جَائِزَة ٱلْحُسَيْنْ بْن عَبْدِ ٱللَّهْ ٱلثَّانِي لِلْعَمَلِ ٱلتَّطَوُّعِيّ
AL HUSSEIN BIN ABDULLAH II AWARD FOR VOLUNTARY WORK

النادي الطبي
Medical Club

General Surgery

Subject: Hashimite University General surgery Topics

Group no: _____

Done by: Maya Al-Hmouze

هَذَا خَلْقُ اللَّهِ فَأَرُونِي مَاذَا خَلَقَ الَّذِينَ مِن دُونِهِ ۚ بَلِ الظَّالِمُونَ فِي ضَلَالٍ مُّبِينٍ

General Surgery

Done by :
Maya hussien Al-hmouze

Hernia

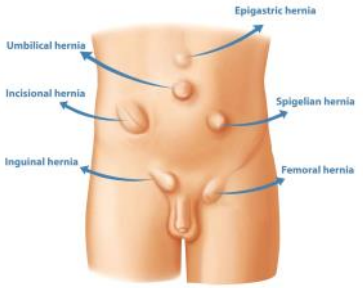
Monday, February 5, 2024 7:36 PM

Definition

Protrusion of a peritoneal sac through a musculoaponeurotic barrier (abdominal wall).

Types

- Inguinal (Direct OR Indirect)
- Femoral
- Umbilical
- Incisional
- Epigastric
- Spigelian



Causes

- Congenital
- Increase in intra-abdominal pressure
  - Straining at defecation or urination (rectal cancer, colon cancer, prostatic enlargement, constipation)
  - Obesity
  - Heavy lifting
  - Pregnancy
  - Chronic cough
  - Ascites
- Weakness of abdominal wall

Contents

- Can be any abdominal viscus except liver
- Fluid
- Omentum
- Intestine

Features of hernia

- Weak spot
- Reduced when lying down
- More prominent with coughing

Symptoms

- Swelling / lump
- Constipation
- N/V
- Pain " if strangulated"
- Urinary symptoms

▶ Complications

- Incarceration (Swollen or fixed within the hernia sac "not reducible ")
  # Reducible: Ability to return the displaced organ or tissue/hernia contents to their usual anatomic site.
- Strangulation (Incarcerated hernia with resulting ischemia & necrosis)
- Intestinal obstruction
  # Complicated hernias present with ?! Tenderness , Fever , Erythema

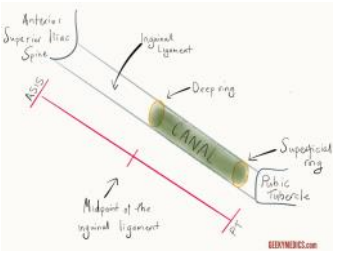
▶ Diagnosis

imaging
- Ultrasound
- Herniography (fluoroscopy following injection of contrast medium)

examination of
- Internal inguinal ring test (reduce the swelling, locate the deep ring and occlude it, asking the patient to cough ⇨ Impulse felt ⇨ Indirect hernia)
- Attempt to reduce the hernia , if cannot the probable identity = femoral > indirect > direct
- Percussion (if hyper resonant & has bowel sound = bowel , if dull & no bowel sound = fat/omentum)

▶ NOTE: what's the location of internal & external inguinal ring?!

Between anterior superior iliac spine and pubic tubercle
- Above Mid -point & medial = Internal " Deep " inguinal ring
- Distal 1/3 & lateral = External "Superficial" inguinal ring



▶ How to deal with reducible hernia " Not emergency"

- Apply ice to incarcerated hernia
- Sedate
- Use the Trendelenburg position for inguinal hernias
- Apply steady gentle manual pressure
- Admit and observe for signs of necrotic bowel after reduction
- Perform surgical herniorrhaphy

▶ Treatment of hernia

- simple herniotomy (sac excision)
- herniorraphy
- herniaplasty

- Laparoscopical herniorrhaphy
  Indication?!
  1-Bilateral inguinal hernia
  2-Recurring hernia
  3-Acute case to resume full activity as soon as possible
- Mc Vay repair (Cooper's ligament sutured to transversus abdominis aponeurosis/conjoint tendon)
- Mesh repair " Lichtenstein"
- Bassini repair (Sutures approximate reflection of inguinal ligament (Poupart's) to the transversus abdominis aponeurosis/ conjoint tendon)

Complications of hernia repair

- Urinary retention
- Foreign body sensation
- Ejaculation disorder
- Infection
- Recurrence
- Testicular atrophy (Thrombosis of spermatic cord veins, usually with indirect hernia)
- Pain after hernia (Due to ilioinguinal nerve compression)
- Loss of cremasteric reflex , Numbness of ipsilateral penis, scrotum, thigh (Due to ilioinguinal nerve injury)

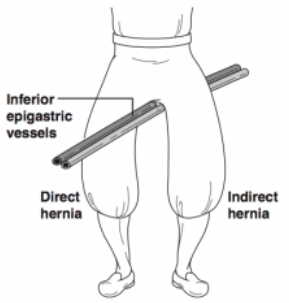
Inguinal hernia

Direct & Indirect inguinal hernia

	Direct hernia	Indirect hernia "Most common"
Location	• Protrudes through HesselBach triangle • Inferior /Medial to epigastric vessels	• Goes through both internal & external inguinal ring • Superior/Lateral to epigastric vessels
Cause	Acquired defect from mechanical breakdown over the years	Patent processus vaginalis" congenital "
Recurrence	Higher	Lower
Age	Older	Younger
Risk of strangulation	Lower	Higher

Pantaloon hernia

Hernia sac exist as both direct and indirect hernia
(two sacs separated by the inferior epigastric vessels)



Sliding hernia

Hernia sac partially formed by the wall of a viscus (i.e., bladder/cecum)

- In females = ovaries OR fallopian tubes
- In males = cecum OR sigmoid

▶ Femoral hernia

- Definition : protrudes below inguinal ligament through femoral canal below & lateral to pubic tubercle .
- Risk factors: female , pregnancy , exertion
- Highest risk of strangulation
- Sac contain mainly omentum
- Treatment: Mc Vay repair , Mesh plug repair

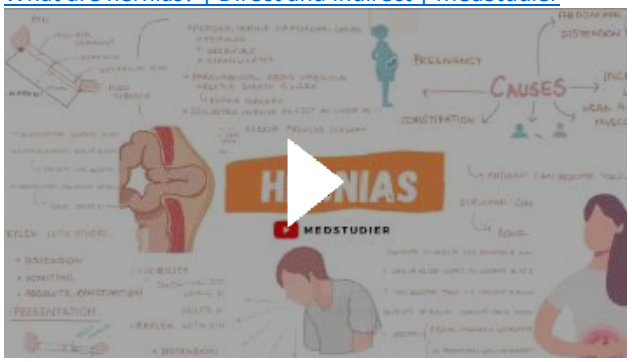
▶ Obturator hernia

- Definition: Hernia through obturator canal " Anterior pelvic"
- Risk factors : Elderly female , previous pregnancy .
- Positive Howship- Romberg sign : Inner thigh pain with internal rotation.

▶ other hernias

- Litter's hernia :Hernia involving a Meckel's diverticulum
- Amyand's hernia : Hernia sac containing a ruptured appendix
- Spigelian hernia : Hernia through the linea semilunaris (or spigelian fascia), also known as spontaneous lateral ventral hernia.
- Incisional hernia : Hernia through an incisional site; most common cause is a wound infection
- Sciatic hernia : Hernia through greater sciatic foramen " Posterior pelvic"
- Umbilical hernia : Hernia through the umbilical ring, in adults associated with ascites, pregnancy, and obesity
- Epigastric hernia : Hernia through the linea alba above the umbilicus .
- Hiatal hernia : Hernia through esophageal hiatus

What are hernias? | Direct and Indirect | MedStudier



Laparoscopic Inguinal Hernia Repair (4k)



Trauma

Wednesday, February 14, 2024 9:08 PM

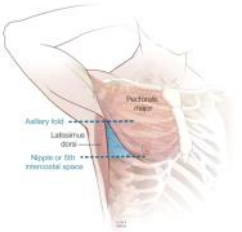
A : Airway & C-spine stabilization

- Goal ?! To secure airway & protect spinal cord
- How do we immobilize the spinal cord?! We use backboard & neck collar &Tape over forehead
- Quickest way to see if the air way is intact or not ?! Ask the Pt to talk
- How to do establish the air way?! 1) clear airway 2)Jaw thrust 3) Nasopharyngeal (for conscious Pt) 4)Oropharyngeal (For unconscious Pt) 5)Endotracheal intubation 6) Cricothyroidotomy (Contraindicated in children)

B : Breathing

- Inspection (Air movement , Tracheal shift , Cyanosis, Jugular venous distention , Asymmetrical chest expansion , Use of accessory muscle, Open chest wound)
- Auscultation for breath sound (inspiratory stridor = airway obstruction , wheeze = asthma/COPD , coarse crackles = pneumonia / pulmonary edema , fine crackles = pulmonary fibrosis)
- Percussion for any dullness(effusion, collapse, consolidation) OR hyperresonance (pneumothorax)
- Palpation for any subcutaneous emphysema OR flial chest
- What are the life threatening conditions that must be diagnosed in this step ?! Tension OR open pneumothorax , Massive hemothorax

Pneumothorax



- Definition : Injury to the lung, resulting in release of air into the pleural space between the normally apposed parietal and visceral pleura
- Symptoms / signs : dyspnea, jugular venous distention, tachypnea, anxiety, pleuritic chest pain, unilateral decreased or absent breath sounds, tracheal shift away from the affected side, hyperresonance on the affected side.
- Treatment of tension pneumothorax : Needle thoracostomy in the second intercostal space midclavicular line, followed by tube thoracostomy placed in the anterior/ midaxillary line in the fifth intercostal space (Safety triangle)
- Treatment of open pneumothorax ?! Initial treatment is occlusive dressing fixed at 3 sides only then definitive treatment is chest tube with under water seal

Flial chest

- Definition : Two separate fractures in three or more consecutive ribs
- Sign : Flail segment of chest wall that moves paradoxically (sucks in with inspiration and pushes out with expiration opposite the rest of the chest wall)
- Treatment : Stabilization with cotton gauze + adhesive bandage , Intubation with positive pressure ventilation

Tracheobronchial disruption

- Definition : Damage to tracheobronchial tree from blunt or penetrating trauma to chest or neck OR Inhalation of fumes OR Aspiration of liquids or objects .
- Symptoms/Signs : Sever subcutaneous emphysema with respiratory comprise , Chest pain , Hamman's crunch (mediastinal friction rub with heart beat) , Hemoptysis .
- Diagnosis: Bronchoscopy (Gold standard) , CXR (see secondary findings : Pneumothorax , Pneumomediastinum)
- Treatment : Oxygenation , Ventilation ,Chest tube

Massive Hemothorax

- Symptoms / signs : Unilaterally decreased or absent breath sounds; dullness to percussion
- Diagnosis : CXR ,CT , Chest tube output
- Treatment : chest tube with under water seal , Volume replacement
  # indication for urgent thoracostomy in hemothorax ?!
  1) >1500 cc of blood on initial placement of chest tube
  2) Persistent >200 cc of bleeding via chest tube per hour x4 hours

Cardiac tamponade

- Definition : Bleeding into the pericardial sac, resulting in constriction of heart, decreasing inflow and resulting in decreased cardiac output
- Symptoms / signs: Tachycardia/shock with Beck's triad(Hypotension + Muffled heart sound + JVD) , pulsus paradoxus, Kussmaul's sign (JVD with inspiration) .
- Diagnosis : Ultrasound
- Treatment : pericardial window

C : Circulation

- Goal ?! secure adequate tissue perfusion & treat any external bleeding
- How to asset the circulation ?! Pulses , Heart rate, blood pressure, peripheral perfusion, urinary output, mental status, capillary refill (normal <2 seconds), exam of skin: cold, clammy =hypovolemia
  # if a radial pulse is palpable, then systolic pressure is at least 80 mm Hg; if a femoral or carotid pulse is palpable, then systolic pressure is at least 60 mm Hg
- How to treat shock?! 2 large IV cannulas with infusion of warm crystalloids saline
- How to treat external bleeding ?! Direct pressure +/-Tourniquet & 1:1:1 ratio (RBCs-Plasma-Platelet)

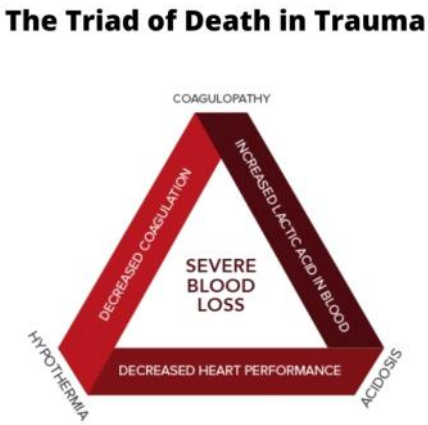
D : Disability

- Goal?! To check for any neurological injury from brain to spinal cord
- How to asses disability ?! Glasgow coma scale , Asses the pupil , Asses motor/ sensory function
  # Glasgow coma scale in normal human?! 15
  # Glasgow coma scale in dead people?! 3
  # Glasgow coma scale in coma/ indication for intubation?! </= 8

E : Exposure & Environment

- Undress the Pt to check for any other injuries BUT avoid hypothermia using log roll method

► Triad of death in trauma and treatment for each



- How to manage Hypothermia ?!

Remove wet clothes , Warm the Pt , Insert warm IV fluid

- How to manage coagulopathy ?!

1:1:1 ratio (RBCs- Plasma - platelet)

- How to manage Acidosis ?!

O2 therapy & IV warm crystalloids

Tracheostomy Procedure with Hanns - YouTube

Flail Chest with Paradoxical Motion | NEJM



Burns

Saturday, February 17, 2024 9:53 PM

Definition

Injury or coagulative necrosis of the skin and other tissues by physical or chemical agents.

Causes

Physical agents

- Thermal
- Electrocution
- Irradiation
- Cold burn
- Friction burn (When a hard object rubs off some of your skin)

Chemical agents

- Alkalis or Acid

Which is more serious , Acid or Alkali burns ?!

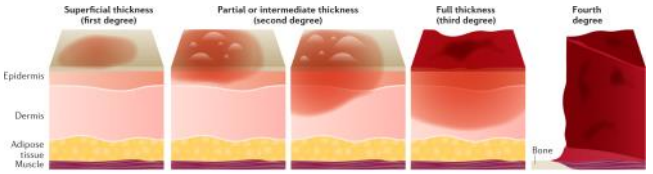
Alkali burns are more serious because the body cannot buffer the alkali, thus allowing them to burn for much longer.

Why are electrical burns so dangerous?!

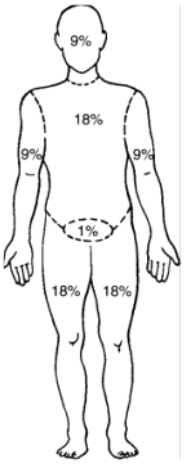
Most of the destruction from electrical burns is internal (cardiac dysrhythmias, myoglobinuria, acidosis, and renal failure are common)
How to treat myoglobinuria?! Hydration with IV fluid , Alkalization of urine with IV bicarbonate , Mannitol diuresis

Level of burns

Level of burn	Site involved	Presentation	Treatment
First - degree burn	Epidermis only (Sunburn)	Painful , Dry ,Red , No blisters	• Keep clean • +/- Neosporin • Pain meds
Second - degree burn	-Superficial partial thickness (The epidermis and superficial part of dermis and heals within 2 weeks) -Deep partial thickness (The epidermis and deep part of dermis heals within 3-4 weeks)	Painful , Hypersensitive , Swollen , Mottled areas , Blisters , Open weeping surface	• Remove blisters (apply antibiotic ointment) • Dressing (Silverlon) • Pain meds
Third - degree burn	All layers of skin (Complete destruction of epidermis & dermis)	Painless - mildly painful , Swollen , Dry, Mottled white area , Eschar. " Dried leather "	• Early Excision of eschar" dead black tissue" • STSG (split thickness skin graft)
Fourth - degree burn	Injury to bone or muscle	Pain to deep pressure , Charred black , Dry with patches of dead skin	• Surgical intervention



▶ How to determine burn severity ?!



TBSA affected (Total Body Surface Area) by rule of nines :

- Each upper limb = 9%
- Each lower limb = 18%
- Anterior & posterior trunk = 18% each
- Head and neck = 9%
- Perineum and genitalia = 1%

➢ Second - degree burn

- > 20 % TBSA

➢ Third - degree burn

- > 10% TBSA with 2 degree burn
- Any burn involving face , hands, feet , perineum
- Any burn with inhalation injury
- Any burn with associated trauma
- Any electrical burn

▶ Parkland formula

V = TBSA burn X weight (kg) X 4

Used to estimate the volume of crystalloid necessary for initial resuscitation ,
Half of calculated volume is given in first 8 h then the rest in the next 16 h

⇒ Minor burn
(Less than 10% in children and 15% in adults of body surface area.)

⇒ Intermediate burn
(Involves 10-30% in children and 15 - 30% in adults)

⇒ Major burn
(Involves more than 30% of total body surface area)

▶ Stages of burns

1. Stage of destruction (thermal injury result in 3 zones)
   - Central zone of coagulation " Contain eschar "
   - Intermediate zone of stasis "Characterized by vasodilation and exudation of plasma on the surface"
   - Outer zone of hyperemia " Contains inflammatory mediators (prostaglandins, histamine & kinins) → oedema and usually recover completely "
2. Stage of inflammation
   (characterized by vasodilation and exudation of plasma on the surface)
3. Stage of healing
   (The rate of healing of burns depends on the density of surviving hair follicles & sweat glands)

▶ Difference between Autograft & Allograft STSG

- Autograft (STSG from the Pt own skin)
- Allograft (STSG from cadaver)

▶ Complications of burns

- Wound infection
  (Increased WBC with left shift , discoloration of burn eschar (most common sign), necrotic skin lesion in unburned skin, edema, ,hypotension)
- Shock
  (loss of fluid from the intravascular space as a result of burn injury, which causes “leaking capillaries” that require crystalloid infusion)
- Pneumonia
  (Patients with greater than 20% TBSA burns usually develop a paralytic ileus → vomiting → aspiration risk → pneumonia)
- GI complications (Ileus & Ulceration)
  (Curling's ulcer " Gastric/duodenal ulcer")
- Renal failure
  (Acute tubular necrosis from hypoperfusion)
- Sepsis
- Marjolin's ulcer (SCC)

▶ Smoke inhalation

▶ Signs

- Smook & soot in sputum , mouth , nose , fascial hair burn
- Carboxyhemoglobin
- Throat/ mouth erythema
- Low O2 saturation
- Loss of consciousness, Dyspnea , confusion , Headache

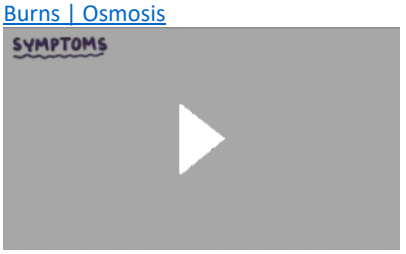
▶ Diagnosis

- Bronchoscopy
- Carboxyhemoglobin levels

▶ Treatment

- 100% O2 until carboxyhemoglobin is ruled out

Burns | Osmosis



Ulcers

Friday, March 1, 2024 9:28 PM

▶ Definition

Wounds or breaks in the skin that do not heal or heal slowly due to underlying pathology (Loss of both epidermis & dermis).

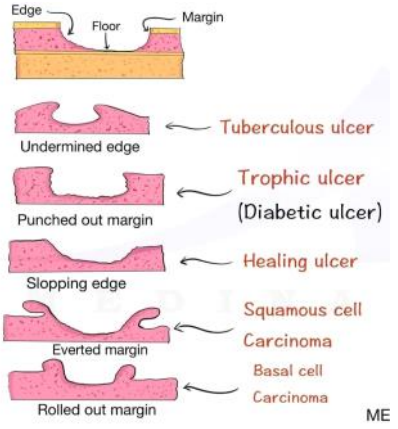
▶ Types

- Venous ulcer
- Arterial ulcer
- Neuropathic ulcer (Diabetic foot)
- Pressure ulcer

	Venous ulcers	Arterial ulcers	Neuropathic ulcer	Pressure ulcer
Cause	Chronic venous insufficiency	Peripheral artery disease (Atherosclerotic stenosis)	Peripheral neuropathy	Prolonged unrelieved pressure (immobility)
Risk factors	• DM • DVT • Pregnancy	• DM • Age • Smoking • Vascular disease • Deformed foot		
Location	Gaiter area(ankle to midcalf) , typically over medial malleolus	Distal toes , Anterior shin, Pressure points, Lateral malleolus	Bony prominences (metatarsal head , heel)	Weightbearing point (sacrum, ischemia, calcaneus)
Appearance	• Irregular borders • Shallow • Exudative	• Symmetric • Well defined • Punched-out appearance • Non-exudative	• Hyperkeratotic edge • Punched out • Undermined borders	Varies from • Non-blanchable erythema • Full-thickness skin loss
Pain	Mild -Moderate "at rest " # Relieved when elevating the leg	Severe "at night " # Worse when elevating the leg	Absent	Present
Associated signs	• Telangiectasis(small, widened blood vessels on the skin) • Varicose veins • Hemosiderin deposition • Lymphedema • Edema • Lymphatic Stasis • Dermatitis (erythematous eczematous patches) • Lipodermatosclerosis (shiny sclerotic appearance)	• Arterial insufficiency • Cold & pale atrophic skin • Hair loss • Absent pulses	• Claw toes • Charcot joints • Absent reflex • Dry scaly foot • Osteomyelitis	• Soft tissue infection • Osteomyelitis

Picture				
				

Ulcers types according to the edge shape



- Sloping (Healing ulcer)
- Punched-out (Syphilis , DM)
- Undermined (TB)
- Rolled out (Basel cell carcinoma)
- Everted (Squamous cell carcinoma)

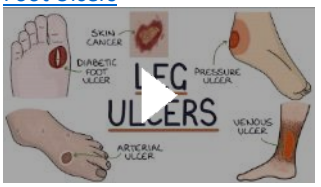
Ulcers types according to the duration

- Acute ulcer (< 2 weeks)
- Chronic ulcer (> 2 weeks)

Diagnosis

- Ankle -Brachial pressure index
- For arterial & venous ulcers
- Doppler
- CT -Angio
- Angiogram & Venogram
- Culture study of the discharge
- Biopsy of the edge or margin of ulcer.

Understanding Leg and Foot Ulcers



Treatment

Treatment of arterial ulcers	Treatment of venous ulcers	Treatment of neuropathic ulcers
• Dressing of ulcer # NO debride to the ulcer, why? 1 because it could result in larger ulcer /ischemia • Surgical revascularization	• Irrigate the wound with warm water & remove dry narcotic tissue "Debridement" • Simple low-adherent dressing like paraffin emollients & replace weekly • Biological dressing provides growth factors for the ulcer healing • Antibiotics (in case of cellulitis or active infection) • Compression therapy • Analgesia	• Well-fitting shoes with good depth • Careful toenail cutting • Regular inspection of foot • Surgical resection of prominent bone • Eradication of infection • Surgical debridement of narcotic ulcers • Amputation

Peripheral arterial disease (Limb ischemia)

Saturday, March 2, 2024 12:46 PM

▶ Definition

Occlusive atherosclerotic disease in the lower extremities which reduce the blood flow to the affected areas
Most common site for arterial atherosclerotic occlusion in lower extremities?!
Occlusion of superficial femoral artery in Hunter's canal

▶ Causes

- Atherosclerosis " most common"
- Thrombus/Emboli
- DM
- Inflammation of the arteries /Infections
- Structural defect
- Injury

▶ Risk factors

- Family history of premature heart attacks or strokes
- Older than 50 years
- Overweight
- Smoking
- Diabetes
- High blood pressure
- High cholesterol

▶ Symptoms/Signs

- Intermittent claudication (pain /cramping of calf -thigh-buttock muscle after walking for specific distance , the pain resolves after stopping for a specific time while standing)
- Rest pain (pain in the foot usually in the distal metatarsals which arises at rest/nigh & awake the pt)
  # What typically resolves the pain?! Hanging the foot over the side of bed or standing "gravity afford some extra flow to the ischemic area"
- Erectile dysfunction
- Sensorimotor impairment
- Tissue loss
- Absent pulses
- Bruits
- Muscular atrophy
- Decrease hair growth
- Capillary refill > 2 sec
- Thick toenails
- Tissue necrosis(gangrene)/ulcers/infection



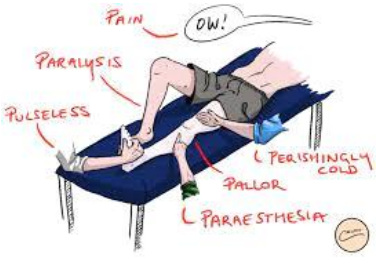
Area affected	Clinical picture
Aortoiliac	• Buttock-thigh-calf claudication • Impotency in men
External iliac	• Mid-thigh claudication
Femoropopliteal	• Calf claudication • +/- Planter claudication
Infra popliteal	• Planter claudication

▶ Leriche syndrome

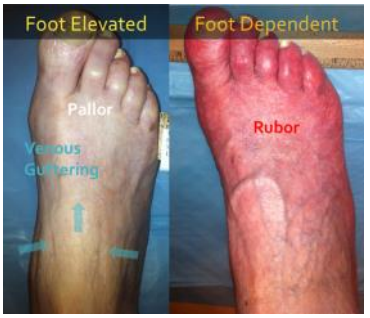
- Definition: it's atheromatous occlusion of distal aorta just above bifurcation
- Symptoms: Bilateral thigh/buttock claudication, Impotence , Absent/diminished femoral pulse
- Treatment: Aorto-bifemoral bypass graft

▶ 6 P's of peripheral vascular disease

- Pain
- Pale
- Paralysis
- Pulseless
- Paresthesia
- Poikilothermia (Perishing cold)



▶ Diagnosis



- Burger's test (Examining the leg after elevation and then in a dependent position. With elevation, the foot turns pale and there can be venous guttering (all the blood has drained out of the veins). When in a dependent position, the foot turns brightly red, called rubor, before returning to a normal pink color)
- Ankle to Brachial index (ABI)
  Normal ABI = 0.9 - 1.3
  Moderate arterial disease ABI = 0.5-0.8
  Rest pain "Severe" ABI = < 0.5
  Gangrene ABI = < 0.3
- Pulse volume recording (PVR)
  Large wave form = good collateral blood flow
- Doppler / Ultrasound
- A-Gram (dye in the vessel & X-ray) "Gold standard"

▶ Leriche Fontaine classification

Grade I	Asymptomatic , Detected by ABI < 0.9
Grade II a	Intermittent claudication , Not limiting the Pt life
Grade II b	Intermittent claudication , Limiting the Pt life
Grade III	Pain or Paresthesia at rest
Grade IV	Established gangrene , Critical ischemia

► Treatment

➢ Treatment of claudication

- Exercise , Smoking cessation , Diet
- Promote vasodilation (Provide warmth to the affected extremities)
- Aspirin+/- Pentoxifylline

➢ Surgical graft bypass

➢ Angioplasty (Balloon dilation)

➢ Endarterectomy (Remove the diseased intima & media)

➢ Surgical patch angioplasty (patch over stenosis)

► Indication for surgery

- Severe claudication that affect the quality of life
- Tissue necrosis
- Infection
- Rest pain

► Dry gangrene Vs Wet gangrene

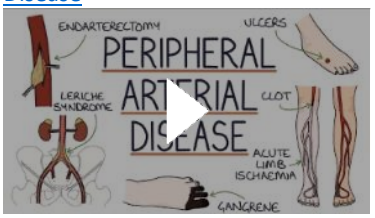
➢ Dry gangrene

- Dry necrosis of tissue without signs of infection
- Limited amputation is sufficient

➢ Wet gangrene

- Moist necrotic tissue with signs of infection
- Higher amputation is often needed

Understanding Peripheral Arterial Disease



Shock

Sunday, February 18, 2024 12:32 AM

▶ Definition

Inadequate tissue perfusion/Oxygenation & delivery of nutrients necessary for normal function

▶ Types

- Hypovolemic /Hemorrhagic
- Cardiogenic
- Septic
- Neurogenic
- Anaphylactic

] Distributive shock " warm shock"

▶ Hemodynamic changes in shock

Shock	Cardiac output (CO)	Systemic vascular resistance (SVR)	Pulmonary capillary wedge pressure (PCWP)	JVB
Cardiogenic	↓	↑	↑	↑
Hypovolemic	↓	↑	↓	↓
Neurogenic	↓	↓	↓	↓
Septic	↑	↓	↑	↓

▶ Signs of shock

- Pale
- Diaphoretic, cool skin
- Hypotension, tachycardia,
- Tachypnea
- Altered Mental status and pulse pressure
- Poor capillary refill
- Poor urine output

▶ Indication of tissue perfusion

- Urine output
- Mental status
- Lactic acid " Elevated "
- ABG "Acidosis "

Initial steps in shock (to stabilize the Pt before determining the cause of shock)

- 2 large cannulas
- Fluid resuscitation (multiple litters of NS)
- Draw blood (CBC, Electrolytes , Renal function , PT/PTT)
- ECG , CXR

Hypovolemic shock

Definition

Decreased intravascular volume (decrease circulatory blood which lead to decrease CO & \preload)

Causes

- Hemorrhage
- Burn
- Dehydration
- Bowel obstruction
- Crush injury
- Pancreatitis

Signs

Early

- Orthostatic hypotension
- Mild tachycardia " Early sign"
- Anxiety
- Diaphoresis
- Vasoconstriction (Decreased pulse pressure with Increased diastolic pressure)
- Cold & clammy skin

Late

- Changed mental status
- Decreased BP
- Marked tachycardia

Classes

Class I	< 15% OR 750 cc blood loss	Mild anxiety , Normal vital signs
Class II	15%-30% OR 750-1500 cc blood loss	Normal systolic BP with decrease pulse pressure , Tachycardia , Tachypnea , Anxiety , Delayed capillary refill.
Class III	30%-40% OR 1500-2000 cc blood loss	Tachycardia , Tachypnea , Decrease systolic BP , Decrease pulse pressure , Confusion , Delayed capillary refill
Class IV	> 40% OR > 2000 cc blood loss	Decrease systolic BP, Tachycardia , Tachypnea , Decrease pulse pressure , Confused & Lethargic , No urine output , No capillary refill

► Treatment

- Stop the bleeding
- IV fluid then Blood product

  # How to evaluate the effectiveness of the treatment ?!
  Urine output, BP, heart rate, mental status, extremity warmth, capillary refill, body temperature pH, and lactate level.
  # We shouldn't use Vasopressors in treating hypovolemic shock.

► What type of patient does not mount a normal tachycardiac response to hypovolemic shock?

- Patients on B-blockers
- Spinal shock (loss of sympathetic tone)
- Athletes

► Septic shock

► Definition

Documented infection and hypotension
Most common cause ?! Gram negative septicemia
Common complications?! Multiple organ failure, DIC, death

► Risk factors

- Trauma
- Immunosuppression,
- Corticosteroids
- Hematologic disease
- Diabetes

► Symptoms / Signs

➢ Initial
- Vasodilation(resulting in warm skin and full pulses)
- Normal urine output

➢ Delayed
- Vasoconstriction
- Poor urine output
- Mental status changes
- Hypotension

➢ Associated features (SIRS= systemic inflammatory response syndrome)
- Fever
- Hyperventilation
- Tachycardia
- Increased WBC

Diagnosis

- Early
  - Hyperglycemia/ glycosuria
  - Respiratory alkalosis
  - Hemoconcentration
  - Leukopenia
- Late
  - Leukocytosis
  - Acidosis
  - Elevated lactic acid
- Identifying organism

Treatment

1. Volume (IV F)
2. Antibiotics (empiric, then by cultures)
3. Drainage of infection

Cardiogenic shock /obstructive shock

Definition

Cardiac insufficiency; left ventricular failure (usually), resulting in inadequate tissue perfusion
Occur in 2 ways: 1- Extrinsic compression(obstructive) " ↓ venous return &CO"
2- Myocardia injury " inadequate contraction &↓ CO"

Causes

- MI
- Papillary muscle dysfunction
- Massive cardiac contusion
- Cardiac tamponade
- Tension pneumothorax
- Cardiac valve failure

Symptoms /Signs

- Dyspnea
- Cold & clammy skin
- Rales
- Pulsus alternans (increased pulse with greater filling following a weak pulse)
- Loud pulmonic component of S2
- Gallop rhythm
- Hypotension
- Decreased cardiac output
- Elevated CVP/wedge pressure
- Decreased urine output (low renal blood flow)

Diagnosis

- CXR (Pulmonary edema)
- ECG/ Echo

Treatment

➢ CHF
- Diuretics
- Afterload reduction (e.g., ACE inhibitors) with or without pressors

➢ Left ventricular failure (MI)
- Vasopressors (Dopamine , Norepinephrine)
- Afterload reduction (Nitroglycerin , Nitroprusside)

➢ Last resort support mechanism
- Intra-aortic balloon pump (IABP)
- Ventricular assist device (VAD)

Neurogenic shock

Definition

Inadequate tissue perfusion from loss of sympathetic vasoconstrictive tone.

Causes

Spinal cord injury :
- Complete transection of spinal cord
- Partial cord injury with spinal shock
- Spinal anesthesia

Symptoms / Signs

- Hypotension (Loss of sympathetic tone)
- Bradycardia
- Warm & dry skin
- Neurologic deficit

Treatment

- IV fluid
  # vasopressors reserved for hypotension refractory to fluid resuscitation
- Supine OR Trendelenburg position

Spinal cord shock

- Definition : Complete flaccid paralysis immediately following spinal cord injury; may or may not be associated with circulatory shock
- Classical findings: Hypotension ,Bradycardia (lack of compensatory tachycardia)

Anaphylactic shock

Definition

A rapid and severe allergic reaction that can lead to swelling of the airways, difficulty breathing, and a drop in blood pressure.

Symptoms

- Hypotension
- Tachycardia
- Cough
- Dyspnea
- Pruritus
- Urticaria
- Restlessness

Treatment

BASE

- Benadryl
- Aminophylline
- Steroids
- Epinephrine

Shock | Clinical Presentation



Surgical complications

Thursday, February 29, 2024 9:40 AM

Classical sign of infection / inflammation

- Swelling /Edema
- Calor (Heat)
- Dolar (Pain)
- Rubor (Redness / Erythema)

Wound seroma



- Definition : Collection of lymph and serum in the operative wound.
- No erythema , No tenderness
- Treatment : Needle aspiration

Wound hematoma



- Definition : Collection of blood (blood clot) in operative wound.
- Presentation : Discoloration of the wound edges (purple/blue), blood leaking through sutures
- Treatment : Remove with hemostasis

Wound infection



- Symptoms/Signs: Erythema, swelling, pain, heat
- Classification:

1- Clean "Hernia" (2% infection rate) , No antibiotics
2- Clean-contaminated (3-5% infection rate), Prophylactic antibiotics
3- Contaminated (5-10% infection rate), Prophylactic antibiotics
4- Dirty "Abscess" (30% infection rate) , Therapeutic antibiotics

- Treatment : leave open with wet to dry dressing changes, antibiotics
- Organisms:

➢ Group A β-hemolytic streptococcal gangrene (Following penetrating wound)
➢ Clostridial myonecrosis (postoperative abdominal wound)
➢ Necrotizing fasciitis

Disseminated intravascular coagulation (DIC)

- Definition: Activation of the coagulation cascade leading to thrombosis and consumption of clotting factors and platelets and activation of fibrinolytic system (fibrinolysis), resulting in bleeding.
- Causes : Tissue necrosis, Septic shock, Allergic reactions, Massive blood transfusion reaction, Cancer, Snake bites, Trauma, Burn injury, Liver dysfunction.
- Symptoms/Signs : Acrocyanosis , Bleeding from incision site
- Diagnosis : Increased fibrin degradation products, Elevated PT/PTT, Decreased platelets, Decreased fibrinogen , Presence of schistocytes (fragmented RBCs), Increased D-dimer.
- Treatment : supportive (IVFs, O2, platelets, FFP, cryoprecipitate (fibrin)) , Heparin +Antithrombin III

Complication of thermal regulation

Hypothermia

- Definition : Drop in temperature by 2 c

- When the temp is below 35 c = Coagulopathy , Platelet dysfunction
- Risks : 1) 3x risk increase of cardiac events
  2) 3x risk of superficial site infection
  3) Increase risk of blood loss & transfusion requirement

► Malignant hyperthermia

- Autosomal dominant
- Presentation : Fever , Tachycardia , Rigidity , Cyanosis
- Treatment : Dantrolene

► Pulmonary complication

► Atelectasis

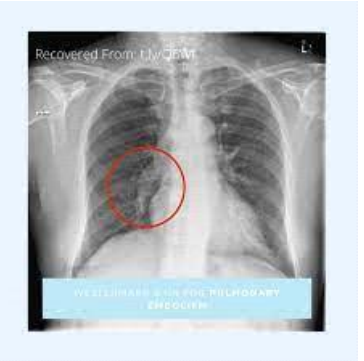
- Definition: Collapse of the alveoli
- Signs: Fever , Decrease breath sound with Rales , Tachypnea , Tachycardia , Increase density in CXR .
- What is the prophylactic measure ?! Preoperative smoking cessation , Incentive spirometry
- Treatment : Postoperative incentive spirometry , Deep breathing, Coughing , NT suctioning , Chest PT.

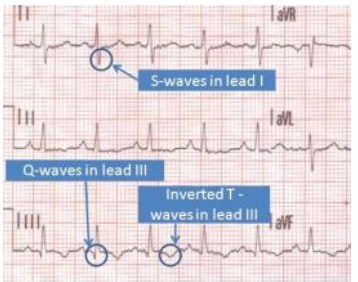
► Postoperative respiratory failure

- Definition : Respiratory impairment with increased respiratory rate , SOB, Dyspnea.
- Diagnosis : ABG , CXR , ECG , Pulse oximetry , Auscultation.
- Treatment : Supplement O2 , Chest PT , Suctioning , Intubation , Ventilation.
  # Indication for intubation & ventilation?!

1. Unconscious (can't protect his airway).
2. Progressive hypoxemia (PaO2 <55 despite O2 supplement)
3. Progressive acidosis (PH<7.3 ,Pco2 >50)
4. RR >35

► Pulmonary embolism





- Definition: DVT that embolizes to pulmonary arterial system .
- Symptoms /Signs of DVT: Lower extremity pain , Swelling , Tenderness, Homan's sign (Calf pain with dorsiflexion of the foot)
- Diagnosis of DVT: Duplex ultrasonography
- Symptoms / Signs of PE: SOB, Tachypnea, Hypotension, Cerebral palsy, Fever, Loud pulmonic S2, Hemoptysis with pulmonary infraction.
- Diagnosis of PE: CT angiogram , ABG (decrease PO2 &PCO2 from hyperventilation), CXR (1- westermark's sign " wedge shape area of decreased pulmonary vasculature resulting in hyperlucency " 2- opacity with base at pleural edge from pulmonary infraction.) ,ECG (cor pulmonale "S1Q3T3 RBBB &Rt axis deviation" , Flipped T wave or ST depression)
- Treatment :

- Stable Pt = Anticoagulants (heparin followed by 3-6m coumadin) , IVC filter (metallic filter placed into IVC through jugular vein to catch emboli before lodging the pulmonary artery).
- Unstable Pt = Thrombolytic therapy , Trendelenburg operation (pulmonary artery embolectomy)

► Aspiration pneumonia

- Definition: Pneumonia following aspiration of vomitus.
- Symptoms/Signs: Respiratory failure, Cerebral palsy ,Increase sputum production, Fever , Cough , Mental status change, Tachycardia , Cyanosis, Infiltrates on CXR

- Treatment: Bronchoscopy , Antibiotics in case of pneumonia development , Intubation in case for RS failure , Ventilation+ PEEP "Positive end-expiratory pressure" in case of ARDS development .
  # Mendelson syndrome : it's chemical pneumonitis 2 to aspiration of stomach contacts "gastric acid".

Cardiovascular complication

Myocardial infraction (MI)

- Risk factors: History of MI/angina, QS on ECG, S3, JVD, CHF, Aortic stenosis, Advance age, MI within 6m.
- How does the postoperative MI presents ?! Often No chest pain , New onset CHF, New onset cardiac dysrhythmia, Hypotension, Tachypnea, N/V, Bradycardia, Neck/arm pain.
- ECG findings: Flipped T wave, St elevation/depression , Dysrhythmia
- Diagnosis : ECG, Lap(Troponin 1, CK-MB fraction)
- Treatment : (BEMOAN) BEta-blocker , Morphine , Oxygen , Aspirin , Nitrates

Postoperative CVA" Cerebro vascular accident (stroke)"

- Symptoms/Signs: Aphasia , Motor/sensory defect(usually lateralizing).
- Diagnosis: Head CT (rule out hemorrhage if anticoagulant is going to be used), Carotid doppler U/S.
- Treatment: ASA+/- Heparin
- Prevention: Avoid hypotension, Continue aspirin in high risk Pt.

Renal complications

Postoperative renal failure

- Definition : Increase in serum creatinine and decrease in creatinine clearance; usually associated with decreased urine output.
- Diagnosis : Electrolytes , BUN , Urine analysis, Cr , Renal ultrasound , FENa (fractional excretion of NA+)
- Indication for dialysis : AEIOU (Acidosis , Electrolytes abnormality , Intoxication , Volume overload , Uremic complication)

Urinary retention

- Definition : Enlarged urinary bladder resulting from medications or spinal anesthesia
- Classical sign of urinary retention in elderly : Confusion
- Diagnosis : Palpable bladder on physical exam , bladder residual volume upon placement of a Foley catheter
- Treatment : Foley catheter

Gastrointestinal complication

Postoperative ileus

- Definition : Lack of function without evidence of obstruction
- Diagnosis : KUB (Dilation throughout with air in colon & rectum)

Small bowel obstruction

- Diagnosis : Air -fluid level , No air in colon or rectum

► Pseudomembranous colitis

- Definition : Superinfection with C difficile due to alteration in normal flora
- Symptoms / signs : Diarrhea, Fever , Hypotension /Tachycardia
- Diagnosis : C, difficile toxin in stool , Fecal WBCs , Flex sign (mucous pseudomembrane visible in the lumen of colon)
- Treatment: Flagyl (PO or IV) , PO vancomycin , Emergent colectomy "in case of toxic megacolon"

► Abdominal compartment syndrome





- Definition : Increased intra-abdominal pressure usually seen after laparotomy or a after massive IVF resuscitation (e.g., burn patients).
- Symptoms / Signs: Tight distended abdomen, decreased urine output, increased air way pressure, increased intra-abdominal pressure.

How to measure intra- abdominal pressure ?! Read intra bladder pressure (Foley catheter hooked up to manometry after instillation of 50–100 cc of water)

What's the normal intra-abdominal pressure?! <15 mmHg

- Treatment : Release the pressure by placing drain and/ or decompressive laparotomy (leaving fascia open)

What is Bogata Bag ?! Sheet of plastic used to temporarily close the abdomen to allow for more intra- abdominal volume.

► Gastric dilation

- Risk factors: Abdominal surgery, Gastric outlet obstruction, Splenectomy, Narcotics .
- Symptoms/Signs: Abdominal distension, Hiccups, Nausea, Electrolytes abnormalities.
- Treatment: NGT decompression.

► Postoperative pancreatitis

- Definition: Pancreatitis due to manipulation of pancreas during surgery OR low blood flow during procedure, Gallstone, Hypercalcemia, Medications.
- Diagnosis: Lab (Amylase & Lipase)
- Treatment: NPO, Aggressive fluid resuscitation+/- NGT PRN.

► Constipation

- Causes : Narcotics, Immobility
- Treatment: OBR (ortho bowel routine) " docusate sodium daily "

► Short bowel syndrome

- Definition: Malabsorption & diarrhea due to extensive bowel resection (< 200 cm of small bowel remaining)
- Treatment: TPN initially , small meal chronically

► Blind loop syndrome

- Definition: Bacterial overgrowth in small intestine
- Causes: Anything that disrupt normal flora

  # Surgical causes of B12 deficiency?! Blind loop syndrome, Gastrectomy (decrease secretion of intrinsic factor), Excision of terminal ileum (site for B12 absorption)

Dumping syndrome

- Definition : Delivery of hyperosmotic chyme to small intestine causing massive fluid shift into the bowel
- Causes: any procedure bypasses the pylorus or compromises its function
- Symptoms/Signs: Postprandial diaphoresis, Tachycardia , Abdominal pain/distention, Emesis, Increase flatus, Dizziness, Weakness.
- Treatment: Small-multiple-low fat/carbohydrates meals "high in protein", Surgery

GI bleeding
Ischemia colitis
Anastomotic leak
Enterocutaneous fistula

Endocrine complication

Diabetic ketoacidosis (DKA)

- Definition: Deficiency of body insulin resulting in hyperglycemia , formation of ketoacids , osmotic diuresis &metabolic acidosis,
- Signs: Polyuria, Tachypnea, Dehydration, Confusion, Abdominal pain.
- Treatment : Insulin drip, IVF rehydration, K+ supplementation +/- IV bicarbonate
  # We have to monitor Potassium & Hypokalemia closely in DKA.

Addisonian crisis

- Definition: Acute adrenal insufficiency in the face of stressor (surgery -trauma-infection)
- Causes: Postoperative , Inadequate cortisol release usually from steroid administration in the past year.
- Symptoms/Signs: Tachycardia, N/V, Diarrhea, Abdominal pain+/-fever, Progressive lethargy, Hypotension, Hypovolemic shock.
- Diagnosis: Lab (decrease Na+, increase K+ 2 to decrease aldosterone).
- Treatment: IVFs , Hydrocortisone IV, Fludrocortisone PO.

SIADH (syndrome of inappropriate antidiuretic hormone)

- What does ADH do?1 ADH increase NaCl &H2O resorption in kidney which increase intravascular volume
- Where does ADH come from?! It's released from posterior pituitary
- Causes: Mainly lung/CNS (CNS trauma, Lung cancer, pancreatic cancer, duodenal cancer, Pneumonia/lung abscess, Increase PEEP, Stroke m General anesthesia, Morphine , Postoperative
- Diagnosis: Lab(low sodium, low chloride, low serum osmolality, Increase urine osmolality)
- Treatment: Treat the cause & restrict fluid intake.

► Diabetes insipidus (DI)

- Definition: failure of ADH renal fluid conservation resulting in dilute urine in large amount
- Types: 1- Central (neurogenic) DI = decrease production of ADH
  2- Nephrogenic DI = decrease effect of ADH on kidney
- Causes of central DI: Brain injury /tumor/surgery /infection
- Causes of nephrogenic DI: Amphotericin B, Hypercalcemia, Chronia kidney infection.
- Diagnosis : Lab (hypernatremia, decrease urine sodium, decrease urine osmolality, increase serum osmolality)
- Treatment: Fluid replacement , Vasopressin for central DI, Thiazide diuretics for nephrogenic DI.

► Neurological complication

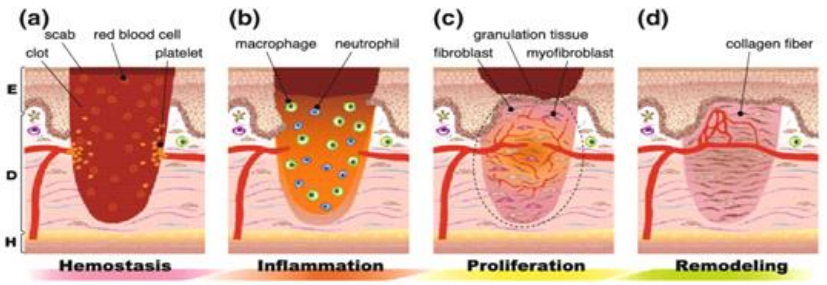
► Delirium - Dementia - Psychosis
► Seizure disorders
► Stroke & TIA

Wound healing

Thursday, March 14, 2024 11:32 PM

▶ Phases of wound healing

Phase of wound healing	Time	Effector cells	Characteristics
Hemostasis phase	Immediately after injury	• Platelets • Clotting factors	→ Vasoconstriction → Platelet aggregation → Platelet plug formation → Coagulation activation
Inflammatory phase	1-6 days after wound	• Platelets • Neutrophils • macrophages	→ Clot formation → Increase vessel permeability & VD → Neutrophils migration into tissue → Macrophages clear debris 2 days later → Chemotaxis → Cellular response ** Neutrophils (24-48h) ** Macrophages (48-96h) ** Lymphocytes (5-7days)
Proliferative phase	4 day- 3week after wound	• Fibroblast/ myofibroblast • Endothelial cells • Keratinocytes • Macrophages	→ Deposition of granulation tissue & type III collagen → Angiogenesis → Epithelial cell proliferation → Dissolution of clot → Wound contraction by myofibroblast # this phase would be delayed in case of Vit C & copper deficiency
Remodeling phase	1 week- 1 year after wound	Fibroblast	→ Type I collagen replaces Type III collagen → Increase tensile strength of tissue → Collagenases break down type III collagen " which require zinc to function" # Zinc deficiency will delay wound healing



▶ Factors Affecting Wound Healing

- Age
- Genetic (Osteogenesis imperfecta (type I collagen defect), Ehlers - Danlos syndrome (collagen disorders) , Marfan's syndrome (fibrillin defect))
- Systemic Health (DM)
- Vitamins (Vit C, Zinc, Iron)
- Drugs(cytotoxic drugs " 5FU, Methotrexate, Cyclosporine" , Steroids)
  # What reverse the effect of steroids on wound healing?! Vitamin A

▶ Essential for wound healing

- Moist environment
- Oxygen delivery (fluids, no smoking, supplement oxygen, arterial vascularization)
- Avoid edema
- Remove necrotic tissue

▶ Types of wound healing

- ➢ Primary wound healing (suture wounds close immediately)
- ➢ Secondary wound healing (wounds are left open & heals over time without sutures " heals by granulation, contraction, epithelization over weeks " it will leave a large scars)
- ➢ Delayed primary wound healing (suture wound closed 3-5 days after incision)

▶ Negative pressure wound therapy " Wound vac"

- ➢ Definition: Occlusive dressing with sponge & negative pressure system used to accelerate wound healing in acute & chronic wounds.
- ➢ Components: Negative pressure unit + Occlusive dressing + Foam sponge
- ➢ Advantages:
  - Draws wound edges together
  - Remove exudate & infectious material
  - Reduces edema
  - Promotes perfusion
  - Facilitates formation of granulation tissue

▶ Dakin solution

- ➢ It's dilute sodium hypochlorite (Bleach) , used on contaminated wounds

Wound Healing - Stages of healing and pathology

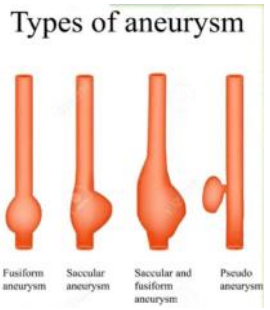


Arterial vascular diseases

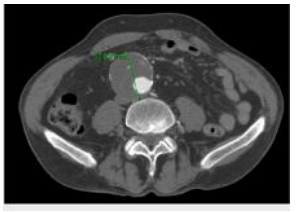
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Type of aneurysm	Indication for surgical repair (Size of aneurysm)
Thoracic aorta	>6.5 cm
Abdominal aorta	>5.5 cm
Iliac artery	>4 cm
Femoral artery	>2.5 cm
Popliteal artery	>2 cm

► Abdominal aortic aneurysm (AAA)









- Definition: Abnormal dilation of abdominal aorta (X2), forming true aneurysm.
- Causes: atherosclerosis, infection (syphilis, E.coli, Salmonella) and trauma, genetic (Marfan's syndrome, Ehlers- Danlos syndrome).
- Types of aneurysm according to layers involved :
  - → True aneurysm: Dilation of all three layers of the vessel (Intima, Media, Adventitia)
  - → False aneurysm (pseudoaneurysm): Dilation of artery not involving all three layers
- Types of aneurysm according to morphology:
  - → Fusiform
  - → Saccular
- Risk factors: Male, Atherosclerosis, HTN, Smoking, Advance age, Connective tissue disease.
- Most common cause: Atherosclerosis
- Most common location: Infrarenal
- Symptoms: Asymptomatic, Epigastric discomfort, Back & abdominal pain, Bruit
- Risk factor for rupture: Increase aneurysm diameter, COPD, HTN, Recent rapid expansion,
- Symptoms of rupture : Triad (Abdominal pain + Pulsatile abdominal mass + Hypotension) , Loud bruit,
- Diagnosis: Ultrasound, Contrast CT scan, A-gram (to asses lumen patency & iliac/renal involvement)
- Treatment: Endovascular aneurysm repair "EVAR" (repair of AAA by femoral catheter placed stents), open elective surgery (transabdominal)
- Indication for surgical repair: AAA >5.5 cm in diameter, Rupture of AAA, Rapid growth, Embolization of plaque.
- Postoperative complication of open surgery : Cardiac ischemia/infraction, atelectasis and lower lobe consolidation, Colonic ischemia, Renal failure, sexual dysfunction and spinal cord ischemia.
- Postoperative complication of EVAR: Endoleak, Graft migration, Graft limb occlusion.

Understanding Abdominal Aortic Aneurysms

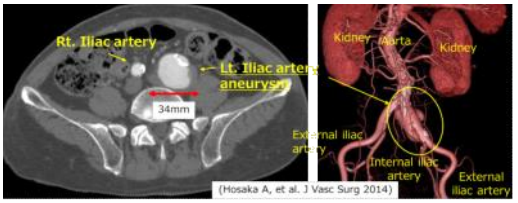


► Popliteal aneurysm



- Definition: Aneurysm of popliteal artery caused by atherosclerosis & rarely bacterial infection
- Symptoms: swelling behind the knee, Leg pain
- Diagnosis: Physical exam, Ultrasound, A-gram
  # Always examine the contralateral popliteal artery because 50% of Pt will have contralateral popliteal artery aneurysm.
  # Always examine the rest of arteria tree especially the abdominal aorta because 75% of Pt will have aneurysm else where
- Treatment: Exclusion & bypass
- Indication for surgery: > 2cm in diameter

► Iliac aneurysm



- Occur with Aortic aneurysm & rarely on its own.
- Treatment: open surgery (inlay graft) , some iliac aneurysms may be suitable for endovascular repair.

► Acute arterial occlusion



- Definition: Acute occlusion of an artery caused by embolization, or by acute thrombosis of an atheromatous lesion or vascular injury.
  # Source of emboli ?! Heart (clot from A-fib, after MI, Endocarditis, Myxoma) , Aneurysm, Atheromatous plaque
- Most common site of acute arterial occlusion from emboli ?! Common femoral artery
- Most common site of arterial occlusion from atherosclerosis?! Superior femoral artery
- Symptoms/Signs: 6P's (Pain, Paralysis, Pallor, Paresthesia, Poikilothermia , Pulselessness)
  # Describe the pain?! Acute onset (the Pt can tell you exactly when & where it happened)



- Diagnosis: A-gram, ECG(look for MI, A-fib), ECHO (look for MI, valve vegetation)
- Treatment: Anticoagulant + IV heparin , A-gram , Surgical embolectomy (via cutdown & Fogarty ballon)
  # Fogarty ballon catheter: Catheter with a ballon tip that can be inflated with saline , after inflation we pull the catheter out and it will bring the embolus with it.
- Postoperative complication after reperfusion of a limb: Compartment syndrome, Hyperkalemia, Renal failure (from myoglobinuria), MI



⇒ Compartment syndrome:

- Definition: Leg (calf) is separated into compartments by unyielding fascia, tissue swelling from reperfusion can increase the intercompartment pressure.
- Symptoms/Signs: Pain(after passive flexion/extension of the foot), Paralysis, Paresthesia, Pallor , Pulse is present (because systolic BP is much higher than the minimal 30 mmHg needed for the syndrome)
- Diagnosis: Compartment pressure measurement
- Treatment: Opening compartment via bilateral calf incision fasciotomies of all four calf compartment.

Venous & lymphatic disorders

Friday, March 15, 2024 9:30 PM

► Varicose veins



- Definition: abnormally dilated, elongated, tortuous superficial veins of the lower limb
- Risk factors: Smoking, Obesity, Female, Old age, OCP, Prolonged standing
- Causes: Primary (Congenital weakness of wall of veins [familial], Valvular incompetence in the veins of the lower limbs) Secondary (previous DVT, pelvic tumor, Pregnancy, Congenital venous malformation [Klippel– Trenaunay syndrome])
- Symptoms: Bulging, bluish veins, Itching or burning discomfort around the veins, Skin color changes around the veins, Swelling in the legs, Aching pain in the legs, feeling of heaviness in the legs and feet, Nighttime leg cramps
- Stages:

Stage 1	spider veins(1-1.5 mm , red , purple or pink) or reticular veins (2 mm , green blue or purple)
Stage 2	varicose veins(more than 2.5 mm , elevated above the level of skin , dark blue or purple)
Stage 3	edema
Stage 4	pigmentation or eczema & liposclerosis
Stage 5	active venous ulcer



- Complication: Edema, Hemorrhage, Pigmentation, Superficial thrombophlebitis, Venous ulcer
- Diagnosis: Duplex ultrasound, Tap test (applying pressure to saphenofemoral junction & tap the varicose vein to feel thrill), Cough test(applying pressure to saphenofemoral junction & ask pt to cough to feel thrill), Trendelenburg test (Ask the patient to lie down& Elevate the leg then apply tourniquet & ask the pt to stand up if varicose veins appear the incompetent valve is below the tourniquet), Perthes test (The leg is elevated and the veins are emptied then tourniquet is applied to the upper thigh to constrict the saphenous vein return flow then The patient then walks around the room for five minutes if veins dilated means the deep veins are affected)
- Treatment: Elevation, Compression, Sclerotherapy, Surgery(ligation & stripping, Endothermal ablation, phlebectomy)
  # Sclerosing agents: sodium tetradecyl sulfate, hypertonic saline, polidocanol

► Deep venous thrombosis (DVT)





- Definition: Clot formed in the pelvic or lower extremity veins.
- Common location: In the venous sinuses in the calf muscles or ilio- femoral veins
- Risk factors for thrombosis: Virchow's triad (Stasis + endothelial injury + Hypercoagulable state)
  - Stasis (Immobility, CHF, Obesity)
  - Endothelial injury (Trauma, Surgery, Recent fracture, Previous DVT)
  - Hypercoagulable state(Pregnancy, Smoking, OCP, Malignancy, Burns)
- Symptoms/Signs: Lower extremity pain, Swelling, Dilated superficial veins, Redness, Warmth Tenderness, Homan's sign(calf pain with dorsiflexion), Pulmonary embolism
- Complications: Venous gangrene, PE, Post-phlebitis syndrome (Chronic leg pain, oedema, skin complications & secondary varicose veins),
- Diagnosis: Duplex ultrasonography, D-dimer
- Wills score: "SHIT PMH"
  - Symptoms of DVT = 3
  - History of DVT/PE = 1.5
  - Immobilization = 1.5
  - Tachycardia >100 = 1.5
  - Post-op surgery = 1.5
  - Malignancy = 1
  - Hemoptysis = 1

DVT/PE likely > 4 points unlikely </= 4

- Treatment: unfractionated heparin or low molecular weight heparin" Enoxaparin" (for prophylaxis & acute management) , Anticoagulation, Thrombolytic (fibrinolytic) therapy , IVC filter, post-op warfarin , Venous thrombectomy
- The level of oedema is diagnostic for the level of venous occlusion :

Calf veins thrombosis	Edema affects the foot and ankle
Femoral-popliteal thrombosis	Edema reaches up to the level of lower 1/3 of the thigh
Ilio-femoral thrombosis	Massive oedema affecting the whole lower limb
IVC thrombosis	Edema affects both lower limbs

Lymphedema



- Definition: Tissue swelling caused by accumulation of protein-rich fluid that's usually drained through lymphatic system , and caused by chronic lymphatic obstruction.
- Causes:

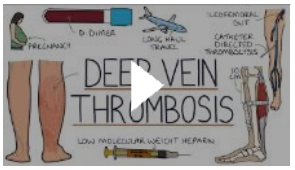
→ Primary lymphedema (Aplasia or hypoplasia, Congenital dilatation and tortuosity, Milroy's disease)

→ Secondary lymphedema (Traumatic" block dissection of inguinal & axillary LN in radical vulvectomy or mastectomy ", Inflammatory, Neoplastic)

- Stages:
  - Stage 0 = Asymptomatic
  - Stage 1 = Soft, pitting edema
  - Stage 2 = Fibrosis and non-pitting edema
  - Stage 3 = Elephantiasis (severe edema, Fibrosis, Skin changes)
- Symptoms: swelling of the limb, feeling of heaviness or tightness, Huge& thick skin(in late stages), fever & rigor (in streptococcal lymphangitis)
- Complication: recurrent cellulitis & lymphangitis, formation of bullae, Lymphangiosarcoma.
- Diagnosis: Lymphoscintigraphy, MRI with contrast, LN biopsy, Doppler ultrasound
- Treatment: Leg elevation, Compression, Antibiotics for infection, Surgery (Lymphatic-venous anastomosis, Excisional operations, Vascularized lymph node transfer)



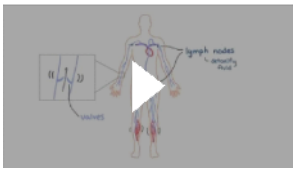
Understanding Deep Vein Thrombosis (DVT)



Understanding Varicose Veins



Lymphedema Explained



Skin lesions

Saturday, March 2, 2024 4:37 PM

Epidermal inclusion cyst



Benign subcutaneous cyst filled with epidermal cell & waxy material , should be removed surgically.

Sebaceous cyst



Benign subcutaneous cyst filled with sebum (Waxy) from blocked sweat gland , it can become infected , should be removed with a small renge of skin including the blocked glands.

Actinic keratosis



Premalignant skin lesion from sun exposure seen as scaly skin lesion , surgical removal eliminates 20% risk of cancer transformation.

Seborrheic keratosis



Benign pigmented lesion in elderly appear stuck on treated by excision , curettage or topical agents.
Leser-Trelat sign : rapid onset of multiple seborrheic keratosis which indicates possible malignancy

Types of cancer

- Basel cell carcinoma (most common)
- Squamous cell carcinoma
- Melanoma (most fatal)

Basal cell carcinoma



- Definition: Carcinoma arising in the germinating basal cell layer of epithelial cells. With low risk of metastasis.
- Risk factors: Sun exposure, Fair skin, Radiation, Chronic dermatitis, Xeroderma pigmentosum.
- Most common sites: Head , Neck , Hands, Above upper lip
- Symptoms/Signs: Slow growing skin mass(chronic ,scaly), Scab , Ulceration+/- Pigmentation (Pearl like) , 3P's (Pearly , Pink, Papule)
- Diagnosis: Excisional or incisional biopsy
- Treatment: Resection with 5mm margins

► Squamous cell carcinoma



- Definition: Carcinoma arising from epidermal cell
- Most common site: Head, Neck , Hands , Below lower lip
- Risk factors: Sun exposure, Pale skin, Chronic inflammatory process, Immunosuppression , Xeroderma pigmentation, Arsenic.
- Symptoms/Signs: Raised, slightly pigmented skin lesion , Ulceration/Exudate, Chronic scab , Itching
- Diagnosis: Small lesion = Excisional biopsy
  Large lesion = Incisional biopsy
- Treatment : Small lesion(< 1 cm)= Excise with 0.5 cm margin
  Large lesion (> 1 cm) = Resect with 1-2 cm margin +/- skin graft
  # Marjolin's ulcer : SCC arising in chronic inflammation/ wound or scars
  # Bowen's disease: SCC in situe

► Melanoma

- Definition: Neoplastic disorder produced by malignant transformation of melanocytes (which are derived from neural crest cell in basal layer of epidermis)
- Tumor marker: S-100
- Most common sites: Skin, Eyes, Anus
  # Most common site in men ?! Back # Most common site in women?! Legs
- Risk factors: White pt with blond/red hair, Fair skin, Freckling, History of blistering sun burn , Blue/green eyes, Actinic keratosis, Atypical/large congenital nevi.
- Characteristics : Pigmented , Irregular borders & surface & coloration , Darkening of pigmented lesion , Recent/ Rapid enlargement , Erosion or ulceration , Pruritus
- ABCDEs of melanoma: Asymmetry , Border irregularity, Color variation, Diameter > 6mm / Dark lesion , Elevation
- Histological Types :
  - Superficial spreading melanoma : most common , occur in exposed & non-exposed sun areas
  - Lentigo maligna melanoma: least aggressive , Superficial malignant cells in elderly head or neck
  - Acral lentiginous melanoma: most common in African American , occur on palms, subungual area , mucosal membrane
  - Nodular melanoma: most aggressive , dark vertical growth direction lesion
  - Amelanotic melanoma: melanoma from melanocytes but with lack of pigment
- Most common site for metastasis: local = Nodes , Distant = Lung, bone, heart, small bowel , brain
- Diagnosis: Excisional/ Incisional biopsy
- Treatment: Amputation/Resection + lymphadenectomy (in case of palpable LN metastasis)

Skin Cancer, Causes, Signs and Symptoms, Diagnosis and Treatment.

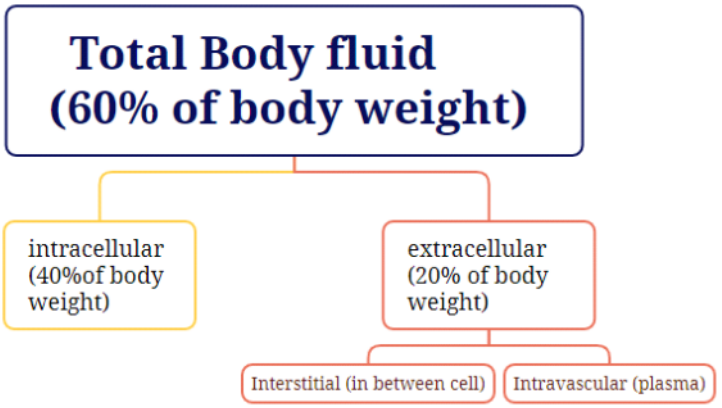




Fluid & Electrolytes

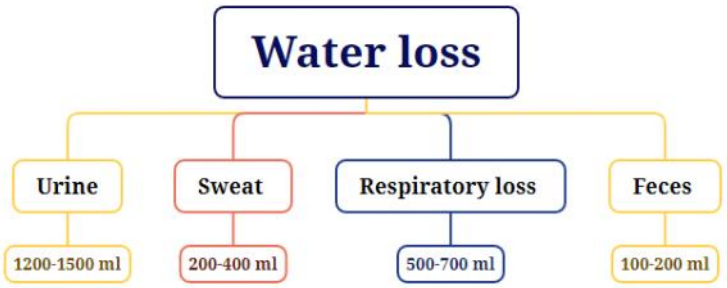
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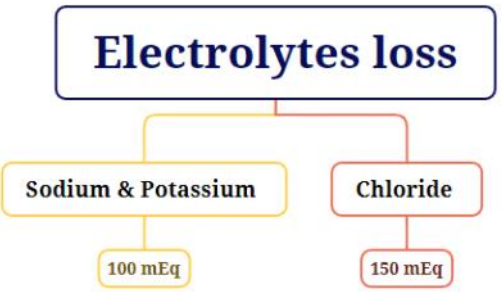
► Body fluid compartments



❖ The percentage of blood in ideal body weight is 7%

► Levels and sources of normal daily water & Electrolytes loss

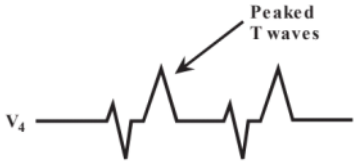
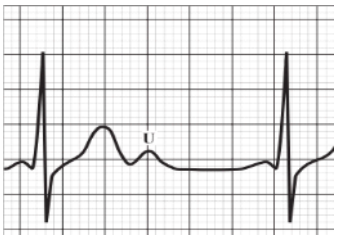




► 4/2/1 rule

Maintenance of IV fluids for hourly rate:
4 ml/kg for the first 10 kg
2 ml/kg for the next 10 kg
1 ml/kg for every kg over 20
Example : pt weight 70 kg
4 x 10 kg = 40
2 x 10 kg = 20
1 x 50 kg = 50
Total = 110 ml/hr maintenance rate

► Potassium
(Normal range 3.5-5.0)

	Hyperkalemia	Hypokalemia
Surgical causes	• Iatrogenic overdose • Blood transfusion • Renal failure • Diuretics • Acidosis • Tissue destruction (Injury/hemolysis)	• Diuretics • Certain antibiotics • Steroids • Alkalosis • Diarrhea • Intestinal fistulae • NG aspiration • Vomiting • Insulin • Insufficient supplementation • Amphotericin • Low magnesium
Symptoms/signs	- Increase DTR - Weakness - Paresthesia - Paralysis - Respiratory failure - Diarrhea - Hyperactive bowel sound	- Areflexia (Decrease in deep tendon reflex "DTR") - Weakness - Tetany - N/V - Constipation - Paralytic Ileus - Paresthesia
ECG findings	→ Peaked T wave → Depressed ST segment → Prolonged PR → Wide QRS → Bradycardia → Ventricular fibrillation 	→ Flattening of T wave → U wave → ST segment depression → PAC " Premature atrial contraction" → PVC "Premature ventricular contraction" → Atrial fibrillation 
Treatment	CB DIAL K • Calcium (cardioprotective) • Bicarbonate (Because Alkalosis derive K+ intercellularly) • Dialysis • Insulin /dextrose • Albuterol (nebulizer) • Lasix (Furosemide) • Kayexalate(sodium polystyrene sulfonate)	• IV KCl (for rapid ttt , Max 10 mEq/hr through IV , MAX 20 mEq/hr through central line) • PO KCl (for chronic ttt) # Replace magnesium before replacing hypokalemia , why?! Because hypomagnesemia inhibit K+ reabsorption from renal tubules

▶ Sodium
(Normal range 135-145)

	Hypernatremia	Hyponatremia
Surgical causes	• Inadequate hydration • Diabetes insipidus • Diuresis • Vomiting • Diarrhea • Diaphoresis • Tachypnea • Iatrogenic (TPN)	➢ Hypovolemic • Excess diuretic • Hypoaldosteronism • Vomiting • NG suction • Burns • Pancreatitis • Diaphoresis ➢ Euvolemic • SIADH • CNS abnormalities • Drugs ➢ Hypervolemic • Renal failure • CHF • Liver failure (cirrhosis) • Iatrogenic fluid overload (dilutional)
Symptoms /Signs	- Seizures - Confusion - Stupor - Pulmonary/ peripheral edema - Tremors - Polydipsia - Respiratory paralysis - Red &rosy skin	- Seizures - Coma - N/V - Ileus - Lethargy - Confusion - Weakness - Crave salt
Treatment	The ttt should be done slowly (<12 mEq/hr per day) • D5W (dextrose 5% in water) • 1/4NS or 1/2NS (normal saline) #Major complication of lowering Na fast ?! Seizure , due to cerebral edema .	The ttt should be done slowly (<12 mEq/hr per day) ➢ Hypovolemic → NS IV → Correct underlying cause ➢ Euvolemic "SIADH" → Furosemide → NS acutely → Fluid restriction ➢ Hypervolemic "Dilutional" → Fluid restriction → Diuretics #Major complication of correcting it fast ?! Central pontine myelinolysis (confusion, spastic quadriplegia, horizontal gaze paralysis)

► Calcium
(Normal range 8.5-10.5)

	Hypercalcemia	Hypocalcemia
Surgical causes	CHIMPANZEES • Calcium supplementation IV • Hyperparathyroidism/Hyperthyroidism • Immobility /Iatrogenic (Thiazide diuretics) • Mets/Milk alkali syndrome • Paget's disease (bone) • Addison disease /Acromegaly • Neoplasm (colon , lung , breast , prostate , multiple myeloma) • Zollinger- Ellison syndrome • Excessive vit -D • Excessive vit - A • Sarcoid	• Short bowel syndrome • Intestinal bypass • Vitamin D deficiency • Sepsis • Acute pancreatitis • Osteoblastic metastasis • Aminoglycosides • Diuretics • Renal failure • Hypomagnesemia • Rhabdomyolysis
Symptoms/Signs	- Stones , Bones , Abdominal groans , Psychiatric overtones - Polydipsia - Polyuria - Constipation	- Chvostek's sign (Facial muscle spasm with tapping of facial nerve) - Trousseau's sign (Carpal spasm after occluding blood flow in forearm with blood pressure cuff) - Perioral paresthesia "early" - Increased deep tendon reflex "late" - Confusion - Abdominal cramps - Laryngospasm - Stridor - Seizure - Tetany - Psychiatric abnormalities (depression, paranoia , hallucinations)
ECG findings	• Short QT interval • Prolonged PR	• Prolonged QT • Prolonged ST • Peaked T wave
Treatment	→ NS → Diuresis (Furosemide) NOT thiazide → Steroids → Calcitonin → Bisphosphonates(pamidronate) → Mithramycin → Dialysis	→ IV Calcium gluconate (in acute ttt) → Calcium PO, Vit-D (in chronic ttt) # possible complication of infused calcium if the IV infiltrates?! Tissue necrosis

Magnesium
(Normal range 1.5-2.5)

	Hypermagnesemia	Hypomagnesemia
Surgical causes	• TPN (total parental nutrition) • Renal failure • IV over supplementation	• TPN • Hypocalcemia • Gastric suctioning • Aminoglycosides • Renal failure • Diarrhea • Vomiting
Symptoms /Signs	- Respiratory failure - CNS depression - Decrease deep tendon reflex	- Increased deep tendon reflex - Tetany - Asterixis - Tremor - Chvostek's sign - Ventricular ectopy - Vertigo - Tachycardia - Dysrhythmias
Treatment	→ IV Calcium gluconate → Insulin + Glucose → Dialysis → Lasix (Furosemide)	→ MgSO4 IV (in acute ttt) → Magnesium oxide PO (in chronic ttt) # Side effect?! Diarrhea

Glucose
(Normal range 70-100)

	Hyperglycemia	Hypoglycemia
Surgical causes	• DM (poor control) • Infections • Stress • TPN • Drugs • Lab error • Drawing over IV site • Somatostatinoma • Glucagonoma	• Excess insulin • Decrease caloric intake • Insulinoma • Drugs • Liver failure • Adrenal insufficiency • Gastrojejunostomy
Symptoms/Signs	- Polyuria - Hypovolemia - Confusion/Coma - Polydipsia - Ileus - DKA (Kussmaul breathing) - Abdominal pain - Hyporeflexia	- Sympathetic response (Diaphoresis, Tachycardia, Palpitation) - Confusion /Coma - Headache - Diplopia - Neurologic deficits - Seizures
Treatment	→ Insulin	→ Glucose IV or PO

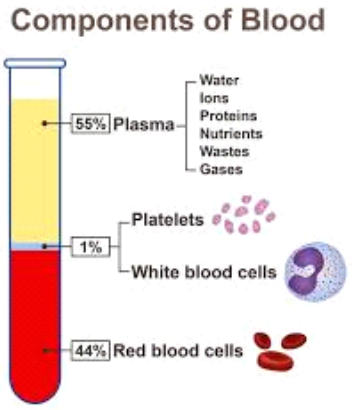
▶ Phosphate
(Normal range 2.8-4.5)

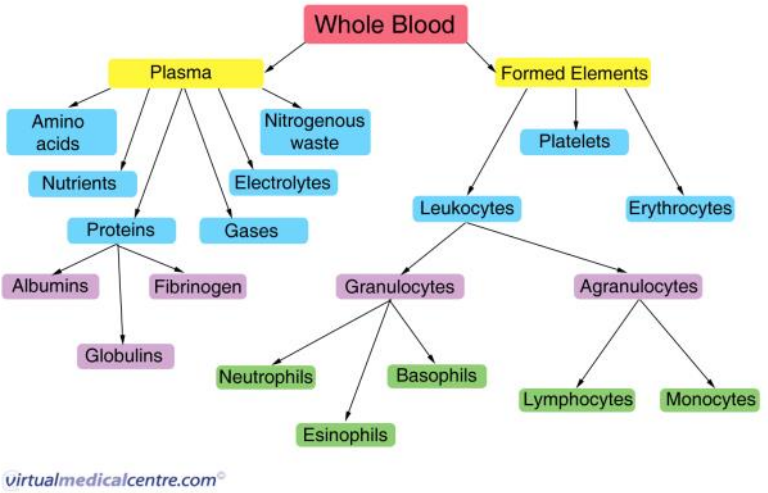
	Hyperphosphatemia	Hypophosphatemia
Surgical causes	• Renal failure • Sepsis • Chemotherapy • Hyperthyroidism	• GI losses • Inadequate supplementation • Medications • Sepsis • Alcohol abuse • Renal loss
Symptoms/Signs	- Calcification (Ectopic) - Heart block	- Weakness - Cardiomyopathy - Neurologic dysfunction (Ataxia) - Rhabdomyolysis - Hemolysis - Poor pressor response - Respiratory failure (Complication of sever hypophosphatemia)
Treatment	→ Aluminum hydroxide (bind phosphate)	→ Supplement with sodium phosphate OR potassium phosphate IV

Blood product

Saturday, March 16, 2024 3:32 PM

▶ Blood components





▶ Terms / Description

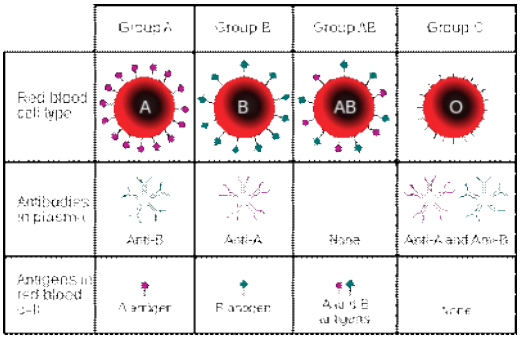
Hemopoiesis	The formation of blood cellular components, mainly in red bone marrow
Whole blood	None of the elements has been removed, Rich in coagulation factors # indication: Large volume hemorrhage as seen in trauma.
PT	Prothrombin time : tests extrinsic coagulation pathway
PTT	Partial thromboplastin time: tests intrinsic coagulation pathway
INR	International normalized ratio:
PRBCs	Packed RBCs: 1 unite = 300 ml (+/- 50ml), No platelets or clotting factors. # Indication: Active Bleeding , Symptomatic Anemia
Platelets	Responsible for blood clotting # Indication: Thrombocytopenia, Surgery with active bleeding, platelets <50 x10⁹
FFP	Fresh frozen plasma: replaces the clotting factors (particularly V & VIII), No RBC, No WBC, No platelets # Indication: Factor V deficiency, DIC, Liver failure, if PT > 1.5 times normal, Antidote for warfarin toxicity
Cryo	Cryoprecipitate: it's concentrated FFP, replaces fibrinogen, von Willebrand factor(vWF), some clotting factors (VIII, XIII) # Indication: factor VIII & fibrinogen (< 0.8) deficiency, Von Willebrand disease
Hematocrit	Packed cell volume (PCV), The percentage of total blood volume occupied by RBCs . Men = 40-48% women= 36-42%

Plasma products	# Indication of human albumin: Hypovolemia, Hyponatremia # Indication of hyperimmune globulin: Immunodeficiency, Autoimmune disease (GBS)
PCC	Prothrombin complex concentrate, formed by farther processing the plasma, it contains factor (II, IX, X,VII) # Indication: Vit k deficiency , Antidote of warfarin
Thrombocytopenia	Low platelets count < 100,000
Hemophilia A	Deficiency in factor VIII, the PTT is elevated
Hemophilia B	Deficiency in factor IX, the PTT is elevated
Von Willebrand's disease	Deficiency in vWF & factor VIII:C, the pt present with abnormal bleeding time , it's corrected with DDAVP or Cryoprecipitate

► Blood types

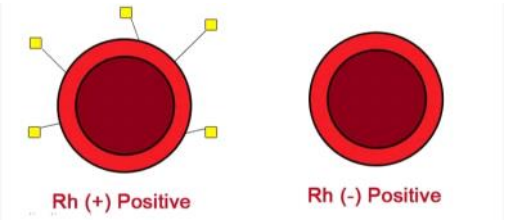
⇒ Which blood type is the universal doner for PRBCs ?! O negative
⇒ Which blood type is the universal doner for FFP?! AB
⇒ Which blood type is the universal recipient?! AB (because it has no Ab)
➢ 2 systems:

1. ABO system



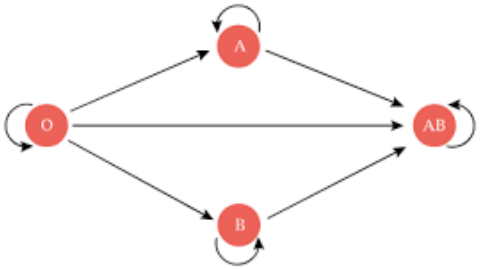
ABO incompatibility in pregnancy : if the mother is type O & the baby is type AB, because the mom has both Anti-A & B, the Ab can cross the placenta and cause destruction of baby RBC leading to hemolytic anemia.

2. Rh system (D Antigen)



Rh incompatibility in pregnancy : when Rh negative mother is carrying her first Rh positive baby because of Rh antigen in the baby the mother will develop Anti-Rh antibodies, so if she becomes pregnant with another Rh positive baby the Ab can cross the placenta & damage the baby RBCs which cause hemolytic anemia and death.

➢ Blood compatibility:



▶ Transfusion types

⇒ Autologous transfusion (Pre-donate their own blood up to 3 weeks before surgery)
⇒ Allogeneic transfusion (Using another's blood)

▶ Transfusion inductions

- To replace the blood lost in surgery of trauma
- In inherited blood disorders (Thalassemia, Sickle cell anemia)
- Hemoglobin levels < 6
  # Normal Hb in men = 13.5-17.5
  # Normal Hb in women = 12.0-15.5

▶ Pre-transfusion procedures

⇒ Separatee blood components
⇒ Test for infections (Hepatitis B-C, HIV 1-2)
⇒ Leukoreduction
(removal of white blood cells by filtration can minimize the risks associated with these contaminating leukocytes , such as: CMV, HTLV)
⇒ Pathogen reduction treatment
(Using Mirasol PRT " riboflavin (vitamin B2) + ultraviolet light" to minimize risk of infection)
⇒ Test ABO & Rh groups

▶ Symptoms of transfusion reaction

- Fever, Chills
- Nausea
- Hypotension
- Headache
- Lumbar pain
- Chest pain
- Abnormal bleeding
- Fascial flushing

▶ Complications of single transfusions

1. Incompatibility hemolytic reactions.
   (Within 24 h post-transfusion ,due to ABO Incompatibility, Pt present with classical triad of "fever + flank pain + red-brown urine ")
2. Febrile transfusions reactions .
   (caused by antibodies directed against donor leukocytes (WBC) and HLA antigens)
3. Allergic reactions .
   (Because of the presence of foreign proteins in donor plasma, these reactions are IgA-mediated cause release of Histamine , and may proceed to anaphylactic shock)
4. Transfusion-related acute lung injury .
   (Antibodies are directed toward HLA in fresh frozen plasma (FFP), symptoms begins within 6h , pt present with ARDS)
5. Infections .
   (Source of contaminants include donor's Blood , donor's skin or as a result of faulty storage)
6. Air embolism
   (caused by a gas bubble within the circulation can obstruct vascular flow, pt present with Cyanosis, respiratory distress, Hypotension, Cardiac arrhythmia, Loss of consciousness , treated with: Placing patient on left side with head down to displace air bubble from pulmonic valve)

▶ Complications of massive transfusions

1. Hypothermia.
   (Blood should be warmed during massive transfusion because it stored at 4C)
2. Coagulopathy.
   (Stored blood has virtually no effective platelets and no coagulation factors, so it can lead to coagulation defect (hemorrhage).
3. Acid-Base disturbances.
   (Each unit of RBCs contains 1–2 mmol of citric acid, Citrate undergoes hepatic metabolism to bicarbonate ,so during a massive transfusion a metabolic alkalosis develop)
4. Hypocalcemia.
   (Citrate in stored blood binds to calcium ions, During rapid transfusion, citrate may reduce total body ionized calcium levels, causing myocardial depression)
5. Iron overload.
   (Each transfused unit of red blood cells contains approximately 250mg of elemental iron, treated with iron chelating agent)
6. Post transfusion purpura
   (Antibodies to platelet antigens "HP1a" causes abrupt onset of severe thrombocytopenia, treated with IVIG, plasmapheresis or corticosteroids)

▶ Treatment for transfusion hemolysis

- Stop the transfusion
- IV fluids
- Diuresis (Lasix) to protect kidneys
- Alkalinize the urine (Bicarbonate)

ABO Blood Antigens and Rh (D Antigen) 🩸 | Biology 🧪



Blood Products & Their Uses EXPLAINED!



Bariatric / obesity

Saturday, March 16, 2024 1:54 AM

► Morbid obesity

- ➢ Definition: BMI > 40 or > 30 with medical problem related to morbid obesity.
- ➢ Body mass index (BMI) = weight [kg]/height [m]²

Normal	18.50–24.99
Overweight	25.00–29.99
Obese class I	30.00–34.99
Obese class II	35.00–39.99
Obese class III	≥40.00

- ➢ Medical conditions associated with morbid obesity: Sleep apnea, Coronary artery disease, DM, Venous stasis ulcer, Arthritis, Infections, Sex-hormones abnormalities, HTN, Breast CA, Colon CA.
- ➢ Laboratory studies in the evaluation of obesity: CBC, Liver function studies, Kidney Function tests, Thyroid Function tests, Fasting glucose and hemoglobin A1c (HbA1c)
- ➢ Management:

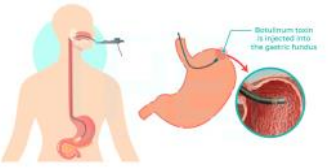
- Lifestyle modifications
- Pharmacotherapy(Orlistat)
- Endoscopic intervention
- Bariatric surgery

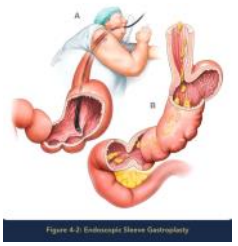
► Lifestyle modification

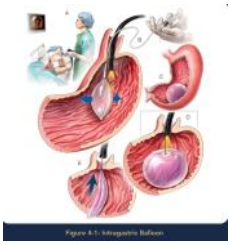
- Diet
- Physical activity
- Behavior modification

► Endoscopic interventions

- Gastric Botox
- Intra-gastric ballon
- Endoscopic sleeve gastroplasty







► Bariatric surgery

- ➢ Definition: Weight reduction surgery for morbidly obese pt.
- ➢ Types:

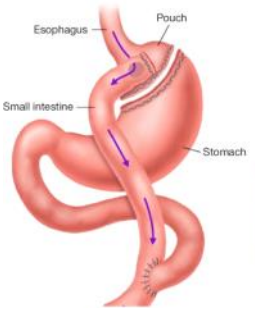
- Restrictive: Decrease size of the stomach
- Malabsorptive: Decreases absorption of calories

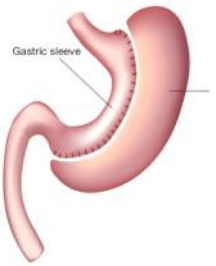
- ➢ Criteria for Bariatric surgery:

- BMI > 35
- BMI > 30 with metabolic complications
- Failure of weight reduction

- ➢ Best options for surgery :

1. Sleeve gastrectomy
   # Mechanism: 75 - 85% of the stomach is removed, along the greater curvature, which leaves a cylindrical, or "sleeve"-shaped stomach the size of a banana.
   # Complications: GERD, Leaks, Bleeding, Stenosis, Weight recurrence

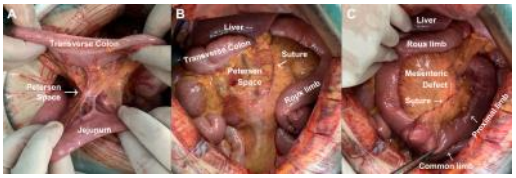




2. Gastric-bypass (Roux-en-Y gastric bypass)
   # Mechanism: stomach stapling creates a small, thumb -sized stomach pouch, the small intestine is divided about 18 inches below the stomach, and is rearranged to provide an outlet to the small stomach, Food enters the second part of the small bowel within about 10 minutes of beginning the meal this reduces food intake and reduces the feeling of hunger
   # Complications: Nutrition & Vitamins deficiency, Leaks (pt present with tachycardia), Dumping syndrome(when pt eat too much carbohydrates so the food is dumped into Roux pouch), Marginal ulcer
3. Vertical- banded gastroplasty
   # Mechanism: Laparoscopically placed band around stomach with subcutaneous port to adjust constrictions which result in smaller gastric reservoir

➢ Petersen's hernia: Internal herniation of small bowel through mesenteric defect from Roux-en Y, seen after gastric bypass .





► Monogenic obesity

➢ Definition: rare form of obesity that results from mutations in a single gene
➢ Symptoms: severe and early-onset obesity

⇒ Congenital leptin deficiency:
- Cause: Mutation in leptin gene (LEP)
- Symptoms: Hyperphagia , Severs/early obesity , Delayed puberty, Impaired immunity
- Diagnosis: Genetic testing , Leptin levels are undetectable.
- Treatment: Recombinant leptin

⇒ Leptin receptor deficiency:
- Cause :Mutation in leptin receptor gene (LEPR)
- Symptoms: Hyperphagia, Severe/early obesity, Problems with sexual development
- Diagnosis: Genetic testing, Leptin levels are high
- Treatment: Not available

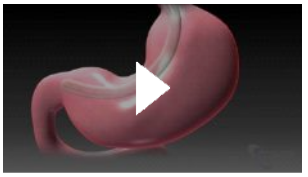


FIG. 1. Effects of recombinant human leptin treatment in leptin deficiency.

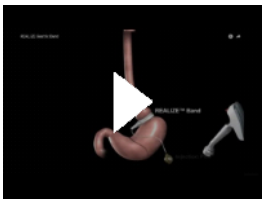
Roux en-Y Gastric Bypass, with Introduction on Body Mass Index, Animation.



Sleeve Gastrectomy



Gastric Banding Bariatric Surgery Animation



Nutrition

Saturday, March 16, 2024 3:32 PM

► Malnutrition

- ➢ Definition: Deficiencies, excess, imbalance in persons intake of energy/nutrition.
- ➢ Includes 3 terms:

1. Undernutrition(Wasting = low weight for height, Stunting= Low height for age, Underweight= Low weight for age)
2. Micronutrition-related malnutrition (micronutrition= Vitamins & minerals (Vit A, Iodine, Iron, Zinc, Folate)
3. Overweight obesity

- ➢ Causes:

I) Reduced food intake (Fasting, Anorexia, Pain in swallowing)
II) Altered metabolism (trauma, surgery, sepsis, cancer, burns
III) Impaired digestion or absorption (Infection, Structural defect (IBD), Surgical structural changes (Gastrectomy), Mucosal abnormality (Coeliac disease), Enzymes deficiency (Lactose intolerance).

- ➢ Consequences:

- Decrease of fat & muscle mass
- Reduction in cardiac muscle mass , Decrease CO, Decrease renal perfusion & GFR.
- Disrupt GI function which lead to decrease reabsorption of water & electrolytes leading to diarrhea
- Increase risk of infection/ Delay wound healing
- Depression, Anxiety, Apathy

- ➢ How do we asset the nutritional status :

1. BMI & Anthropometry (study of body proportions & measurements)
   # significant weight loss : Unintentional weight loss of >10% of pt weight in last 6 months / > 20% in 3 months
2. History / PE
3. Laboratory techniques

- ➢ Anthropometry measurements:

→ Triceps skinfold thickness = indirect measure of energy stores.
→ Midarm muscle circumference = indirect measure of protein stores
→ Hand grip strength in non-dominant hand








- ➢ Important physical exam findings:
  - Bitot's spots, Xerophthalmia, dry skin, keratosis pilaris = Vit A deficiency
  - Easy bruising, perifollicular hemorrhage, bleeding gums = Vit C deficiency
  - Koilonychia = iron deficiency anemia
  - Conjunctival pallor = non-specific anemia
  - Easily plucked hair = protein deficiency
- ➢ Laboratory tests (Prealbumin, Transferrin(<200), Albumin (<3.0), Total lymphocyte count, Anergy, Retinol-binding protein)

Disease	Deficiency
Rickets	Vit D deficiency
Scurvy	Vit C deficiency
Beri-Beri	Vit B deficiency
Hemolytic anemia	Vit E deficiency
Xeropthalmia	Vit A deficiency
Coagulopathy / Bleeding	Vit K deficiency
Goiter	Iodine deficiency
Osteoporosis	Calcium deficiency
Anemia	Iron deficiency
Megaloblastic anemia	Vit B12/folate deficiency

► Carbohydrates Supplementation before surgery:

⇒ The importance?! reduces insulin resistance and tissue glycosylation through surgery, helps postoperative glucose control, and enhances return of bowel function.

- ➢ The first dose given as an 800 ml volume (containing 100 g carbohydrate) around 12 h before surgery.
- ➢ The second dose given as a 400 ml volume (containing 50 g carbohydrate) 2-3 h before surgery.

▶ Why is it recommended to avoid eating 8 hours before surgery?

To prevent aspiration of food during anesthesia and complications from food in the stomach

▶ Refeeding syndrome

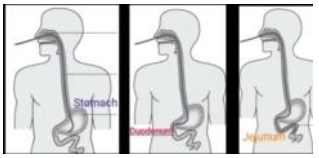
- Definition: Decrease serum potassium, magnesium, phosphate after refeeding a starving pt.
- Symptoms: Confusion, seizure, coma, Hypotension, Arrythmia, RS failure, Pulmonary edema, Anorexia, Diarrhea, Weakness, Paresthesia, Neuropathy, Rhabdomyolysis, Anemia, AKI.
- Treatment: Replace electrolytes, re-feed at low rate (10-15 kcal/kg/day)

▶ Overfeeding

⇒ Excess protein (Azotemia, Hyperammonemia)
⇒ Excess fat (Fat overload syndrome)
⇒ Excess carbohydrate (Fatty liver, Hypercapnia, Hyperglycemia)

▶ Nutritional support types

⇒ Enteral (Oral feeds, Tube feeding)



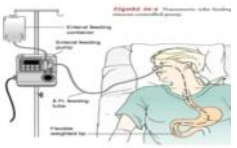
Enteral tube feeding types:

1. Short term use (< 4 weeks)
   Nasogastric, Nasoduodenal, Nasojejunal
2. Long term use (> 4 weeks)
   Gastrostomy, PEG (percutaneous endoscopic gastrostomy), Jejunostomy

Contraindication of enteral tube feeding:

- Intractable vomiting/diarrhea
- Intestinal obstruction
- Paralytic ileus
- Sever shock
- Sever GI hemorrhage





Mood of delivery :

A. Bolus feeding (50-100ml are given every 4 h)
B. Continuous infusion(20ml/h)

Types of formula:

- Polymeric (whole protein, carbohydrates, fats. Given to pt with functional GI)
- Monomeric (short peptides, free amino acids, minimal fats. Given to pt with limited GI function)
- Disease specific formula (Liver failure pt are given Hepatic -Aid which is low in electrolytes, COPD/ARDS are given Pulmocare which is high in fats)

Complication of enteral feeding:

- Tube related (Malposition, Aspiration, Leakage)
- Metabolic (Hyper- natremia/glycemia/kalemia, Hypo- natremia/kalemia)

⇒ Parenteral



Types:

1. TPN " total parenteral nutrition" (IV route)
2. PPN" partial parenteral nutrition"(enteric route + IV rout)

Indications:

- GI malfunction (Fistula, Obstruction, IBD, Congenital anomalies)
- Pt on NPO > 7 days
- Failed enteral feeding
- Pre-operative

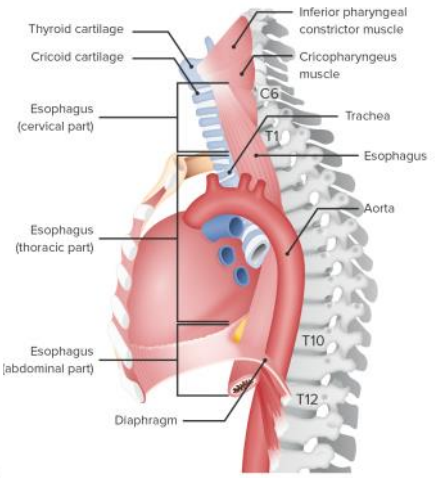
Route of delivery :

A. Peripheral parenteral nutrition (PPN)
- Short term , up to 2 weeks
- Advantage: Avoid complications associated with CPN
- Disadvantages: Thrombophlebitis

B. Central parenteral nutrition (CPN)
- Long term, >10-14 days
- SVC = via subclavian or internal jugular vein
- IVC = via femoral vein
- Complications: Line dislodgement, Pneumothorax, Line sepsis, Venous/cardiac thrombosis

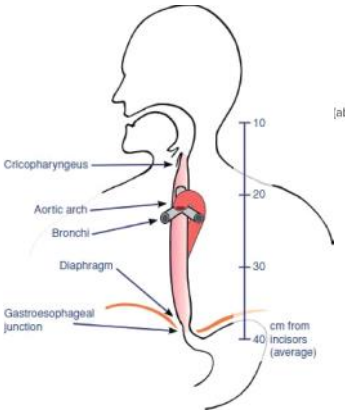
Esophagus

Thursday, March 7, 2024 11:32 PM



- ❖ starts at the lower border of the cricoid cartilage (atC6)to the cardiac orifice at(T 11)

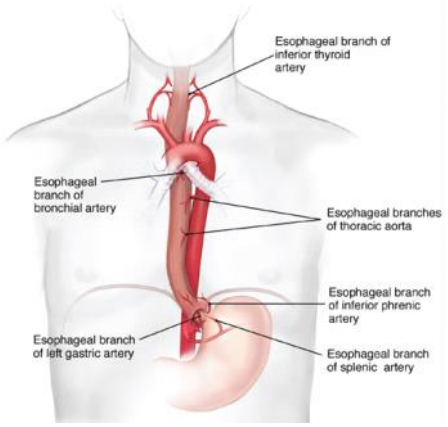
- ❖ Resting pressure of the upper esophageal sphincter is:
  - A-P : 100mm Hg
  - laterally : less than50mmHg
- ❖ Resting pressure of the lower esophagus is :40mmHg

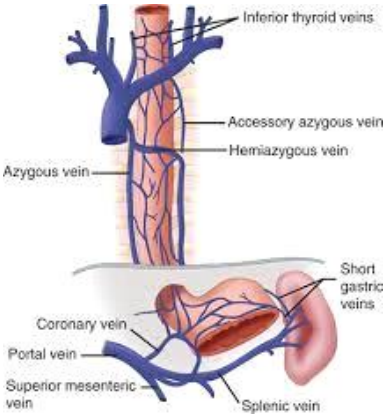


- ❖ 3 division :
  - Cervical division
  - Thoracic division
  - Abdominal division

- ❖ It has 3 constrictions: (distance from incisor teeth)
1. Cricopharyngeal constrictions:15 cm
2. Constriction where aortic arch &left main bronchus:25cm
3. Diaphragmatic constriction :40cm

	Arterial blood supply	Venous blood supply	Nerve supply	Lymphatic drainage
Upper third	Inferior thyroid A	Inferior thyroid V into Brachiocephalic trunk	Recurrent laryngeal nerve	Deep cervical lymph nodes
Middle third	Thoracic aorta	Venous plexus , Azygous V into IVC	• Parasympathetic (vagus N) • Sympathetic	Superior and posterior mediastinal nodes
Lower third	Lt gastric A , Lt inferior phrenic A	Esophageal V into coronary V then into portal system	• Parasympathetic (vagus N) • Sympathetic	Left gastric and celiac nodes.





Achalasia

Friday, February 2, 2024 3:10 PM

Definition

it's a motility disorder when the LES is unable to relax (High LES tone) & loss of peristalsis in distal 2/3 of esophagus

Causes

- Idiopathic
- Neurological (ganglionic degeneration of Auerbach's plexus, vagus nerve)
- 2 to chagas disease (T.cruzi infection)
- 2 to extraesophageal malignancy

Symptoms

- Dysphagia to both solid & liquid
- Weight loss
- Regurgitation of undigested food
- Chest pain
- Bad breath
- Nocturnal cough

Diagnosis



- Barium swallow (Bird's beak appearance)
- Manometry (High LES pressure , Incomplete relaxation , Decrease peristalsis)
- EGD " To rule out secondary causes"

Treatment

Short term

- Nitrates
- Calcium channel blocker
- Endoscopic injection of botulinum toxin

Long term

- Surgical Haller myotomy " where circular muscle layer of LES is incised"
- Pneumatic balloon dilation

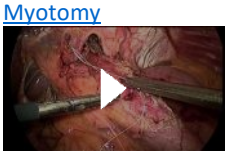
Achalasia (Year of the Zebra)



Complication of achalasia

- Aspiration pneumonia
- Malnutrition

Laparoscopic Heller Myotomy



Pseudo achalasia

- Definition : Tumor at esophagogastric junction , Pt normally >60 years.

GERD

Thursday, February 1, 2024 8:53 PM

Definition

Gastric juice reflux from stomach to esophagus due to failure of LES [decreased tone of LES]

Causes that decreases LES tone

- Decreased esophageal motility
- Hiatal hernia
- Gastric outlet obstruction
- Dietary factors (acids)
- Progesterone

Risk factors

- Alcohol
- Smoking
- Obesity
- Caffeine
- Chocolate
- Fatty food

Complications of GERD

- Erosive esophagitis
- Esophageal ulcer
- Esophageal strictures
- Barrett esophagus
- Recurrent pneumonia (Due to recurrent Aspiration)
- Gingivitis , laryngitis, Pharyngitis

Symptoms

- Heartburn(pyrosis) / dyspepsia (Worse after meals or when lying down)
- Regurgitation
- Waterbrash reflex (salivary hypersecretion with indigestion)
- Dysphagia
- Dyspnea
- Chest pain
- Cough
- Hoarseness of voice / sore throat
- Early satiety
- Post prandial N/V

Diagnosis

- Esophagogastroduodenoscopy (EGD) with biopsy
- Barium Swallow (to see complication like strictures not GERD itself)

- 24-hour ph monitoring of lower esophagus (Gold standard)
- Manometry , CXR , ECG

▶ Treatment

➢ Life style modification
- Elevate head at night
- Small meals

➢ Medication

⇒ Mild = antiacid

⇒ Chronic = H_2 blocker OR PPIs (long term/ sever).

➢ Surgery
- Lap Nissen
- Toupet (used in severe decreased esophageal motility)

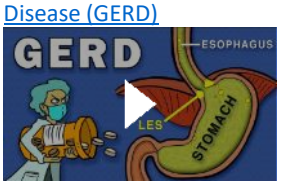
▶ What is the outcomes of lap Nissen surgery

- Increase LES tone
- Elongate LES
- Returns LES to abdominal cavity

▶ When do we go for the surgical treatment (Indication)

- Failure of medical treatment
- Respiratory problems (Aspiration → Pneumonia)
- Esophageal injury (ulcers , strictures, hemorrhage, Barrett's esophagus)

Gastroesophageal Reflux Disease (GERD)



▶ Post-operative complication of Lap Nissen

- Gas bloat syndrome (inability to burp or vomit)
- Stricture
- Dysphagia
- Spleen injury requiring splenectomy
- Esophageal perforation
- Pneumothorax

Laparoscopic Nissen Fundoplication



▶ Barrett's esophagus

- Definition :Columnar metaplasia from squamous epithelium as a result of chronic irritation from reflux.
- 10% of patients with GERD will develop Barrett's esophagus
- 30% of patients with Barrett's esophagus will develop adenocarcinoma
- Treatment: - Nonsurgical: mucosal resection & photodynamic therapy
  - Surgical: radiofrequency ablation OR cryoablation



Esophagitis

Friday, February 2, 2024 6:10 PM

Definition

Inflammation of esophageal mucosa

Symptoms

- Odynophagia
- Dysphagia

Types

Reflex (Erosive) esophagitis

- Definition : Inflammation of epithelial layer
- Cause : 2 to GERD
- Presentation of the esophagus : Erythema , Edema , Erosion
- Histology : - Basal zone hyperplasia - Lamina propria elongation - No eosinophils

Medication-induced esophagitis

- Bisphosphonates
- Tetracycline
- NSAIDs
- Ferrous sulfate
- potassium chloride

Eosinophilic esophagitis

Eosinophilic esophagitis (NORD)



- Immune mediated , Allergic reaction
- Risk factors : - male - middle aged - Asthma, atopy ,allergies - CCL26 gene mutation
- Biopsy: Eosinophils
- Endoscopy : Esophageal rings & linear farrows " scalloped appearance"
- Poor response to GERD medication
- Treatment : - PPIs - avoid allergic food - Steroids " long term"



Infectious esophagitis

- Associated with ?! Immune suppression
- Candida = Yellow- white plaques
- HSV-1 = Punched out ulcers
- CMV = Linear ulcers

Corrosive esophagitis

- 2 to Caustic agents

Esophageal disorders

Friday, February 2, 2024 6:39 PM

Esophageal varices

- Definition : Dilated submucosal veins in lower 1/3 of esophagus .
- Causes : - portal HTN -Cirrhosis
- Symptoms : painless Hematemesis , Melena
- Prophylaxis : Non- selective beta blocker " Propranolol , Nadolol"
- Treatment : Endoscopic Banding , TIPS , Balloon tamponade " if sever"

Mallory - Weiss syndrome

- Definition : It's damage to mucosa at GE junction
- Causes : - Chronic vomiting
- Risk factors : -Alcohol use - Bulimia nervosa -Pregnancy
- Symptoms : - painful hematemesis - Abdominal/back pain - Melena
- Diagnosis: EGD
- Treatment : -Water lavage -Angiographic embolization

Plummer Vinson syndrome

- Plummer DIES: Dysphagia , Iron deficiency anemia , Upper Esophageal webs , increase risk of SCC
- Risk factors : - white - middle aged - women -Postmenopausal - glossitis

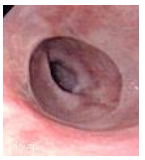
Boerhaave syndrome" perforation"

- Definition : Transmural rupture of esophagus so air will exit esophagus
- Causes : Sever chronic vomiting
- Symptoms/sign: pain post emesis , Hamman sign(Mediastinal crunch or clicking)
  # Meckler's triad : Emesis , lower chest pain , Cerviacl emphysema
- Findings : - Air in mediastinum on X-ray - subcutaneous emphysema (air under skin in neck)
- Diagnosis : - CBC (leukocytosis) - Barium swallow/CT -CXR
- Treatment : - IV antibiotic -Surgical repair

Esophageal webs & ring

- Webs = Upper esophagus
- Rings = Lower esophagus
- Definition : Extension / protrusion of mucosa
- symptoms : Dysphagia , Chest pain.

Schatzki ring



- Definition : It's a ring at squamocolumnar junction
- Symptoms : Dysphagia to solid
- Causes : Ingestion to alkali , acid , bleach , detergents .
  # who's more dangerous ingestion of acid or alkali ?!
  Alkali , because it lead to full thickness liquefactive necrosis while acid will only affect the mucosa .

► Diffuse esophageal spasm



- Definition : Spontaneous , un coordinated contraction pf esophagus with normal LES pressure. # seen in Young Pt
- Symptoms : -Dysphagia - Angina -like chest pain
- Diagnosis : - barium swallow (corkscrew appearance) - Manometry
- Treatment : -Nitrates - CCBs -Heller myotomy.

► Esophageal hiatal hernia

- Symptoms : -Dysphagia - Heartburn -Chest pain - Post prandial fullness.
- Diagnosis : - Barium swallow -Endoscopy

Type	Information	Complications
Sliding hiatal hernia " Type 1"	• Definition : when a portion of GEJ & Stomach goes into thorax. • Risk factor: GERD • Treatment : Small meals, Head elevation , Antiacid ,Nissen fundoplication.	• GERD • Reflex esophagitis • Aspiration
Paraoesophageal hiatal hernia "Type 2"	• Definition : stomach into thorax. • Treatment : Elective surgery	• Obstruction • Hemorrhage • Strangulation

► Esophageal diverticula

Zenker diverticulum "False "	Traction diverticulum	Epiphrenic diverticulum
• Involve Upper 1/3 of esophagus • Pathophysiology: Failure of cricopharyngeal muscle to relax - increase in intraluminal pressure - outpouching. • Risk factor: >50 year old • Symptoms: Dysphagia , Regurgitation, Halitosis (bad breath), weight loss , Chronic cough. • Diagnosis : Barium swallow • Treatment: cricopharyngeal myotomy	• Involve Midpoint of esophagus near trachea bifurcation. • Pathophysiology : Traction from contagious mediastinal inflammation& adenopathy "pulmonary TB" - retraction of esophagus • Symptoms: Asymptomatic , Dysphagia , Regurgitation. • Diagnosis: barium swallow • No treatment	• Involve Lower 1/3 of esophagus. • Risk factors: Esophageal dysmotility , Achalasia • Symptoms: Dysphagia • Diagnosis : barium swallow • Treatment : Esophagomyotomy.

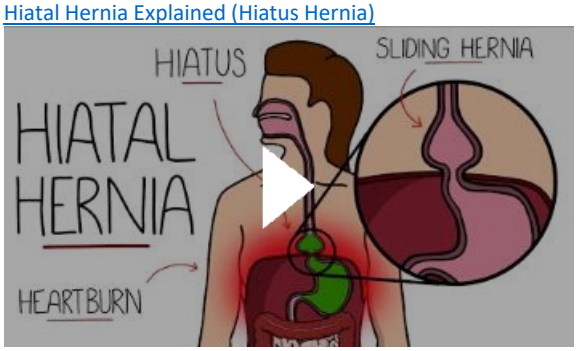
► Scleroderma esophagus

- Definition : Esophageal smooth muscle atrophy ,with decrease LES pressure &distal esophageal dysmotility.
- Symptoms : - Acid reflex - Dysphagia - Heartburn
- Risk factor : - Strictures - Barret esophagus - Aspiration

Nut cracker esophagus

- Definition : Hypertensive peristalsis.
- Symptoms: Angina- like chest pain , Dysphagia .

Hiatal Hernia Explained (Hiatus Hernia)



Esophageal tumor

Friday, February 2, 2024 4:22 PM

▶ Types

Type	Part of esophagus affected	Risk factors	Prevalence	Common site of metastasis
Squamous cell carcinoma	Upper 2/3	• Alcohol • Hot liquids • Strictures • Smoking • Achalasia • Nitrosamine rich food • Plummer Vinson syndrome	Most common world wide	Lung
Adenocarcinoma	Lower 1/3	• Chronic GERD • Barrett esophagus • obesity • Smoking	Most common in America	Liver

▶ Esophageal cancer tend to be aggressive, Why?!

Due to lack of serosa in esophageal wall .

▶ Symptoms

- Progressive dysphagia " first to solid then liquid"
- Hematemesis , Hoarseness of voice (Due to recurrent laryngeal nerve involvement)
- Chest pain
- Weight loss
- Anorexia
- Cough " in SCC"
- Odynophagia (Due to extrapharyngeal involvement " Mediastinal invasion")
- Aspiration pneumonia (Due to tracheobronchial tree involvement)
- Tracheoesophageal OR bronchoesophageal fistula

▶ Diagnosis

- Barium swallow (narrowing of esophagus with irregular borders)
- EGD with biopsy
- CT & Endoscopic U/S " for tumor staging"

▶ Staging

- Stage 1 = Invade lamina propria or submucosa , No nodes
- Stage 2 a = Invade muscularis propria or adventitia , NO nodes

- Stage 2 b = Invade up to muscularis propria , Involve reginal nodes
- Stage 3 = Invade adventitia , Involve regional node OR Involved adjacent structure
- Stage 4 = Distant metastasis

▶ Treatment

- chemo radiation
- Surgical resection

Esophageal Cancer (Year of the Zebra)

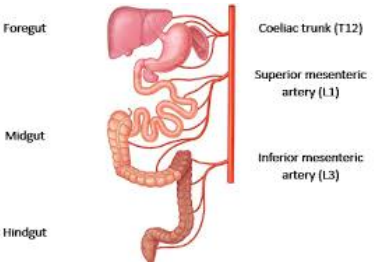


Stomach

Sunday, March 17, 2024 2:13 AM

► The gut is divided into:

	Foregut	Midgut	Hindgut
Contents	• Esophagus • Stomach • 1st part of duodenum • Upper part of 2nd part of duodenum	• Rest of duodenum • Jejunum • Ileum • Ascending colon • Right 2/3 of transverse colon	• Left 1/3 of transverse colon • Descending colon • Sigmoid colon • Rectum • Anal canal
Blood supply	Celiac trunk	Superior mesenteric artery	Inferior mesenteric artery
Venous drainage	Portal vein	Portal vein	Portal vein



► Stomach

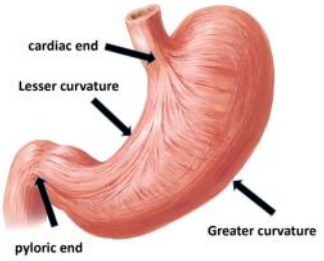
⇒ 2 Ends:
- Cardiac end
- Pyloric end

⇒ 2 Borders:
- Lesser curvature
- Greater curvature

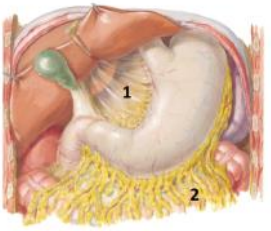
⇒ 2 Surfaces :
- Anterior surface
- Posterior surface

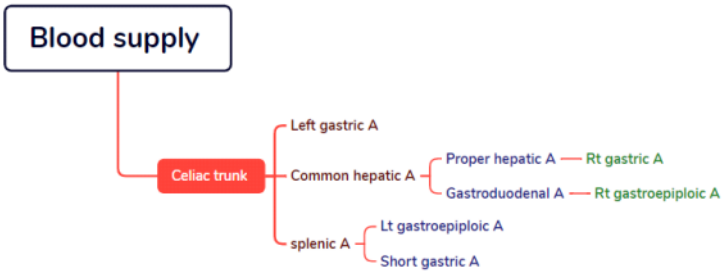
⇒ 3 Parts:
1. Fundus
2. Body
3. Pyloric part

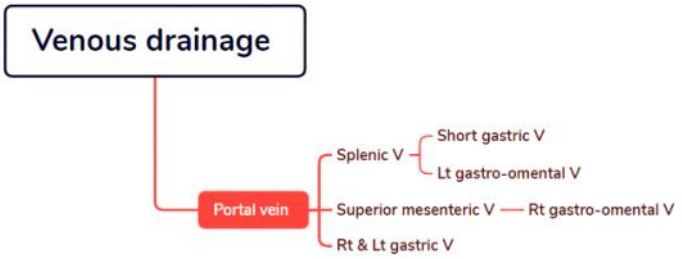
⇒ 2 peritoneal folds:
1. Lesser omentum
2. Greater omentum



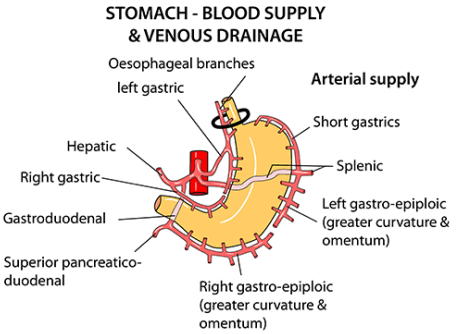




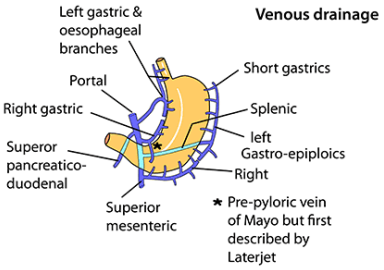




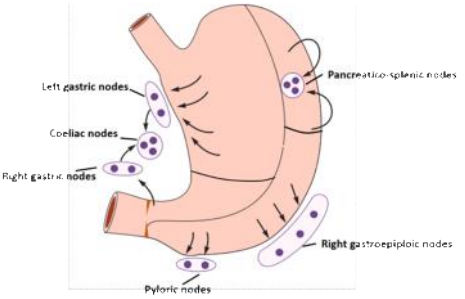
- Blood supply to the stomach:
  Greater curvature (Rt & Lt gastroepiploic A, Short gastric A)
  Lesser curvature (Rt & Lt gastric A)
  Fundus (Short gastric A)
  Pylorus (Gastroduodenal A)



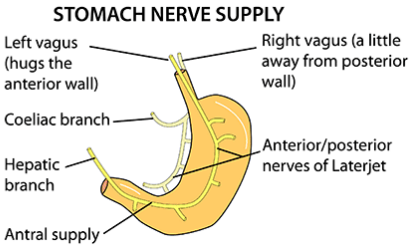
- Venous drainage: (Parallel to arterial supply)
  Rt & Lt gastric V
  Short gastric V (drain the fundus)
  Lt gastro-omental V (drain greater curvature)
  Rt gastro-omental V (drain greater curvature)



- Lymphatic drainage:
  Juxtacardial nodes/paracardial nodes
  Rt & Lt Gastric node (Lt drain both anterior & posterior wall)
  Hepatic-pyloric-Lt gastric node (drain pylorus)
  Short gastric node
  Gastro-omental/Gastroepiploic node (Rt gastroepiploic drain Rt half of greater curvature)
  Pancreaticosplenic node (drain fundus & body)
  Pyloric node
  # All of them drain in Celiac node



- Nerve supply:
  Parasympathetic (through Anterior vagal trunk which arise from Lt vagus N (supply portion from anterior surface + Pylorus)
  & Posterior vagal trunk which arise from Rt vagus N (supplies the rest of anterior surface + Posterior surface)
  # Responsible for inducing gastric secretion and motility, as well as relaxation of the pyloric sphincter during gastric emptying.
  Sympathetic (through Celiac plexus which originate from (T6-T9)
  # Responsible for inhibiting gastric motility and constricting the pyloric sphincter, thus preventing gastric emptying.



Inflammatory bowel disease

Sunday, February 4, 2024 7:49 PM

Definition

Chronic autoimmune inflammatory condition that affect GI (It's a relapsing & remitting disease)

Prevalence

- Female predominance
- More common among white
- More common among Jewish
- 2 Peaks : 15-30 , late 60s

Types

	Ulcerative colitis	Crohn's disease
Location	• Colitis = colon inflammation • Continuous lesion • Always involve rectum • Starts in colon & moves upwards • Doesn't affect small intestine	• Affect any part of GI • Skip lesion • Rectum sparing • Mouth to anus • Terminal illum is hallmark location
Antibodies	P-ANCA	ASCA (anti-saccharomyces Ab)
Gross morphology	▪ Mucosal & submucosal inflammation ▪ Lead pipe appearance	▪ Transmural inflammation ▪ Cobble stone appearance
Microscopically	Crypt abscess , pseudo polyps	Non -caseating granulomas
Pain	Left lower quadrant	Right lower quadrant
Adenocarcinoma	Significant	Only if it involve colon
Intestinal manifestation	• Bloody diarrhea "Hematochezia" • Abdominal pain , Fever , Weight loss , Anorexia	• Non -bloody diarrhea • N/V , Fever , Weight loss , Malaise
Extraintestinal manifestation	◇ Aphthous stomatitis "ulcer" ◇ Uveitis ◇ Primary sclerosing cholangitis ◇ Pyoderma gangrenosum ◇ Erythema nodsum ◇ Toxic megacolon ◇ Fulminant colitis	Same as ulcerative colitis , plus: ✧ Migratory polyarthritis ✧ Fistulas "Peri-anal , Abdominal , bladder" ✧ Creeping fat ✧ Strictures ✧ Kidney stones ✧ Vit -B12 deficiency ✧ Malabsorption of bile

Smoking effect

- Improves outcomes in Ulcerative colitis
- Worsens outcomes in Crohn's disease

Appendectomy effect

- Increase risk of Crohn's disease
- Reduce risk of Ulcerative colitis



Cobble stone

Skip lesion



String sign



▶ Diagnosis

- Blood test (Inflammatory markers "CRP &ESR")
- Stool test
- Barium follow through (skip lesion , string sign appearance)
- Barium enema (Lead pipe appearance)
- Endoscopy + biopsy

Lead pipe



▶ Treatment

- Corticosteroids "Prednisone" (for flare-ups)
- 5-ASA agents " Sulfasalazine , Mesalamine"
- Immunomodulators "Azathioprine" OR Biologics monoclonal Ab to TNF-a "Infliximab" (for refractory ,maintenance , moderate to severe "
- Total proctocolectomy "In UC" to remove colon & rectum (for fulminant colitis ,toxic megacolon , decrease risk of cancer)
- Surgical resection " In Crohn's disease" (for perforation , strictures , fistula)

▶ Microscopical colitis

- Definition : Inflammatory disease of the colon
- More common in older females
- Symptoms : Chronic watery diarrhea (≥ 3 episodes per day for ≥ 4 weeks), Abdominal pain , Fatigue ,Weight loss
  # worse at night
- Diagnosis : Normal colonic mucosa on endoscopy , on Histology we see lymphocytic infiltrates in lamina propria with Thickened subepithelial collagen band .
- Treatment : Budesonide " type of steroid" , Anti-diarrhea " Loperamide , Bismuth salicylate , Biological agents " Infliximab " , Surgery (ileostomy , subtotal colectomy)

Ulcerative colitis - causes, symptoms, diagnosis, treatment, pathology



Crohn's disease (Crohn disease) - causes, symptoms & pathology



Microscopic Colitis (Lymphocytic & Collagenous Colitis) - An Underdiagnosed Form of IBD



Irritable bowel syndrome

Tuesday, February 6, 2024 8:27 PM

▶ Definition

Idiopathic functional disorder with recurrent abdominal pain , Associated with ≥ 2 of the following :

- Relieved by defecation
- Change in stool frequency
- Change in appearance & consistency of stool

More common in Middle-aged Females

▶ Symptoms

Symptoms should be present for at least 3 months to diagnose

- Lt lower Cramping abdominal pain " sigmoid colon location "

Relieved ?! Defecation

Exacerbated?! Stress , Irritation of intestinal lumen

- Abdominal distention & bloating
- Diarrhea predominant OR constipation predominant OR mixed
- Defecation straining , urgency , feeling of incomplete emptying
- Comorbid with psychiatric disorder (Depression , Anxiety , Fibromyalgia)

▶ Diagnosis

➢ Per Rome IV diagnostic criteria

At least 1 day/week in 3months of episodic abdominal discomfort with ≥ 2 criteria :

- Relieved by defecation
- Change in stool frequency
- Change in stool appearance & consistency

➢ Normal lab results , No mucosal lesion on sigmoidoscopy

▶ Treatment

- Lifestyle modification & Dietary changes (Avoid dairy , excess caffeine)
- Antispasmodic " Hyoscyamine , Dicyclomine " (for abdominal pain)
- Diphenoxylate , Loperamide (for diarrhea)
- Colace , Psyllium (for constipation)
- TCAs, SSRIs (for psychiatric disorders)

Irritable Bowel Syndrome (IBS) - Including Symptoms, Criteria & Treatment!



Peptic ulcer

Saturday, February 3, 2024 3:36 PM

Definition

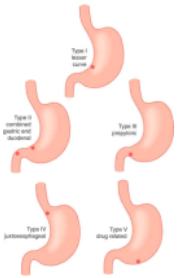
Damage to gastric OR duodenal mucosa caused by impaired mucosal defenses &/or increase the acidic gastric contents.

Causes

- H. pylori (gram -)
- NSAIDs
- NSAIDs + Corticosteroids
- Alcohol
- Smoking
- Zollinger Ellison syndrome
- Stress
- Male

Types

	Duodenal ulcer "common"	Gastric ulcer
Pathogenesis	Increase in offensive factors (increase in gastric acid secretion)	Decrease in defensive factors (normal/low acid secretion)
H. Pylori infection	70-90%	60-70%
Pain	Decrease with meals = weigh gain	Increase with meals = weight loss
Malignant potential	Low	High
Risk factors	NSAIDs	Smoking
Age / sex	Young <40 Men	Old >40 Men
Associated blood type	Type O	Type A
Location	1-2 cm distal to pylorus "Usually in posterior wall "	• Type 1 = on lesser curvature • Type 2 = gastric & duodenal ulcers • Type 3 = prepyloric • Type 4 = near gastroesophageal junction • Type 5 = drug induced



Symptoms / Signs

- Dull , burning epigastric pain (Often related to meals , can radiate to the back)
- N/V
- Hematemesis (Coffee ground emesis)
- Melena (Blood in stool)
- Rigid abdomen , Rebound tenderness , Guarding abdomen (in Acute perforation)
- Valentino's sign (RLQ pain/ peritonitis as a result of succus collecting from a perforated peptic ulcer)

► Complications

- Hemorrhage (>4-6 transfusion in last 24h , hemodynamically unstable)
- Perforation (sudden onset of abdominal pain , tachycardia , fever , rigidity , peritonitis)
- Gastric outlet obstruction (- Scaring & fibrosis - Spasm - Edema -Pyloric dysmotility)
- Intractable pain

► Diagnosis



- Upper endoscopy +biopsy
- Barium swallow (pooling of contrast in ulcer)
- Laboratory tests
  # Serology (Detect IgG antibody for H. pylori)
  # Urea breath test (Detect Co2 from radio - labeled urea metabolism)
  # Stool Ag test (Detect H. pylori Ag in the stool)
  # Endoscopic biopsy (intestinal metaplasia , Mucosa - associated lymphoid tissue" MALT")
- CXR /CT abdomen (To evaluate Air under diaphragm)
- Serum gastrin level (To screen for Zollinger - Ellison syndrome)

► Treatment

- Life style modification (Discontinue NSAIDs , Stop smoking &alcohol, Decrease stress & coffee , Avoid eating before bedtime)
- Acid suppression therapy
- ◇ PPIs : Omeprazole , Lansoprazole (Block H+/K+ ATPase pump directly in parietal cell membrane)
- ◇ H2-blocker : Cimetidine , Ranitidine (Block histamine-based parietal cell acid secretion)
- ◇ Antiacids : Aluminum hydroxide , Calcium carbonate , Bismuth subsalicylate)
- Cytoprotection :Sucralfate , Misoprostol (Decrease risk of ulcer in Pt who requires NSAIDs)
- Surgical " Parietal cell vagotomy" (For complication " bleeding ,perforation ,obstruction")
- H. pylori ttt

	Regimen	Advantage	Disadvantage
Triple therapy	• PPIs • Amoxicillin • Clarithromycin	Twice daily dosage	More expensive
Quadruple therapy	• PPIs • Bismuth subsalicylates • Metronidazole • Tetracycline	Half the time as triple therapy (1weeks of quadruple = 2weeks of triple therapy)	Expensive

▶ Zollinger -Ellison syndrome

▶ Definition

Gastrin - secreting tumor (Gastrinoma) in duodenal &/or pancreas = Acid hypersecretion this lead to recurrent ulcers in duodenum & jejunum
Associated with = MEN1

▶ Symptoms

- Burning abdominal pain
- Diarrhea +/- steatorrhea
- N/V
- Fatigue
- Weakness
- Wight loss
- GI bleeding

▶ Diagnosis

- Elevation in serum gastrin levels
- Positive secretin stimulation test (increase gastrin with administration of secretin)
- CT
- Nuclear oclerotide " to facilitate localization of gastrinomas "

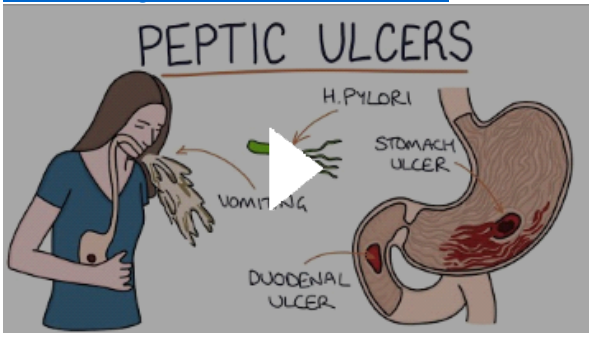
▶ Treatment

- Moderate to high dose of PPIs
- Surgical resection of gastrinoma

▶ Ulcers terms

- Cushing's ulcer: PUD "gastric ulcer"/gastritis associated with neurologic trauma or tumor
- Curling's ulcer : PUD" duodenal ulcer"/gastritis associated with major burn injury
- Marginal ulcer : Ulcer at the margin of a GI anastomosis
- Dieulafoy's ulcer : Pinpoint gastric mucosal defect bleeding from an underlying vascular malformation

Understanding Stomach and Duodenal Ulcers



Endoscopic treatment of a bleeding duodenal ulcer



Gastric carcinoma

Saturday, February 3, 2024 9:19 PM

Types

- Adenocarcinoma "most common"
- Lymphoma
- Carcinoids
- Gastrointestinal stromal tumor "GIST"(Leiomyosarcoma)

Adenocarcinoma

Types

- Proximal diffuse type
- Distal intestinal type

The difference between diffuse & intestinal type

- Distal intestinal
- Shows glands on histology
- Causes: H . Pylori ,Diet ,Smoking
- Commonly on lesser curvature
- Affect Older male
- Proximal diffuse
- No glands in histology , diffuse lymphatic invasion
- Cause: Mutation in CDH1 which code for E-cadherin
- Affect younger female

Morphology

- Ulcerating (ulcer through all layer)
- Polypoid (solid mass project into stomach lumen)
- Superficial
- Linitis plastica /scirrhous (infiltrate all layers)

Risk factors

- Male
- Smoking
- Chronic H. Pylori infection
- Blood type A
- Diet high in nitrates
- Diet low in fruit & vegetables / High in dried , smoked , salted food
- Processed meat " sausages, bacon "
- Pernicious anemia
- Metaplastic atrophic gastritis
- Adenomatous polyps
- Menetrier disease (large stomach folds from epithelial cell hyperplasia)

▶ Symptoms

WEAPON

- Weight loss
- Emesis
- Anorexia
- Pain/epigastric discomfort
- Obstruction " if distal"
- Nausea
- Dysphagia " if proximal"

▶ Diagnosis

- EGD/ barium swallow "to see the ulcers"
- Endoscopy +Biopsy
- Abdominal CT " for staging"

▶ Treatment

- Surgical removal of cancer & adjacent lymph node.
- Chemoradiation

▶ Metastasis of gastric carcinoma

- Metastasis to ovaries = Krukenberg tumor
- Metastasis to supraclavicular node = Virchow's nodes
- Metastasis to rectum = Blumer's shelf
- Metastasis to left axillary adenopathy = Irish node
- Metastasis to subcutaneous periumbilical = Sister Mary Joseph nodule

▶ TNM staging of gastric carcinoma

➢ T (tumor size & penetration)

- T0 "tumor in situ"
- T1
- T2
- T3
- T4 "spread to nearby tissue"

➢ N (cancer spread to nearby lymph node)

- N0 " no spread to lymph node"
- N1 "1-6 nodes"
- N2 "7-15 nodes '
- N3 ">15 nodes"

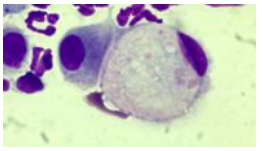
➢ M (metastasis to other organs)

- M0 " no metastasis"
- M1 " metastasis "

Linitis plastica

- Definition : Type of adenocarcinoma that spread to the muscles & Stomach wall which make it thicker and rigid .
- Findings : - Leather bottle in barium meal -Signet ring cell in histology





Lymphoma

- Stomach = most common location for extra- nodal lymphoma
- Usually Non-Hodgkin's lymphoma (B cell)
- Complications: Bleeding , Obstruction , Perforation
- Diagnosis : EGD + biopsy
- Treatment : surgery , chemotherapy

Carcinoids

Cause

Due to Chronic hypergastrinemia states (Gastrin is trophic to enterochromaffin - like cell of stomach leading to hyperplasia then carcinoids , arise in G-cell.
Can be seen in Pt with vitiligo

Types according to the cause of hypergastrinemia

- Type 1 = Autoimmune gastritis / pernicious anemia " most common"
- Type 2 = Zollinger Ellison syndrome
- Type 3 = spontaneous " most aggressive"

Gastrointestinal stromal tumor "GIST"

symptoms

- Asymptomatic
- Nausea
- Distention
- Abdominal pain
- Obstruction & Bleeding

Diagnose

- Ultrasound (Hypoechoic with smooth edges)
- EGD + Biopsy (C-KIT positive)
- CT

► Treatment

- Tumor resection
- Chemotherapy if malignant

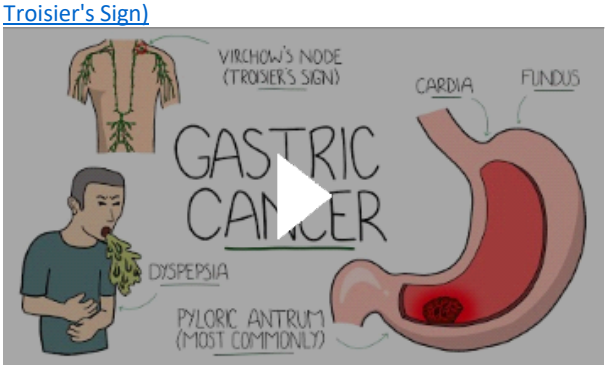
► Mucosa - associated lymphoid tissue lymphoma "MALT Lymphoma"

- Related to?! H. Pylori infection
- Diagnosis : EGD + biopsy
- Treatment : treat H. Pylori

► Gastric volvulus

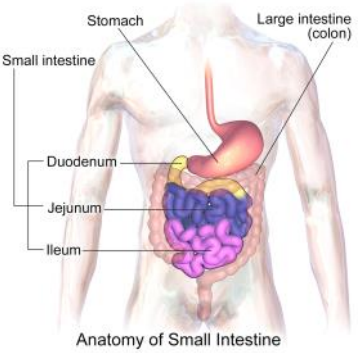
- Definition : Twisting of the stomach , associated with type 2(paraoesophageal) hernia
- Symptoms : Borchardt's triad (1- Distention of epigastrium 2- Can't pass NGT 3-Emesis followed by inability to vomit)
- Treatment : Exploratory laparotomy to untwist.

Gastric Cancer - An Overview for Students and Junior Doctors (Including Troisier's Sign)



Small intestine

Monday, March 18, 2024 12:10 AM

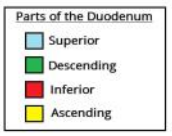


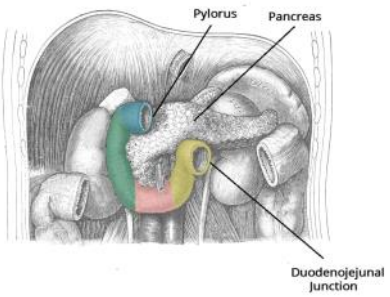
Anatomy of Small Intestine

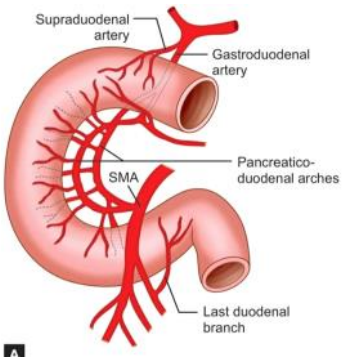
► Duodenum

⇒ Parts :

1. Superior / Bulb
2. Descending
3. Inferior / transverse
4. Ascending





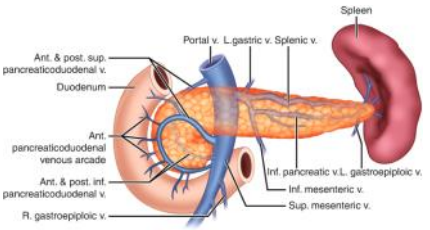


⇒ Blood supply :

- Superior pancreaticoduodenal A "Anterior & posterior" (branch of gastroduodenal A) "supply proximal portion"
- Inferior pancreaticoduodenal A (branch of superior mesenteric A)" supply distal portion"

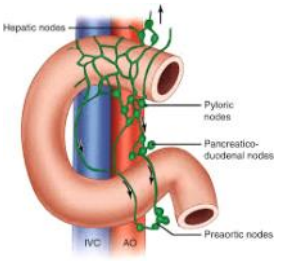
⇒ Venous drainage:

- Superior pancreaticoduodenal V
- Inferior pancreaticoduodenal V



⇒ Lymphatic drainage:

- Anterior lymphatic group (drains into the pancreaticoduodenal nodes & Pyloric node)
- Posterior lymphatic group (drains into the superior mesenteric nodes)



⇒ Nerve supply:

- Sympathetic (Celiac plexus)
- Parasympathetic (Vagus N)

► Jejunum

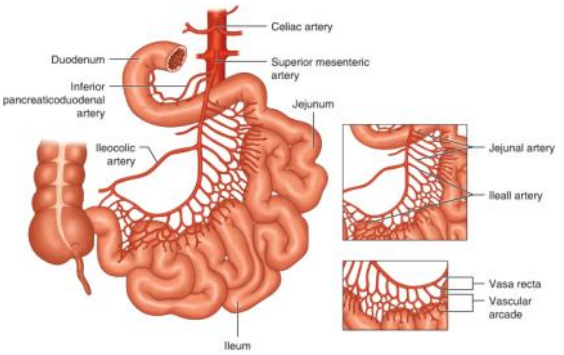
⇒ Blood supply:
Superior mesenteric A

⇒ Venous drainage:
Superior mesenteric V

⇒ Lymphatic drainage:
Superior mesenteric node

⇒ Nerve supply:

- Sympathetic (through Celiac plexus & Superior mesenteric plexus)
- Parasympathetic (through Vagus N)



► Ileum

⇒ Blood supply:
Superior mesenteric A
⇒ Venous drainage:
Superior mesenteric V
⇒ Lymphatic drainage:
Superior mesenteric node
Ileocolic node
⇒ Nerve supply:
- Sympathetic (through Celiac plexus & Superior mesenteric plexus)
- Parasympathetic (through Vagus N)

Small bowel obstruction

Monday, January 29, 2024 7:38 PM

Definition

Mechanical or functional obstruction to the passage of intraluminal contents

Difference between mechanical and functional obstruction

- Mechanical (partial or complete): barrier causes the obstruction
- Functional (ileus): failure of peristalsis " Neurogenic "

Difference between partial and complete obstruction

- Partial obstruction: pt are able to pass gas or have bowel movement's opposite to complete.

Cause

▸ Without previous surgery
- Small bowel = Hernia
- Large bowel = Cancer

▸ With previous surgery
- Small bowel = Postoperative adhesion
- Large bowel = Cancer

▸ Cause of colonic obstruction
- Carcinoma
- Diverticulitis
- Volvulus

▸ Other
- Intussusception
- Crohn disease
- Foreign body
- Compression
- Superior mesenteric artery syndrome (When a part of small intestine that's connected to the stomach is pinched by 2 arteries)

Symptoms

✧ Persistent vomiting (green bilious)/ nausea
✧ Obstipation (inability to pass flatus and the accumulated dry hard feces)
✧ Abdominal pain
✧ Abdominal distention
✧ Hypovolemia lead to systemic findings (Tachycardia , Hypotension ,Tachypnea , Oliguria)

Diagnosis



❖ X-Ray
Air-fluid level & dilated loops of small intestine
Note :
- Different heights of air-fluid level on either side of same loop = Dynamic obstruction
- Same height of air-fluid level on either side of same loop = paralytic ileus .

❖ CBC / Electrolytes
Decrease absorption = Hypovolemia, Hypochloremia , Hypokalemia , Metabolic alkalosis .

❖ Barium enema
(rule out colonic obstruction if the plain film isn't specific)

► Management

- ➢ IV fluid (add potassium to treat hypokalemia) & bowel rest
- ➢ Gastrointestinal decompression by nasogastric tube (NG tube) to empty the stomach
- ➢ Surgery(laparoscopy) / Exploratory laparotomy
  Indication ?!
  - ○ Complete obstruction
  - ○ Partial obstruction with persistent pain /symptoms (fever ,increase WBC)= sign of strangulation or perforation .
- ➢ Obstruction from hernia = Repair the hernia surgically
- ➢ Contrast enema (thought to be helpful if obstruction is colonic origin)

► Complications of obstruction

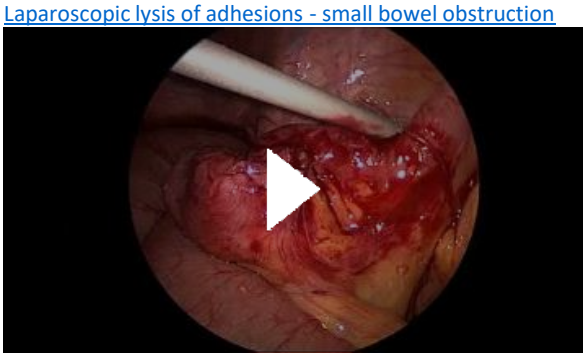
Compromised blood flow may lead to

- Ischemia
- Necrosis
- Perforation

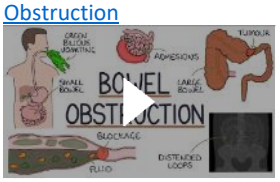
► Paralytic ileus

- Definition: intestinal hypomotility (loss or decrease peristaltic movement) without obstruction
- Causes: Abdominal surgeries, Opiates, Hypokalemia , Sepsis , Trauma , Drugs, Infection(Peritonitis, pancreatitis, appendicitis) .
- Symptoms: Green bilious vomiting , Constipation , Decrease flatus , Distended abdomen , Decrease bowel sound
- Treatment : Bowel rest ,NG tube, Electrolytes correction, Cholinergic drugs (to stimulate intestinal motility)

Laparoscopic lysis of adhesions - small bowel obstruction



Understanding Bowel Obstruction



Understanding Ileus (Paralytic Ileus)



Upper & Lower GI bleeding

Tuesday, February 6, 2024 10:00 PM

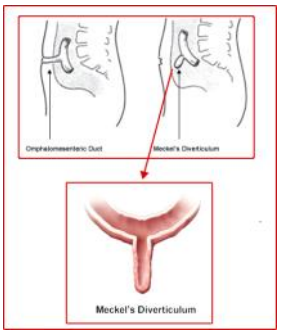
	Upper GI bleeding	Lower GI bleeding
Definition	Bleeding into lumen of proximal GI , proximal to ligament of Treitz	Bleeding distal to ligament of Treitz most commonly in the colon
Location	Proximal to ligament of Treitz (suspensory ligament of duodenum)	Distal to ligament of Treitz
Symptoms	• Hematemesis (coffee ground emesis) • Melena (> 50 cc of blood) • Hypovolemia (elevated BUN , tachycardia, hypotension) • Syncope • Hematochezia • Epigastric tenderness/discomfort	• Hematochezia (bright red blood per rectum "BRBPR") • Abdominal pain / tenderness • Melena • Anorexia • Fatigue • Hypovolemic shock • Syncope
Risk factors	▪ Alcohol ▪ Smoking ▪ Trauma / burn ▪ Liver diseases ▪ Splenic vein thrombosis ▪ NSAIDs / Aspirin ▪ Portal HTN	▪ Medication (aspirin , Plavix ,coumadin) ▪ GI surgery
Etiology	• Peptic ulcer " Most common" • Esophageal / Gastric varices • Esophagitis / Gastritis • Mallory -Weiss tear • Gastric antral vascular ectasia • Dieulafoy's lesion	• Diverticulosis • IBD " usually UC" • Neoplasm • Angiodysplasia • Hemorrhoids / Fissures • AV malformation "Angiodysplasia"
Diagnosis	▪ Endoscopy ▪ NG tube & lavage (- in 15%) ▪ Abdominal X-ray ▪ CBC ,PT/PTT	▪ Rule out UBGI ▪ Anoscopy / Sigmoidoscopy ▪ Colonoscopy " if stable" ▪ Mesenteric angiography " too much blood" ▪ Arteriography/ Exploratory laparotomy "if unstable"
Initial management	➢ Protect airway ➢ IV fluid & packed RBCs ➢ Water lavage (to remove clots)	➢ IV fluid & packed RBCs
Long term management	➢ Treat underlying cause	➢ Endoscopic therapy (Epinephrine injection , cauterization , Clip placement) ➢ Intra -arterial vasopressin infusion OR embolization OR surgery (for diverticular disease or angiodysplasia)

Approach to Upper Gastrointestinal Bleeding - causes, symptoms (melena) and treatment



Meckel's diverticulum

Wednesday, February 28, 2024 12:11 PM



▶ Definition

Remnant of omphalomesenteric duct/ Vitelline duct (which connects the yolk sac with primitive midgut in embryo) " True diverticulum"
Usual location?! 2 ft from ileocecal valve on the antimesenteric border of bowel .

▶ Rules of 2's

- 2% are symptomatic
- Found 2 ft from ileocecal valve
- Found in 2% of population
- Most symptoms occur before age of 2
- May have 2 type of ectopic tissue (mainly gastric & pancreatic tissue)
- Most diverticula are 2 inches long
- Male to female ratio = 2:1

▶ Symptoms

- Lower GI bleeding (Hematochezia /melena)
- RLQ pain
- SBO (Intussusception , Volvulus , Obstruction near terminal ileum)

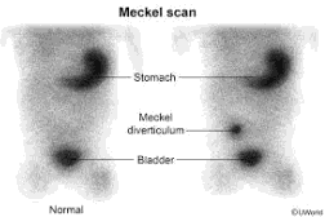
▶ Complications

Meckel's Diverticulum Mnemonic



- Painless intestinal hemorrhage
  (It accounts for 50% of all lower GI bleeding in pt < 2 years old)
  Cause of bleeding?! Ectopic gastric mucosa secreting acid → Ulcer → Bleeding .
  # Most common ectopic tissue in diverticulum?! Gastric mucosa.
  # Other ectopic tissue but less common?! Duodenal , pancreatic , colonic mucosa.
- Intestinal obstruction " most common in adult "
- Inflammation +/- perforation

▶ Diagnosis



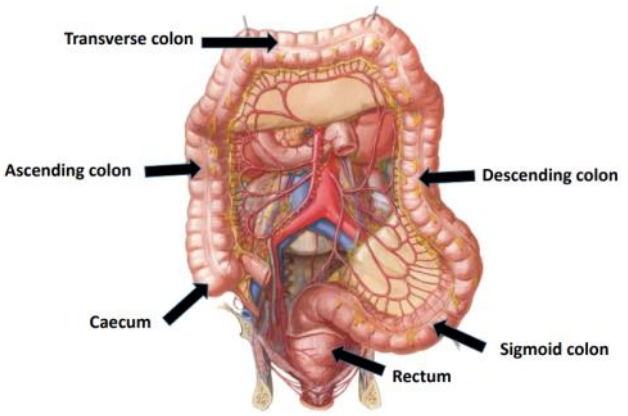
- Meckel's scan (Technetium Tc 99m pertechnetate IV) " to scan for ectopic gastric mucosa"

▶ Treatment

- Surgical resection (Diverticulectomy)with small bowel resection , why?1 because the actual ulcer is usually on the mesenteric wall opposite to the diverticulum .

Large intestine

Monday, March 18, 2024 1:08 AM



► Cecum

the vermiform appendix is attached to the cecum

⇒ Blood supply:
Ileocecal A (branch of Superior mesenteric A)

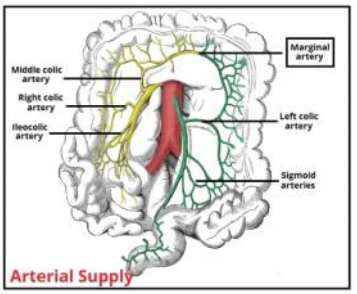
⇒ Venous drainage:
Ileocecal V (which drains into superior mesenteric V)

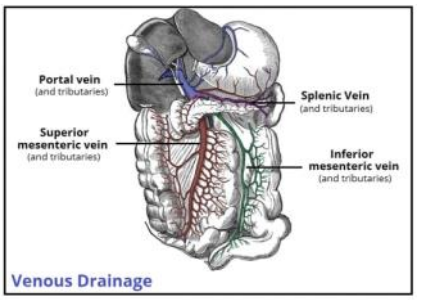
⇒ Lymphatic drainage:
Ileocolic lymph nodes

⇒ Nerve supply:
Parasympathetic, Sympathetic, Sensory
= From Superior mesenteric plexus

► Ascending, transverse , descending, sigmoid colon

	Ascending colon	Transverse colon	Descending colon	Sigmoid colon
Blood supply	• Ileocecal A • Rt colic A # Both branch of superior mesenteric A	• Rt & Middle colic A # Branch of SMA • Lt colic # Branch of IMA • Marginal A # Anastomotic arcades between the right and left colic arteries	• Lt colic A • Sigmoid A # Both are branches of inferior mesenteric A	• Lt colic A • Sigmoid A # Both are branches of inferior mesenteric A
Venous drainage	• Ileocecal & Rt colic V into Superior mesenteric V (which join the splenic V and form hepatic portal V)	• Middle colic V into Superior mesenteric V	• Lt colic V into Inferior mesenteric V	• Sigmoid V into Inferior mesenteric V
Lymphatic drainage	Superior mesenteric node	Superior mesenteric node	Inferior mesenteric node	Inferior mesenteric node
Nerve supply	Parasympathetic, sympathetic, and sensory nerve supply from the superior mesenteric plexus.	• Proximal two-thirds of the transverse colon: receive parasympathetic, sympathetic, and sensory nerve supply from the superior mesenteric plexus. • Distal one-third of the transverse colon: parasympathetic, sympathetic, and sensory nerve innervation from the inferior mesenteric plexus.	parasympathetic, sympathetic, and sensory nerve innervation from the inferior mesenteric plexus.	parasympathetic, sympathetic, and sensory nerve innervation from the inferior mesenteric plexus.





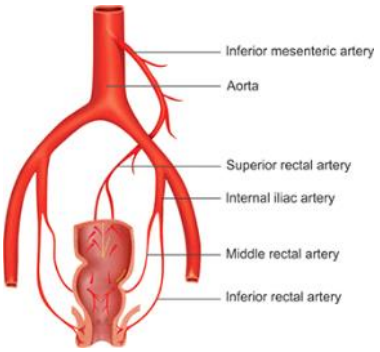
▶ Rectum

⇒ Blood supply
Superior rectal A (continuation of IMA)
Middle & Inferior rectal A (branches of internal iliac A)

⇒ Venous drainage:
Superior , Middle , Inferior rectal V

⇒ Lymphatic drainage:
Pararectal LN (into inferior mesenteric node)
Internal iliac LN (from lower part of rectum)

⇒ Nerve supply:
Sympathetic = Lumbar splanchnic nerves and superior and inferior hypogastric plexuses
Parasympathetic = pelvic splanchnic nerves and inferior hypogastric plexuses



▶ Anal canal

⇒ Blood supply:
Above pectinate line = Superior rectal A (branch of IMA)
Below pectinate line = Middle & Inferior rectal A (branch of internal iliac A)

⇒ Venous drainage:
Above pectinate line = Superior rectal V into Inferior mesenteric V
Below pectinate line = Internal pudendal V to Internal iliac V

⇒ Lymphatic drainage :
Above pectinate line = Inferior mesenteric node
Below pectinate line = Superficial inguinal LN

⇒ Nerve supply:
Above pectinate line = Inferior hypogastric plexus (Anatomical innervation)
Parasympathetic innervation inhibits the tone of the internal anal sphincter and evokes a peristaltic contraction to allow defecation
Below pectinate line = Pudendal nerve (somatic innervation)
The inferior aspect of the anal canal is highly sensitive to pain, temperature, and touch.

Appendicitis

Saturday, January 27, 2024 7:34 PM

► Definition

Inflammation of the appendix caused by obstruction of the appendiceal lumen, producing a closed loop that can lead to necrosis and perforation.

► Peak incidence

Teens to mid-20s

► causes

1- Lymphoid hyperplasia
2- Fecalith
3- Foreign body
4- Parasite
5- Carcinoid tumor

► Symptoms

1. Periumbilical pain (intermittent and crampy)
2. Nausea/vomiting
3. Anorexia
4. Pain migrates to RLQ (constant and intense pain), usually in <24 hours
5. low grade fever (high grade fever if perforate)

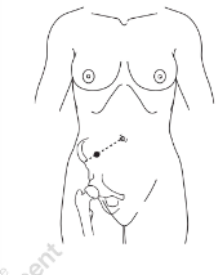
► Signs



- Obturator sign
  Pain upon internal rotation of the leg with the hip and knee flexed.



- Psoas sign
  Pain elicited by extending the hip with the knee in full extension or by flexing the hip against resistance.
- Rovsing's sign
  Palpation or rebound pressure of the LLQ results in pain in the RLQ



- McBurney's point
  Point one third from the anterior superior iliac spine to the umbilicus (often the point of maximal tenderness)
- Percussion tenderness

► Diagnosis

- CBC: increased WBC (>10,000 per mm3) Leukocytosis & Left shift "Neutrophils"
- Ultrasound
- CT
  (Distended thick walled appendix with inflammatory streaking of peri appendiceal fat) .
- X-ray (see the Fecalith , air in Rt side , Scoliosis)

► The Alvarado score

Assessment item	Score
Pain migration to RIF	1
Anorexia	1
Nausea and vomiting	1
RIF tenderness	2
Rebound tenderness	1
Fever $\geq$ 37.3°C	1
Raised WCC	2
Shift of WCC to left	1
Total score	10

Guidelines for management according to total score: <4,probability of acute appendicitis (AA) unlikely; 4–7, AA suspected; >7, definite AA.
RIF, right iliac fossa; WCC, white cell count.

► Management

- preoperative medications/preparation?
  1. Rehydration with IV Fluids
  2. Preoperative antibiotics (2nd generation cephalosporin) with anaerobic coverage

- treatment for nonperforated acute appendicitis?
  laparoscopic appendectomy (prevents perforation), 24 hours of antibiotics.

- treatment for perforated acute appendicitis?
  IV fluid resuscitation and prompt appendectomy; all pus is drained with postoperative antibiotics continued for 3 to 7 days.

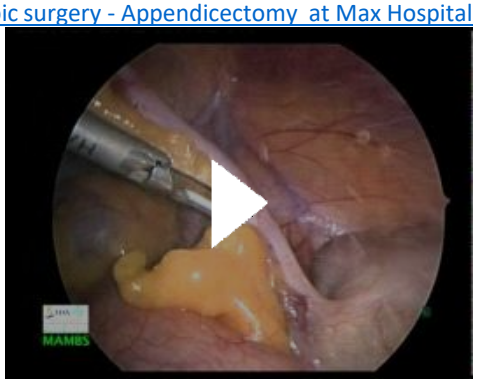
► complications of appendicitis

Pelvic abscess, liver abscess, free perforation=peritonitis

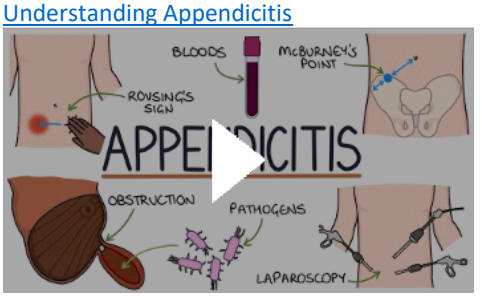
► complications of appendectomy

wound infection, Small Bowel Obstruction, enterocutaneous fistula, infertility with perforation in women, right inguinal hernia, stump abscess

Laparoscopic surgery - Appendicectomy at Max Hospital



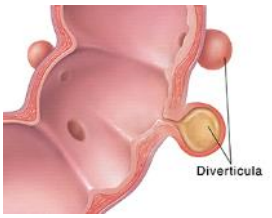
Understanding Appendicitis



Diverticulosis

Thursday, February 15, 2024 9:39 PM

Definition



It's a diverticula found within the colon, especially the sigmoid; diverticula are either :

- False diverticula (Only mucosa and submucosa herniate through the bowel musculature)
- True diverticula (Involve all layers of the bowel wall ,rare in the colon)

Pathophysiology

Weakness in the bowel wall develops at points where nutrient blood vessels enter between antimesenteric and mesenteric taeniae; increased intraluminal pressures then cause herniation through these areas.

Risk factors

- Old age >60
- Obesity
- People with Low fiber diet /high fat ,red meat diet
- Chronic constipation
- NSAIDs use
- Positive family history

Symptoms

- Asymptomatic
- LLQ discomfort
- Bloating
- Constipation /Diarrhea

Understanding Diverticulosis and Diverticulitis



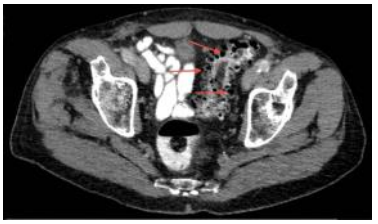
Complications

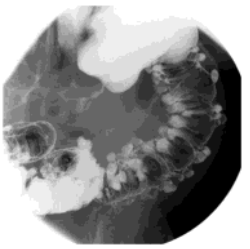
- Bleeding "painless hematochezia"
- Massive diverticulitis

Diagnosis

- Colonoscopy
- Barium enema
- Abdominal CT





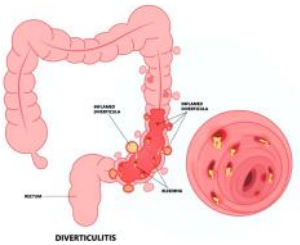


Treatment

- High fiber diet
- Psyllium (increase the bulk of the stool)
- IV crystalloid & packed RBCs (in case of bleeding)
- Surgical removal of the affected area in sever symptomatic cases

Diverticulitis

Thursday, February 15, 2024 10:06 PM



▶ Definition

Infection or perforation of diverticulum

▶ Pathophysiology

Obstruction of diverticulum by a fecalith leading to inflammation and micro perforation

▶ Symptoms / Signs

- LLQ pain & tenderness (cramping OR steady)
- Diarrhea
- Fever /chills
- Anorexia
- N/V
- Dysuria

▶ Diagnosis

- Lab test (Leukocytosis , Elevated CRP)
- Abdominal CT with oral or IV contrast
- X-ray (Air -fluid level for obstruction , Free air if perforated)

Barium enema / colonoscopy should be avoided in acute diverticulitis ,Why?! Because there's risk of perforation

▶ Treatment

- IV fluid , NPO , Broad spectrum antibiotics
- Hartmann's procedure (resection of involved segment with an end colostomy and stapled rectal stump)

▶ Complication

- Abscess
- Fistula
- Obstruction
- Perforation - peritonitis

Mesenteric ischemia

Sunday, February 25, 2024 10:50 PM

Acute mesenteric ischemia

Definition

Acute onset of intestinal ischemia

Causes

- Emboli to mesenteric vessel (mainly Superior mesenteric artery) from heart
  - A-fib
  - MI
  - Cardiomyopathy
  - Valve disease / Endocarditis
  - Mechanical heart valve
- Acute thrombosis of long standing atherosclerosis of mesenteric artery
- Drugs (Digitalis)

Symptoms/signs

- Acute onset of severe pain "pain out of proportion to physical exam"
- Vomiting , Diarrhea or both
- +/- Heme stool "Rectal blood"
- Lactic acidosis (due to bowel infraction)

Classic triad of acute mesenteric ischemia?!

1. Acute onset of pain
2. Vomiting , Diarrhea or both
3. History of A-Fib or heart disease

Diagnosis

- Mesenteric A-gram
- Ct angiography of abdomen &pelvis
- ABG (metabolic acidosis , Increased lactate level)

Treatment

- IV fluid , Antibiotics
- Treatment of emboli
  - Fogarty catheter embolectomy
  - Resect obviously necrotic intestine
  - “Second look” laparotomy is performed 24 to 72 hours postoperatively
- Treatment of acute thrombosis
  - Papaverine vasodilator via A-gram catheter
  - Supraceliac aorta graft to the involved intestinal artery or endarterectomy
  - Intestinal resection/second look as needed

Chronic mesenteric ischemia "Intestinal angina"

Definition

Chronic intestinal ischemia from long-term occlusion of the intestinal arteries; most commonly results from atherosclerosis; usually in two or more arteries because of the extensive collaterals

Risk factors

- Increase age
- Family history
- Smoking
- DM
- HTN
- Elevated cholesterol

Symptoms / Signs

- Weight loss
- Postprandial abdominal pain Anxiety /fear of food , why?! Because of postprandial pain
- Abdominal bruit
- +/- Heme stool
- +/- Vomiting / Diarrhea

Diagnosis

- A-gram
  # Classical finding : Two of the three mesenteric arteries are occluded, and there is atherosclerotic narrowing of the third patent artery.
- Duplex
- MRA

Treatment

- Bypass
- Endarterectomy
- Angioplasty
- Stenting

Mesenteric colitis

Definition

Most common intestinal ischemia due to Nonocclusive ischemia involving portions of splenic flexure, rectosigmoid junction "Watershed areas", descending colon &/OR sigmoid colon (Inferior mesenteric circulation).

Risk factors

- Elderly
- Post -op (colonic surgery , Aortic aneurysm repair)
- HF
- Medications/ Cocaine
- Hypercoagulable states
- Extreme athletes

Symptoms

- Acute LLQ pain
- Urge to defecate
- Red to maroon stool



Diagnosis

- CT with contrast (show portal venous gas which indicates transmural necrosis")
- Abdominal X-ray OR Barium enema (Thumbprinting appearance" due to thickening of bowel mucosa (edema/hemorrhage)")
- Colonoscopy / Sigmoidoscopy

Treatment

- Bowel rest , Fluid , Antibiotics

Mesenteric venous thrombosis "MVT"

Risk factors

- Hypercoagulable states, such as :
  - Antithrombin III deficiency
  - Prothrombin deficiency
  - Protein S deficiency
  - Protein C deficiency
  - Factor 5 Leiden deficiency
- Infections
- Pancreatitis
- Liver disease (cirrhosis)
- Intra-abdominal sepsis
- Sickle cell disease
- Paroxysmal nocturnal hemoglobinuria
- Portal HTN

symptoms

- Bloody diarrhea
- Crampy abdominal pain

Diagnosis

- CT

Treatment

- Thrombolytics
- Long term anticoagulants "Heparin"
- Surgery

Median Arcuate Ligament Syndrome

Definition

Mesenteric ischemia resulting from narrowing of the celiac axis vessels by extrinsic compression by the median arcuate ligament

Symptoms/ Sign

- Postprandial pain
- Weight loss
- Diarrhea
- Abdominal bruit

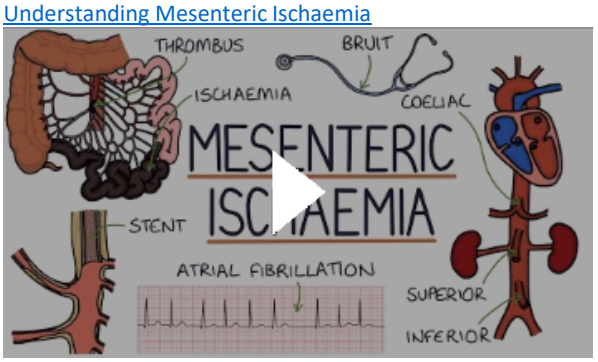
Diagnosis

- A-gram

Treatment

- Release arcuate ligament surgically

Understanding Mesenteric Ischaemia



Colonic Volvulus

Thursday, February 15, 2024 10:43 PM

Definition

Twisting of the colon on itself about its mesentery, resulting in obstruction and, if complete, vascular compromise with potential necrosis, perforation, or both

What is the most common type of colonic volvulus & why?!

Sigmoid volvulus , because the sigmoid is a redundant " floppy " Structure

Sigmoid volvulus

Causes

- High residue diet that result in bulky stool
- Elongated colon
- Chronic constipation
- Laxative abuse
- Pregnancy
- Bedridden elderly
- History of abdominal surgery or distal colonic obstruction

Symptoms /Signs

- Acute colicky abdominal pain
- Progressive abdominal distention
- Anorexia
- Colonic obstruction
- Obstipation
- Cramps
- N/V (Green bilious vomiting)

Diagnosis

- X-ray (Distended loop " Coffee bean sign / omega sign " (where the loop aiming toward RUQ))
- Sigmoidoscopy
- Barium enema(Bird's beak sign)





Treatment

- Sigmoidoscopic reduction
- Hartman's surgery (Removal of rectosigmoid colon)

Signs of strangulation

- Discolored / Hemorrhagic mucosa on sigmoidoscopy
- Bloody fluid in rectum
- Frank ulceration / necrosis
- Fever
- Hypotension

cecal volvulus

Definition

Twisting of the cecum upon itself and the mesentery

Causes

- Idiopathic
- Poor fixation of the Rt colon
- Prior abdominal surgery

Symptoms / Signs

- Acute onset of colicky abdominal pain beginning in RLQ & progress to constant pain
- Vomiting
- Obstipation
- Abdominal distention
- Small bowel obstruction

Diagnosis



- Abdominal X-ray (Dilated , Air -fluid level "Coffee bean sign"(where apex aiming toward LUQ))
- Barium enema

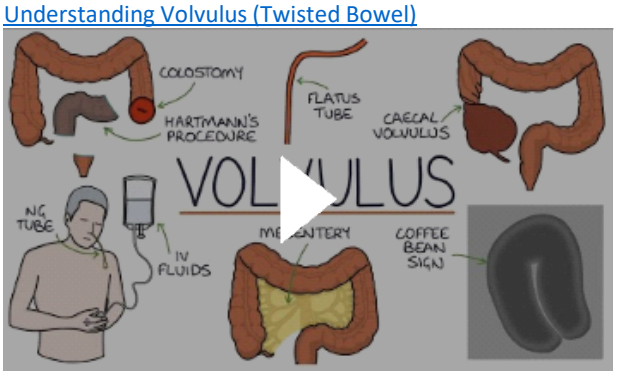
Treatment

- Emergent surgery (Right hemicolectomy with primary anastomosis)

- What are the major difference in the EMERGENT management of cecal volvulus versus sigmoid?

  Patients with cecal volvulus require surgical reduction, whereas the vast majority of patients with sigmoid volvulus undergo initial endoscopic reduction of the twist

Understanding Volvulus (Twisted Bowel)



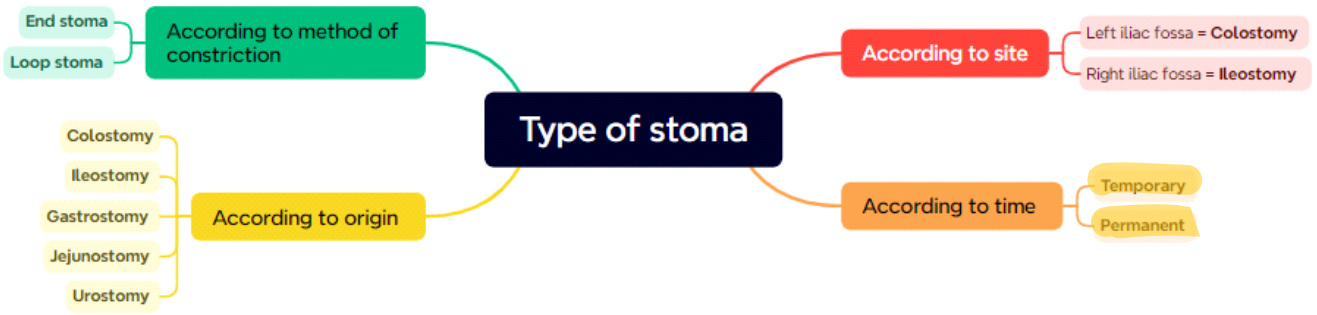
GI stomas

Friday, February 23, 2024 6:21 PM

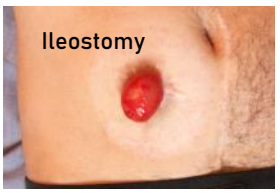
▶ Definition

Artificial openings of a hollow organ for example the bowel or urinary system onto the surface of the abdomen, allowing feces or urine to drain, bypassing the distal portions of the bowel or urinary tract.
Stoma bag :specially adapted bag is fitted around the stoma to collect the waste products.
Ostomy : Operation that connect the GI tract to abdominal wall skin (Man- Made fistula).

▶ Types



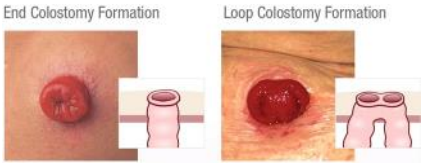












▶ Permanent VS Temporary

Temporary	Permanent
Reversible	Non-reversible
Anastomosis	No distal anastomosis(Permanent removal of distal part)
Example: End colostomy	Example: Loop colostomy

loop ileostomy end ileostomy

How to determine the location of the stoma?!

In the center of Ostomy Triangle (bounded by the anterior superior iliac spine, the pubic tubercle, and the umbilicus) through rectus abdominis muscle(to provide support).
The site should be easily accessed by the Pt & comfortable for them (Should be assisted while standing& setting)
Should avoid ?!

1. Bony prominence (ASIS, Costal margin)
2. The Umbilicus (5 cm away)
3. Old wounds/scars (may be adhesion beneath)
4. Skin folds/creases
5. Waistline of clothes

Effluent

- Definition : The type of stoma output including feces and urine.
- Colostomy = produce Solid OR Semisolid feces
- Ileostomy = produce Liquid OR Mushy contact if small bowel .
- Urostomy = produce Urine

Diet restriction

- Low fiber diet (to reduce stool bulk &reduce intestinal obstruction)
- Avoid vegetables associated with offensive odor (like cabbage, radish , garlic)

Complication

➢ Early

1. Hemorrhage at stoma site
2. Ischemia & Necrosis
   - Caused by skeletonizing the distal small bowel (impaired vascular supply)
3. High output (Dehydration & Malnutrition)
   - Worse and more common with ileostomy.
   - Range from dermatitis to painful ulcerations around the stoma .
4. Obstruction 2 to adhesion
5. Retraction of stoma
   - Stoma going inward, may occur early or late
   - May be exacerbated by obesity.

➢ Delayed

1. Obstruction
2. Skin irritation
   - Ileostomy output should be maintained at less than 1500 mL/d to avoid this problem.
3. Stroma prolapse
   - Stoma protruding outwards more than expected through the stomal opening.
   - More common in loop stoma
4. Stenosis
5. Granulomas
6. Parastomal hernia
   - Less common after an ileostomy than after a colostomy. So it is more common with colostomy
   - Cause : poor appliance fitting, pain, obstruction, or strangulation.
7. Fistula
8. Psychological problems

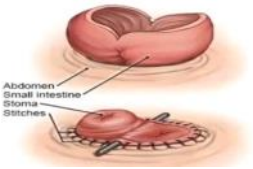
► Colostomy

- Definition : Connection of colon mucosa to abdominal wall skin for more hard stool drainage.
- Why solid stool?! Because most of fluid reabsorption already happened in large intestine .
- Commonest location ?! Left iliac fossa (LIF)
- Indication : Carcinoma of colon -rectum-anus , Diverticular disease , Crohn's disease, Obstruction , Radiation enteritis , Ischemic bowel , Fecal incontinence .
- According to method of constriction :



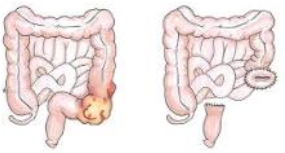
➢ End colostomy (More common)

- Its created after removal of section of bowel & the end part of proximal portion of bowel is brought onto the skin , where the distal part is sutured and left in the abdomen.
- Can be reversed by suturing the 2 ends together creating anastomosis.
- When do we consider it permanent?! After Abdomino- perianal resection (APR) " because the entire rectum &anus have been removed"
- Usual location ?! Lower left abdomen .



➢ Loop colostomy , done to:

- Prevent fecal peritonitis following traumatic injury to the rectum .
- Facilitate the operative treatment of high anal fistula.
- For incontinence &defunction an obstructing low rectal cancer prior to long chemotherapy course.



➢ Hartmann's pouch procedure

- Surgical resection of the rectosigmoid colon with closure of the anorectal stump and formation of an end colostomy.
- When do we use it?! In emergency settings(ischemia , perforation , obstruction of distal colon/rectum)
- Could be reversible after 3-4 months but 40% never undergo reversal so it becomes permanent.

► Ileostomy

- Definition: Connection of the last part of the small intestine (ileum) to the abdominal wall to drain more liquid stool .
- They have Spout ,why?! To drain directly into a tightly fitting stoma bag without the contents coming into contact with the surrounding skin because they are more alkali and more irritating to the skin
- Commonest location ?! Right iliac fossa (RIF)
- Indications: IBD , Bowel ischemia , Colon/rectal cancer, Radiation enteritis , Trauma ,FAP
- According to method of constriction:



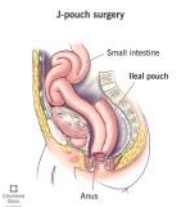
➢ End ileostomy

- Where the ileum is separated from the colon and is brought out through the abdomen to form a stoma permanently after a panproctocolectomy (total colectomy with removal of the large bowel, rectum and anus)



➢ Loop ileostomy

- There are two openings on the skin side-by-side, attached in the middle, the proximal end (the productive side) is turned inside out to form a spout to protect the surrounding skin while the distal end is flatter.
- It's temporarily , can be reversed after 6-8 weeks.



➢ Ileo-anal anastomosis (J-pouch)

- Where the ileum is folded back on itself and fashioned into a larger pouch that functions a bit like a rectum then attached to the anus (replace your colon and rectum internally)

Gastrostomy

- Definition: G-tube through the abdominal wall to the Stomach for drainage or feeding.
- Percutaneous endoscopic gastrostomy (PEG) refers to when the gastrostomy is fitted by an endoscopy procedure.

Urostomy

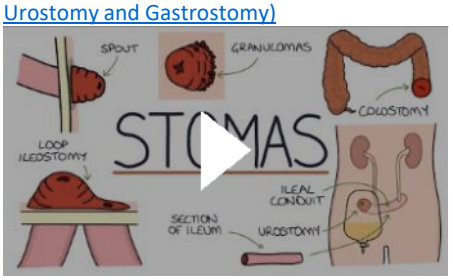
- Definition: Creating an opening from the urinary system onto the skin after cystectomy (removal of bladder)
- Ileal conduit: a piece of your small intestine(Ileum) to make a tube that will connect to the stoma then ureters will be connected to the newly created tube so the urine flows through the tube to the stoma and then out of your body.
- They have a spout
- Typically located in the right iliac fossa (RIF).

Jejunostomy

- Definition : J-tube through the abdominal wall to jejunum for feeding.

	Colostomy	Ileostomy
Site	LIF	RIF
Shape	Flush	Spouted
Effluent	Soli/semisolid (Large bowel)	Liquid (small bowel)
Output	200-700 ml/day	500-1300 ml/day
Electrolyte disturbance	Less common	More common
Skin irritation	Less common	More common
Bad odor	More	Less

Understanding Stomas (Colostomy, Ileostomy, Urostomy and Gastrostomy)



GI Fistula

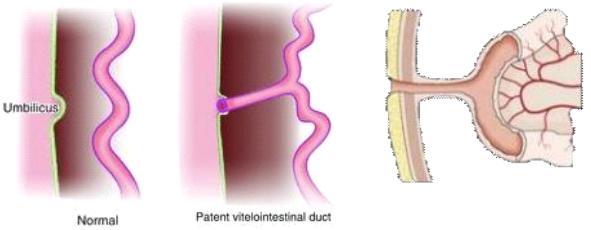
Saturday, February 24, 2024 9:12 PM

Definition

Abnormal communication between two hollow organs OR hollow organ with the skin

Causes

- Trauma /Post operative
- Congenital (Patent Vitello-intestinal duct)
- IBD (Crohn's disease /Colonic diverticulum)
- Foreign body
- Infection (Amebiasis / TB)
- Malignancy



Risk factors for patent fistulas

HIS FRIEND

- High output fistula (>500 cc/day)
- Intestinal destruction (>50% of circumference)
- Short -segment fistula (<2.5 cm)
- Foreign body (G-tube)
- Radiation
- Infection
- Epithelization (colostomy)
- Neoplasm
- Distal obstruction

Symptoms

- Fever , Leukocytosis
- Abdominal tenderness
- Hypovolemia /Dehydration (loss of GI contents)
- Malnutrition
- Skin excoriation & Irritation (in enterocutaneous fistula)

Classification according to nature of discharge

- Bile stained = Duodenum & Jejunum
- Liquid fecal = Ileum & Caecum
- Semi-solid fecal = Distal colon

Anatomical Classification

➢ Internal fistula (Connect two hollow organs)
- Colovesical fistula (With urinary bladder)
- Enteroenteric fistula (With intestine)

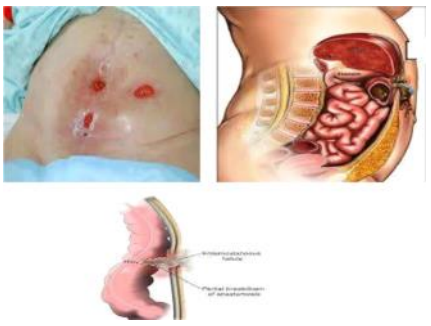
➢ External fistula (Open to external surface of skin)
- Enterocutaneous fistula
  - High output fistula
  - Low output fistula
- Pancreaticocutaneous fistula

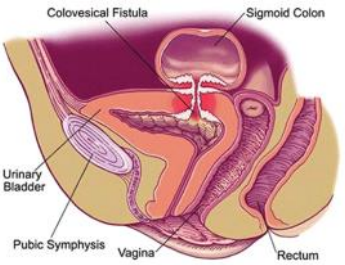
► High output fistula VS Low output fistula

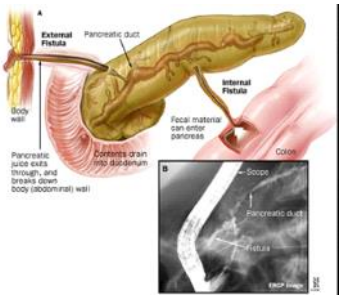
➢ High output fistula
- >500 ml/day.
- Proximal Fistulas "stomach ,duodenum, or jejunum".

➢ Low output fistula
- <500 ml/day
- Distal Fistulas" ileum or colon".

	Enterocutaneous "Bowel to skin"	Colonic fistulas	Pancreaticocutaneous fistula
Definition	Fistula from GI tract to skin		Drainage of pancreatic exocrine secretions through drain tract/wound
Types		• Colovesical (present with recurrent UTIs, Pneumaturia, Dysuria ,Fecaluria) • Colocutaneous • Colovaginal • Coloenteric	
Causes	- Anastomotic leak - Trauma/injury to bowel - Crohn's disease - Abscess - Diverticulitis - Inflammation / infection	- Diverticulitis - Cancer - IBD - Foreign bodies - Irradiation	
Diagnosis	→ CT (rule out abscess) → Fistulogram	→ Barium enema → Cystoscopy	→ ERCP(to define fistula tract)
Treatment	• NPO,TPN • Drain abscess • Surgical resection of involved segment	• Surgical repair /resection	• NPO,TPN • Skin protection • Octreotide • Surgical resection
Complications	- High output fistula - Malnutrition , Dehydration - Skin breakdown		







Diagnosis

- Fistulogram (Contrast is injected into the fistula to provide visualization of all tracts and sites of communication & Shows blockage or stenosis).
- Ultrasound OR CT with oral or IV contrast (To characterize the location of fistula & Aspiration of infected abscess)
- Endoscopy (To assess the bowel for underlying pathologies like IBD, cancer).
- Contrast enema (In case of colonic OR rectal fistula)

Treatment

Heal spontaneously

Non -operative management

- Fluid resuscitation &electrolytes correction (Pt with high output fistula require Catheter)
- Sepsis control (IV antibiotics directed against bowel flora)
- Nutritional support (NPO , IV parenteral(in high output &proximal fistula) , Enteral "Feeding tube" (For low output& distant fistula) , TPN
- Decrease fistula output (with somatostatin &it's analogs) , (H2 antagonist /PPIs for gastric &duodenal fistula)
- Skin protection

Operative management

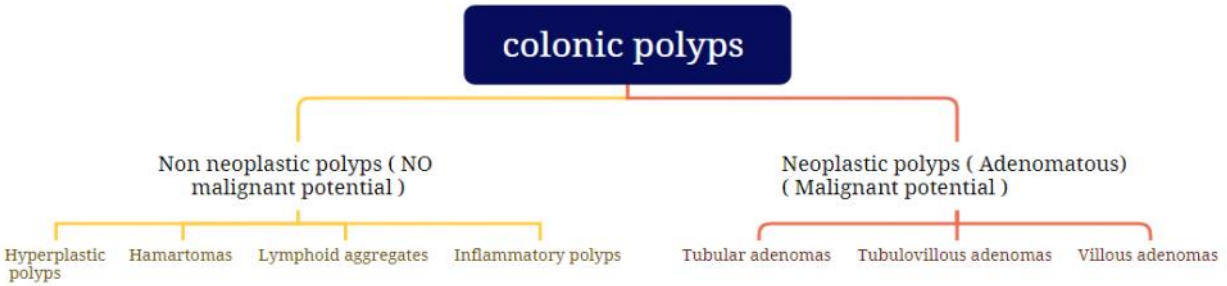
Resection of diseased intestinal segment with anastomosis of healthy ends

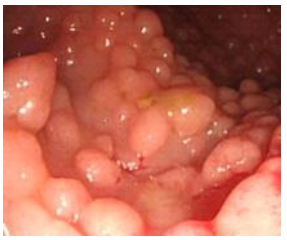
Indication ?!

- Sepsis/Inflammation not amenable for percutaneous drainage
- Complete Distal obstruction
- Uncontrollable bleeding from fistula
- Continued high-output from fistula after patient has been given nothing by mouth &started parenteral nutrition
- Signs of infection after institution of adequate antibiotic therapy and drainage of the abscess

Polyposis syndrome

Thursday, February 15, 2024 10:37 PM





▶ Familial adenomatous polyposis (FAP)

▶ Definition

Hundreds of adenomatous polyps within the rectum and colon , they start arising after puberty & the risk of colorectal cancer is 100% in untreated cases .

▶ Inheritance pattern

Autosomal dominant (APC " Adenomatous Polyposis Coli " gene on chromosome 5)

▶ Treatment

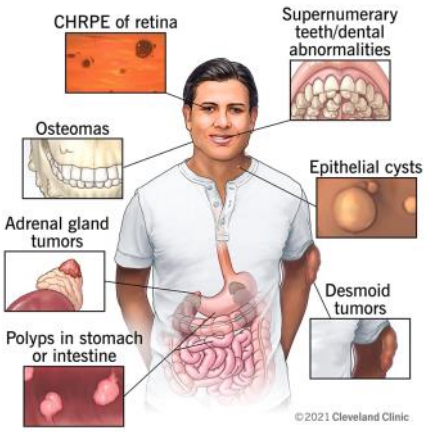
- Total proctocolectomy

▶ Gardener's syndrome

▶ Definition

Neoplastic polyps of the small bowel and colon & the risk of cancer is 100% in undiagnosed cases

Other findings with Gardner syndrome



- FAP+
- Congenital hypertrophy of retinal pigment epithelium
- Sebaceous cysts
- Osteomas of the skull
- Desmoid tumors in abdominal cavity
- Adrenal & Thyroid tumors
- Impacted / supernumerary teeth

Treatment

- Total proctocolectomy
- Tamoxifen ,Sulindac , Steroids (slow the growth of desmoid tumor)

Peutz-Jeghers' syndrome

Definition

Hamartomas throughout the GI tract (jejunum/ileum > colon > stomach) & they increases the risk for cancer

Inheritance pattern

Autosomal dominant (Mutation in LKB1 / STK11)
Female Pt with this syndrome is in high risk for ovarian cancer



Signs

- Melanotic pigmentation (black/brown) of buccal mucosa (mouth), lips, digits, palms, feet (soles)

Treatment

- Removal of polyps (if symptomatic or large >1.5 cm)

Lynch syndrome

Definition

Another name (Hereditary nonpolyposis colorectal cancer "HNPCC") , Proximal colon is always involved
Increase risk of endometrial , ovarian , skin cancer .

Inheritance pattern

Autosomal dominant (Mutation of mismatch repair genes " MLH1,MSH2")

Criteria for Lynch syndrome

3,2,1 Criteria

- At least 3 first degree relatives
- Over at least 2 generations
- With at least 1 person diagnosed with cancer before age 50

Treatment

- Total proctocolectomy

Turcot syndrome

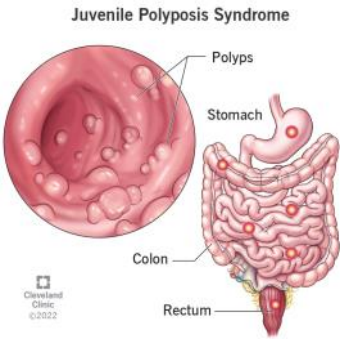
Definition

FAP or Lunch syndrome + CNS tumor (Medulloblastoma or Glioma)

Juvenile polyposis syndrome

Definition

Numerous hamartomata's polyps in colon , stomach , small bowel , pancreas & they increases risk of cancer



Inheritance pattern

Autosomal dominant in children (< 5 years old)

Colorectal cancer

Saturday, February 17, 2024 4:03 PM

Definition

Adenocarcinoma of the colon or rectum (Rectosigmoid > Ascending > Descending)
Most common site for metastasis is?! Liver

Risk factors

- Age(>50 years of age)
- Low fiber / High fat diet
- Obesity
- Smoking
- Positive family history
- FAP / Lynch syndrome
- Adenomatous polyps
- IBD (Mainly Ulcerative colitis)
- Gene mutation (APC , DCC , p53 , K-ras)

Symptoms / Signs

➢ Rt sided colon tumor (Large lumen)
- Melena
- Occult blood in stool
- Microcytic anemia (iron deficiency anemia)
- Postprandial discomfort
- Fatigue
- Weight loss

➢ Lt sided colon tumor (Smaller lumen)
- Hematochezia
- Colicky pain
- Abdominal mass
- N/V
- Change in bowel habits (Narrowing of stool " Pencil stool")

➢ Rectal tumor
- Hematochezia (Fresh blood +/- stool)
- Tenesmus (the feeling that you need to pass stools, even though your bowels are already empty)
- Rectal mass

Diagnosis





- History /Rectum examination
- Barium enema (Apple core appearance)
- Colonoscopy + Biopsy
- Endorectal ultrasound
- The fecal occult blood test "FOBT " (to check stool samples for hidden (occult) blood)
- CBC (for Microcytic anemia)
- CXR/ LFT/Abdominal CT (To look for metastasis)

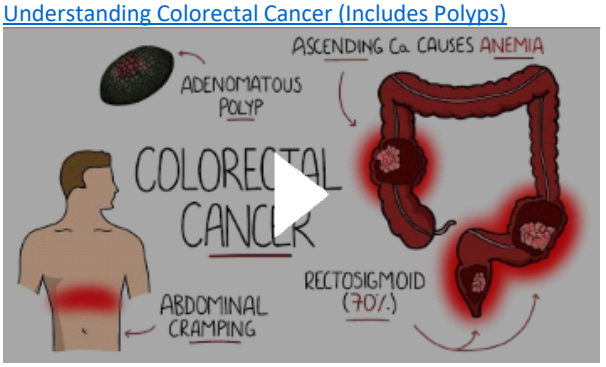
► Treatment

- Surgical resection with regional lymphatic drainage
- Chemotherapy OR Radiation therapy (Depending on stage of tumor , mainly stage 3&4)

► Tumor stages (TMN staging system)

- Stage I (Invades submucosa OR muscularis propria)
- Stage II (Invades through muscularis propria OR surrounding structures but negative nodes)
- Stage III (Positive node , NO distant metastasis)
- Stage IV (Distant metastasis)

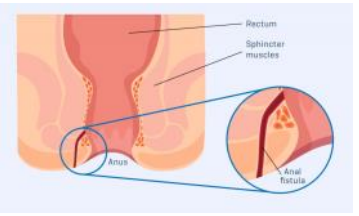
Understanding Colorectal Cancer (Includes Polyps)



Anal disorders

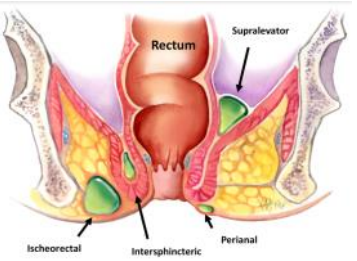
Monday, February 19, 2024 8:36 PM

▶ Fistula in Ano



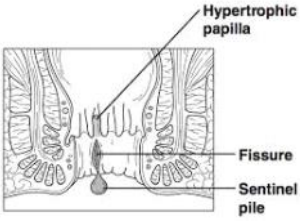
- Definition: Abnormal passage from rectum to perianal skin
- Causes : Anal crypt/gland infection (Perianal abscess) , Crohn's disease , T.B
- Symptoms /Signs: Pain(when you poop ,cough ,set) ,Perianal drainage , Perirectal abscess, Diaper rash , Itching
  # What disease should be considered in fistula in Ano ?! Crohn's disease
- Diagnosis : Physical exam , Proctoscope, MRI
  # Goodsall's rule : Anterior fistulas connects with anus/rectum in Straight line
  Fistulas that exist Posteriorly will have Carved tract .
- Treatment : Fistulotomy ,Seton placement (Thick suture through fistula tract to allow slow transection of sphincter muscle) ,Fistula plug/Fibrin glue , Routine Sitz baths (Sitting in warm bath)
  # Most common complication?! Urinary incontinence .

▶ Anorectal abscess



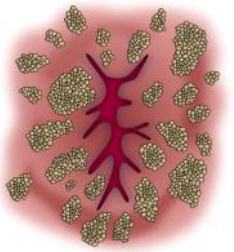
- Definition: Collection of pus in areas around anus/rectum
- Types : Perianal , Intersphincteric , Ischiorectal , Supralevator abscesses
- Cause : Infection of anal crypt gland (Crypt abscess)
- Symptoms/Signs: Rectal pain , Drainage of pus , Fever , Perianal mass.
- Diagnosis : Physical/Digital exam(Reveal Perianal/rectal submucosal mass/fistula) ,MRI
- Treatment : Drainage , Sitz bath, Anal hygiene , Stool softeners

▶ Anal fissure



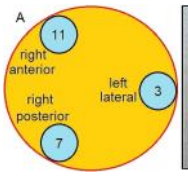
- Definition: Tear or fissure in anal epithelium (Tear in anoderm) below pectinate line
- Most common site: posterior midline (Comparatively to low blood flow)
- Causes: Constipation/Straining ,Low fiber diet, Hyperactive sphincter , Crohn's disease , cancer , Ulcerative colitis , AIDS
- Symptoms /Signs: Pain in anus , Painful bowel movement , Rectal bleeding , Tear in anal skin ,Pain when pooping, Extremely painful rectal exam , Sentinel pile(thickened skin at the distal end of anal fissure) , Hypertrophic papilla
- Triad for chronic fissure : Fissure + Sentinel pile + Hypertrophied anal papilla
- Treatment : Sitz bath , Stool softener, High fiber diet , Anal hygiene , Topical nifedipine , Botox , Lateral internal sphincterotomy (LIS)

▶ Perianal warts (Condyloma acuminatum)

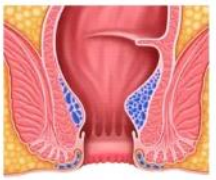


- Definition : A raised growth on the skin around the outside of the anus
- Causes: Human papillomavirus (HPV)
- Symptoms : Painless , Itching , Bleeding
- Major risk for Squamous cell carcinoma
- Treatment : Small = Topical podophyllin
  Large = Surgical resection or Laser ablation

► Hemorrhoids



- Definition: Engorgement of the venous plexuses of the rectum , anus(Anal cushions) or both , With protrusion of the mucosa , anal margin or both
- Cause : Age ,Constipation/ Straining , Portal HTN , Pregnancy
- Symptoms / Signs : Anal mass/prolapse , Bleeding , Itching , Pain
  # what are the Hemorrhoids locations ?! Lt lateral , Rt posterior ,Rt anterior (Location of anal cushions)
- Internal hemorrhoid : Hemorrhoid above the dentate line , NOT painful (Because they receive visceral innervation)
- External hemorrhoid : Hemorrhoid below the dentate line , Painful (Because they receive somatic innervation)
- Treatment : High fiber diet ,Stool softeners, Anal hygiene , Topical steroid , Sitz bath , Rubber band ligation , Surgical resection ,
  # Closed Vs Open hemorrhoidectomy : Closed (Ferguson) = closes the mucosa with suture after hemorrhoid tissue removal
  Open (Milligan-Morgan) = Leaves mucosa open
- Complication of hemorrhoidectomy: Exsanguination (bleeding may pool proximally in lumen of colon), Pelvic infection , Incontinence , Anal stricture .

First - degree hemorrhoid	Hemorrhoid that does not prolapse	 1st Degree
Second - degree hemorrhoid	Prolapse with defection but returns on its own	 2nd Degree
Third - degree hemorrhoid	Prolapses with defecation or any type of Valsalva maneuver & requires active manual reduction (Eat fiber)	 3rd Degree
Fourth - degree hemorrhoid	Prolapsed hemorrhoid that cannot be reduced	 4th Degree

Anorectal Abscess (General Surgery) - Overview



Anal Fissures - Causes, Risk Factors, Pathophysiology, Signs & Symptoms, Diagnosis, & Treatment



Understanding Haemorrhoids



Anal cancer

Monday, February 19, 2024 7:54 PM

Anal canal lesion VS Anal margin lesion

➢ Anal canal lesion (Above dentate line)
- Squamous cell CA " MOST common" (Epidermoid CA , Mucoepidermoid CA, Cloacogenic CA , Basaloid CA)
- Adenocarcinoma
- Melanoma

Anal canal lesion usually metastasis to internal iliac node

➢ Anal margin lesion (Below dentate line) " Have better prognosis than anal canal lesions"
- Squamous cell CA
- Basal cell CA

Anal margin lesion usually metastasis to inguinal node

Risk factors

- Human papilloma virus
- Condyloma
- Herpes /HIV
- Chronic inflammation (fistulae/Crohn's disease)
- Immunosuppression
- Cervical/vaginal cancer
- STDs
- Smoking
- Radiation

	Bowen's disease	Paget's disease
Definition	Squamous cell carcinoma in situ	Adenocarcinoma in situ of anus
Treatment	Local wide excision	Local wide excision

Symptoms /Signs

- Anal bleeding
- Pain
- Palpable mass
- Pruritus

Common locations for metastasize

- Lymph node
- Liver
- Bone
- Lung

▶ Diagnosis

- History / Physical examination (digital rectal exam , colonoscopy)
- Biopsy
- Abdominal /Pelvic CT
- Trans-anal Ultrasound

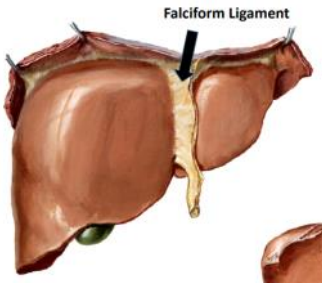
▶ Treatment

NIGRO protocol:

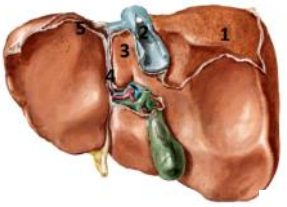
1. Chemotherapy (5-FU and mitomycin C)
2. Radiation
3. Post radiation therapy scar biopsy (6–8 weeks post XRT)

Liver

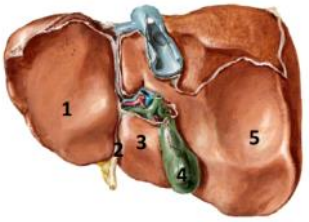
Tuesday, March 19, 2024 12:56 AM



▶ Liver surfaces



- **Anterior**
  Give attachment to falciform ligament .
- **Superior**
  Related to diaphragm
- **Right**
  Related to diaphragm & ribs
- **Posterior**
  Contents : 1. Bare area 2. IVC 3. Caudate lobe 4. Fissure of ligamentum venosum 5. Esophageal impression
- **Inferior**
  Contents: 1. Gastric impression 2. Fissure of ligamentum teres 3. Quadrate lobe 4. Gallbladder 5. Renal impression

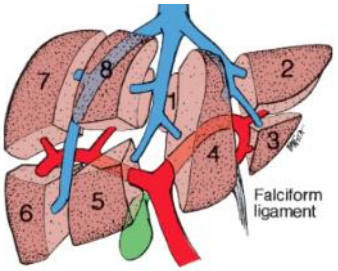


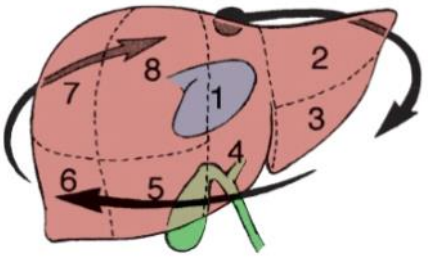
▶ Liver vasculature

- ⇒ **Blood supply**
  Hepatic A
  Portal V (splenic V + Superior mesenteric V)
- ⇒ **Venous drainage**
  Rt & Lt & Middle hepatic V (which drain into IVC)
- ⇒ **Lymphatic drainage**
  Anterior aspect of liver = Hepatic LN into coeliac LN
  Posterior aspect of liver = Phrenic and posterior mediastinal nodes
- ⇒ **Nerve supply**
  Hepatic plexus (contains coeliac plexus "sympathetic" + Vagus N " parasympathetic")

▶ Liver segment

Segment I = Caudate





Jaundice

Thursday, February 8, 2024 3:58 PM

Definition

Yellowing of skin, mucous membrane & sclera due to abnormally elevated levels of bilirubin in the blood (>5 mg) due to impaired hepatic uptake OR conjugation OR excretion.
At what level of serum total bilirubin does one start to get jaundiced? >2.5

Causes

HOT LIVER

- Hemolysis
- Obstruction
- Tumor
- Liver disease

Types

	Pre- hepatic / Hemolytic	Hepatic / Hepatocellular	Post hepatic /Obstructive	Kernicterus
Definition	Excessive hemolysis leading to increase production of bilirubin	Deficient in uptake , conjugation or execration by hepatocytes	Deficient execration from obstruction of bile flow to the duodenum " pathological "	Complication of indirect
Causes	• Hemolytic anemia • Benign (neonates) • Crigle -Najjar syndrome • Gilbert syndrome	• Hepatitis • Cirrhosis • Drug induced • Primary biliary cholangitis	• Gallstone • Cholangiocarcinoma • Pancreatic or liver cancer • Liver fluke • Primary sclerosing cholangitis • Dubin -Johnson syndrome • Rotor syndrome	Irreversible bilirubin deposition in basal ganglia ,pons & cerebellum
Type of bilirubin increased	Unconjugated "Indirect"	Unconjugated +Conjugated	Conjugated "Direct"	
Bilirubin in urine	Absent	Present	Present " Bilirubinuria"	
Urobilinogen in urine	Increased	Variable	Decreased	
PT	Normal	Prolonged ,corrected with vit K	Prolonged , corrected with vit K	
Stool color	Normal	Dark	Dark	
Urine color	Normal	Normal / pale	Pale	
Diagnosis	• Feature of hemolysis on blood smear (Reticulocytosis ,low Hb, low haptoglobin)	• Elevated ALT/AST • Elevated ALP	• Ultrasound (Dilated bile duct) • MRCP,ERCP, PTC • Elevated alkaline phosphatase • Elevated bilirubin+/- elevated LFTs	
Risk factors			• Obesity • Female , > 40 years • Prior intrabdominal pathology	• Prematurity • Sepsis • Asphyxia

➢ Dubin -Johnson syndrome

- Cause: Defective liver enzymes
- Grossly present with BLACK liver (due to impaired secretion of epinephrin metabolites)

➢ Rotor syndrome

- Similar to dubin - Johnson syndrome but milder in presentation
- Cause : Impaired hepatic storage of conjugated bilirubin
- NO black liver

► Physiological vs pathological jaundice

Physiological jaundice	Pathological jaundice
Not present in first 24 h of life (In first 2 weeks of life)	Present in first 24 h of life
High bilirubin < 5 mg	High bilirubin >5 mg
Bilirubin peaks at < 14-15 mg	Bilirubin peaks at > 15 mg
Direct bilirubin <10% of total	Direct bilirubin >10% of total
• Resolve in 1 week in term infants • Resolve in 2 week in preterm infants	• Persist beyond 1 week in term infants • Persist 2 week in preterm infants
Treated by UV light	

► Symptoms

- Yellow discoloration
- Pruritus , WHY?! Bile salt in dermis
- Loss of appetite
- N/V
- Abdominal pain
- Fever

► Diagnosis

- CBC & Blood smear
- Serum level of bilirubin
- Liver function test
- Hepatitis panel
- Ultrasound
- MRCP , ERCP , PTC
- CT /MRI
- Liver biopsy

Jaundice - causes, treatment & pathology



► Treatment

- Treat underlying cause
- Decompress biliary obstruction with ERCP
- Phototherapy " for mild elevation "OR Exchange transfusion " for sever elevation "
  (For unconjugated, why not for conjugated ?! Because it can lead to skin bronzing)

Cirrhosis

Thursday, February 8, 2024 8:43 PM

▶ Definition

Chronic liver disease characterized by diffuse bridging fibrosis & regenerative nodules that disrupt normal architecture of liver

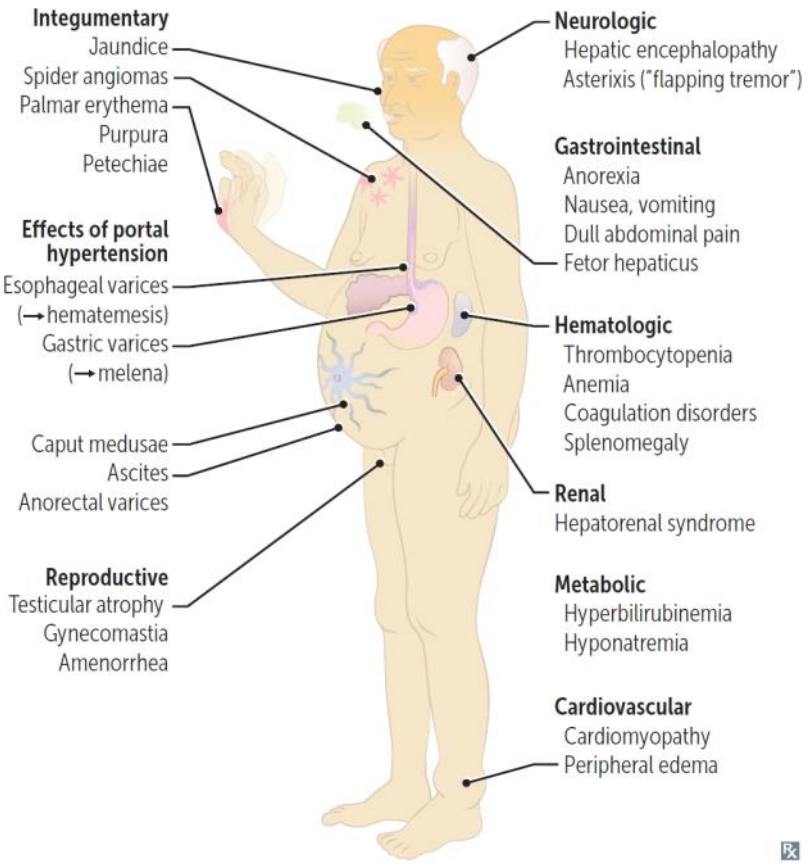
▶ Causes

Intrahepatic	Extrahepatic
• Alcohol • Hepatitis B&C • Autoimmune hepatitis • Inherited metabolic disease (Hemochromatosis , Wilson disease) • a1 antitrypsin deficiency • Nonalcoholic steatohepatitis • Drugs (Acetaminophen toxicity , Methotrexate)	• Primary & secondary biliary cirrhosis • Hepatic vanoocclusive disease (after bone marrow transplantation) • Hepatic congestion (2 to Rt heart failure , Constructive pericarditis)

▶ Symptoms

Spider angiomas (Dilated cutaneous arterioles)

Caput medusa (Dilated periumbilical veins)



Cirrhosis - signs and symptoms

Diagnosis

- Low Albumin , High PT/INR , High Bilirubin , Thrombocytopenia
- Liver biopsy (shows bridging fibrosis & nodular regeneration)
- Rule out causes (Hepatitis serology , Autoimmune markers , Serum ferritin , a1 antitrypsin)
- Serum ascites albumin gradient (SAAG= serum albumin - ascites albumin)
  # If SAAG >1.1 (Related to portal HTN)
  # If SAAG <1.1 (Not related to portal HTN " Nephrotic syndrome , TB , malignancy (ovarian cancer)")

Treatment

- Trat underlying cause & prevent progression
  #All cirrhotic pt should receive vaccination for Hepatitis A, B ,PPSV-23 " for pneumonia"

Complication of cirrhosis

- Portal HTN
- Esophageal varices
- Ascites
- Hepatic encephalopathy
- Hepatorenal syndrome
- Hepatocellular carcinoma "HCC"
- Spontaneous bacterial peritonitis " infected ascites fluid "
- Coagulopathy

Hepatic encephalopathy

- Mechanism : Decrease clearance of ammonia so it reaches the brain
- Precipitants : Dehydration , Infection , Electrolytes abnormality , GI bleeding , Alkalosis , Hypokalemia , Sedating drugs
- Symptoms / signs : confusion & poor concentration , Rigidity & hyperreflexia , Asterixis (flapping tremor) , Fetor hepaticus (musty odor of breath)
- Treatment : limit protein intake , Lactulose (prevent absorption of ammonia) +/Or Rifaximin (antibiotics to kill bowel flora)

Hepatorenal syndrome

- Healthy kidney in unhealthy environment
- Mechanism : progressive renal failure 2 to renal hypoperfusion resulting from VC of renal vessels caused by splanchnic VD & decrease blood flow to kidney .
- Symptoms : Azotemia , Oliguria , Hyponatremia , Hypotension , Low urine sodium "<10 mEq/L"
- Treatment : Octreotide (decrease splanchnic VD) , Midodrine (increase blood pressure) , may require Dialysis , Liver transplantation.

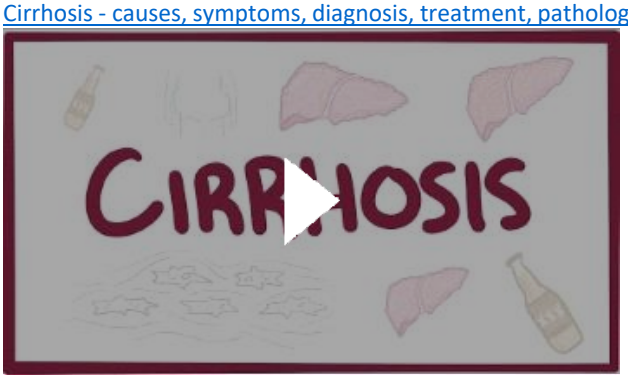
► Spontaneous bacterial peritonitis

- Infected ascites fluid
- Cause ?! E. coli , Klebsiella , Streptococcus pneumonia
- Symptoms / sign: Fever/Chills , Abdominal pain , N/V , Rebound tenderness
- Diagnosis : paracentesis (high WBCs >500 , PMN >250)
- Treatment : IV antibiotic " 3rd generation cephalosporine " , IV albumin , Fluoroquinolone

► Coagulopathy

- Mechanism : Impaired synthesis of all clotting factors except VIII
- Treatment: Fresh frozen plasma
  # Vit-K won't correct coagulopathy?! Because it cannot be used in diseased liver.

Cirrhosis - causes, symptoms, diagnosis, treatment, pathology



Ascites

Thursday, February 8, 2024 11:45 PM

▶ Definition

Accumulation of fluid in peritoneal cavity

▶ causes

- Portal HTN (increase in hydrostatic pressure which lead to transudative effusion)
- Hypoalbuminemia (decrease in oncotic pressure)
- Cirrhosis
- Alcoholic hepatitis
- Rt side HF , Constrictive pericarditis
- Malignancy

▶ Diagnosis

- Shifting dullness on physical examination
- Paracentesis (if SAAG > 1.1 = 1.1 due to portal HTN , <1.1 = other causes)
  # Bloody fluid suggests = Tumor
  # Cloudy fluid suggests = Infection
  # Milky fluid suggests = Lymphatic obstruction

▶ Treatment

- Low sodium diet
- Diuretics "Furosemide , Spironolactone "
- Large volume therapeutic paracentesis
- TIPS " trans jugular intrahepatic portal system shunt " if refractory
  # Complication of TIPS?! Encephalopathy
- Prophylactic antibiotics (to prevent spontaneous bacterial peritonitis "SBP")

Portal hypertension

Thursday, February 8, 2024 8:30 PM

▶ Definition

Increase pressure in portal venous system due to resistance to blood flow through the liver from fibrosis formation .(>10mmHg)

▶ Causes

- Prehepatic (portal vein thrombosis , Schistosomiasis)
- Hepatic (cirrhosis , fibrosis)
- Post hepatic (hepatic vein thrombosis " Budd -Chiari syndrome" , Constrictive pericarditis , CHF)

(Rule 2/3) Cirrhosis → portal HTN →Esophageal varices →Bleeding

▶ Clinical features

- Esophageal varices
- Bleeding (Hematemesis , Melena , Hematochezia)
- Splenomegaly
- Caput medusa (enlarged periumbilical veins)
- Spider angioma , Palmer erythema
- Gynecomastia
- Thrombocytopenia
- Hemorrhoids

▶ Diagnosis

- Paracentesis (Needle inserted into peritoneal cavity to obtain ascitic fluid)
- Ultrasound (portal vein dilation >/= 13-15 mm
- Hepatic venous pressure gradient "HVPG" (Normally it's between 1-5 but in portal HTN it's >6mmHg)

▶ Treatment

- Trans jugular intrahepatic portal system shunt (TIPS) " to lower portal pressure"

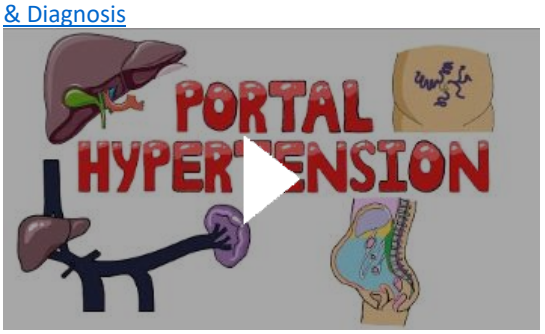
▶ Complication of portal HTN

- Esophageal variceal hemorrhage
- Ascites
- Splenomegaly
- Hepatic encephalopathy

▶ Budd Chiari syndrome

- Cause : Thrombosis of hepatic vein or IVC
- Symptoms : RUQ pain , Hepatosplenomegaly , Ascites , Variceal bleeding
- Diagnosis : Angiogram with venous phase , Liver biopsy (sinusoidal dilatation , congestion)
- Treatment : Porta-caval shunt

Portal Hypertension - Causes of Portal Hypertension (Pre/Intra/Post Hepatic) | Symptoms & Diagnosis



Other liver disorders

Thursday, February 8, 2024 8:08 PM

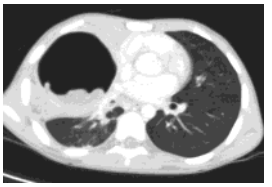
▶ Liver abscess

- Definition : Collection of pus in liver parenchyma
- Most common location : Rt lobe
- Sources : 1) Direct spread from biliary tract infection
  2) portal spread from GI infection (Appendicitis , Diverticulitis)
  3) liver trauma 4)systemic source (Bacteriemia)

	Pyogenic "Bacterial"	Amebic "Parasitic"	Fungal
Organism	Gram - (Klebsiella ,E.coli)	Entamoeba histolytica (reach liver via portal vein) # spread through fecal- oral route	Candida
Causes	• Cholangitis • Diverticulitis • Liver cancer • Liver metastasis		
Symptoms	• Fever , Chills • RUQ pain • Malaise • N/V • Jaundice • Weight loss / Anorexia	• Fever • RUQ pain • Hepatomegaly • Diarrhea	
Diagnosis	• Elevated LFT • Leukocytosis • Ultrasound/CT	• Lab test • Serology test • Ultrasound / CT	
Treatment	• IV antibiotic +metronidazole • Percutaneous Drainage	• Metronidazole IV • Surgical drainage	
Commonly seen in		• Men	• Immunocompromised • Malignancy

▶ Hydatid liver cyst

- Cause : By parasite (Echinococcus granuloses) which is transmitted by dogs , cats, carriers
- Most common site affected ?! Rt live lobe
- symptoms: RUQ pain/ mass , Jaundice
- Diagnosis : CT (Water Lily sign / eggshell calcification) , Serological test
- Treatment: Mebendazole , Surgical resection



▶ Gilbert syndrome

- Hereditary (Autosomal dominant) cause of elevation of unconjugated bilirubin
  # Unconjugated = Indirect = Without bilirubinuria
- Cause ?! - Decrease or absent glucanosyltransferase in liver cell
  -Decrease liver cell uptake of unconjugated bilirubin
  - Mutation on UGT1A1
- Symptoms: Jaundice (comes and goes with alcohol ingestion , stress , fasting, infection)
- Diagnosis : Increase in unconjugated bilirubin after prolonged fasting

▶ a1- Antitrypsin deficiency

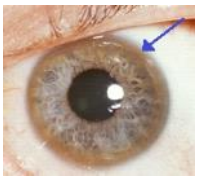
- Autosomal recessive
- Affect lung & liver(cause chronic hepatitis -cirrhosis)
- Diagnosis : serum a1-Antitrypsin & phenotype , Biopsy (PAS + Globules)
- Treatment : Liver transplant

▶ Hemochromatosis



- Cause : Autosomal recessive , abnormal increase in intestinal iron absorption leading to iron deposition in tissue which causes fibrosis & organ damage
- More common in Men after age of 40 , why?! Because menstruation lower iron in women
- Types :
  - ➢ Genetic type (Involve the HFE gene)
  - ➢ Acquired type (2 to blood transfusion therapy)
- Symptoms : Fatigue , arthritis , impotence/ amenorrhea , abdominal pain , cardiac arrythmia # classic triad : Cirrhosis , DM , Skin pigmentation
- Complication : Cirrhosis , Cardiomyopathy , DM, Arthritis (pain in 2&# MCP joint and wrist), Hypogonadism , Hypothyroidism , Hyperpigmentation (Bronze like)
- Diagnosis : High transferrin saturation >45% , High serum levels of Fe, ferritin , transferrin , Liver biopsy , Genetic testing "HFC gene" , CT (increase organ density)
- Treatment : weekly Phlebotomy , Fe chelation with Deferasirox - Deferoxamine - Deferiprone

▶ Wilson disease



- Autosomal recessive (mutation in ATP7B gene) , occur in age between 15-25
- Cause : Impaired excretion of copper into bile so it result in excess copper in body tissue
- Symptoms/ sign : Kayser - Fleischer ring, liver disease (chronic hepatitis, cirrhosis), Neurological signs (parkinsonism symptoms , drooling , incoordination) psychiatric dysfunction (depression , psychosis) , Arthritis , Chondrocalcinosis
- Diagnosis : Low serum ceruloplasmin , High urinary copper ,slit -lamp exam (for kayser ring) , Liver biopsy (High liver copper level)
- Treatment : 1) Avoid food with high copper (nuts, peas , chocolate , mushrooms , shellfish , liver)
  2) Chelation with(penicillamine + pyridoxine) OR Trientine OR Zinc
  3) Maintenance therapy with low dose of penicillamine or trientine or zinc
  4) Liver transplant (especially in fulminant Wilson disease where there is sever hemolytic anemia & high serum copper level excreted from liver & penicillamine is no longer effective)

Crigler- Najjar syndrome

- Type 1
- Complete absence of UDP glucuronosyltransferase in hepatic tissue
- Symptoms : Jaundice , Kernicterus (Unconjugated bilirubin deposition in brain)
- Diagnosis : High unconjugated bilirubin
- Treatment : plasmapheresis & phototherapy , Liver transplant
- Type 2
- Reduced UDP glucuronosyltransferase activity ,not as severe as type 1 ,
- Treatment : phenobarbital (which increase liver enzyme synthesis)

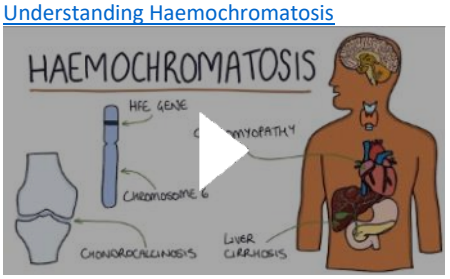
Hemobilia

- Definition: Blood draining via the common bile duct into the duodenum
- Diagnostic triad: RUQ pain + upper GI bleeding /Guaiac positive + Jaundice
- Causes : Trauma , post PTC , Tumor
- Diagnosis : EGD , A-gram
- Treatment : A-gram with Embolization of vessel

Understanding Wilson's Disease



Understanding Haemochromatosis



Liver tumor

Thursday, February 8, 2024 8:46 PM

Hepatic Hemangioma

- Most common benign vascular tumor , common in 30-50 years of age
- Associated with high estrogen levels
- Symptoms : RUQ pain/ mass , Bruit
  # Kasabach - Marritt syndrome =Hemangioma +thrombocytopenia + Fibrinogenopenia
- Diagnosis : CT wit IV contrast , MRI , Ultrasound , Tagged red blood scan
  # No biopsy , why?! Risk of hemorrhage
- Treatment : Observation

Hepatocellular adenoma

- Benign
- Normal hepatocytes without bile duct
- Risk factors : Women , OCB , Glycogen storage disease , Anabolic steroid
- Symptoms : RUQ pain/mass , Fullness
- Diagnosis : CT , Ultrasound+ biopsy
- Treatment: Stop OCB , Surgical resection

Focal nodular hyperplasia

- Benign
- Normal hepatocytes & bile duct
- Risk factors : Female , OCB (not as common as adenoma) , Age (35-50)
- Diagnosis : CT (liver mass with central scar) , Ultrasound + biopsy , Nuclear technetium -99 study
- Treatment : Resection OR Embolization

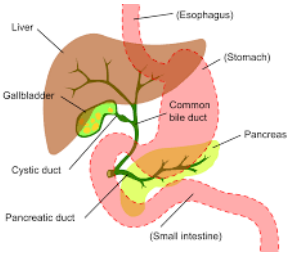
Hepatocellular carcinoma " Hepatoma"

- Most common Malignant tumor
- HCC is associated with Paraneoplastic syndromes (Common clues ?! Hypercalcemia , Hypoglycemia , watery diarrhea , Fever)
- Risk factors: Asia & Africa ,Chronic liver disease ,Hepatitis B&C , Cirrhosis , a1-antitrypsin deficiency , Alcoholic liver disease
- Symptoms/signs: Dull RUQ pain, Painful hepatomegaly , Bruit in RUQ , Bloody ascites , Weight loss , signs of portal HTN - ascites - jaundice- fever - anemia
- Diagnosis : Elevated a-Fetoprotein , High Alkaline phosphatase , ultrasound , CT/MRI , Biopsy
- Treatment : Surgical resection , Liver transplant
  # Pringles maneuver : Inclusion criteria to obtain hepatic inflow occlusion during minimally invasive hepatectomy.



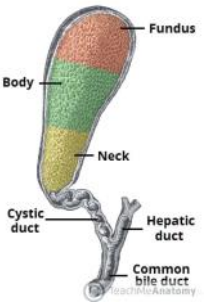
Biliary system

Tuesday, March 19, 2024 12:53 AM



❖ Gallbladder lies beneath segment IV & V

▶ Parts of the gallbladder



- Fundus
- Body
- Neck
  # The neck contains a mucosal fold, known as Hartmann's Pouch. This is a common location for gallstones to become lodged, causing cholestasis.

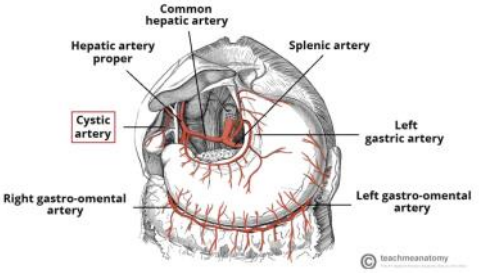
▶ Vasculature

⇒ Blood supply:
Cystic A (branch of Rt hepatic A which is derived from common hepatic A)

⇒ Venous drainage:
Of the neck = Cystic V into portal V
Of the fundus & body = Hepatic sinusoids

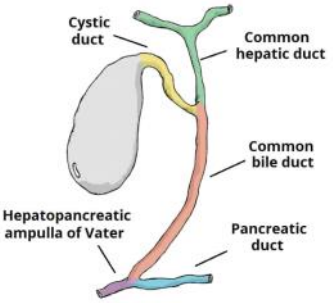
⇒ Lymphatic drainage:
Cystic lymph node into hepatic LN then Coeliac LN

⇒ Nerve supply:
Sympathetic & sensory = Coeliac plexus
Parasympathetic = Vagus N



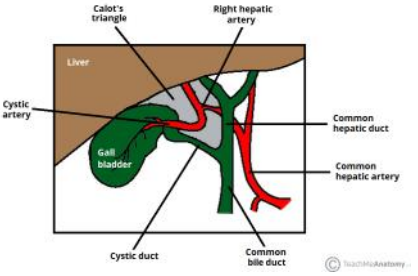
▶ Biliary tree

1. Bile initially secreted from hepatocytes
2. Collected into Rt & Lt hepatic duct
3. They join to form Common hepatic duct
4. Then the common hepatic duct join the Cystic duct to form the common bile duct
5. The common bile duct descends posteriorly to the first part of the duodenum and head of the pancreas.
6. It is joined by the main pancreatic duct, forming the hepatopancreatic ampulla (commonly known as the ampulla of Vater)



▶ Calot triangle

3 C's
- Cystic duct
- Common hepatic duct
- Cystic artery



Cholecystitis

Tuesday, January 30, 2024 7:50 PM

▶ Definition

inflammation of the gallbladder due to obstruction of cystic duct

▶ Types/causes of cholecystitis

- ❖ Calculous cholecystitis (due to?! Gallstone impaction in cystic duct) most common
- ❖ Acalculous cholecystitis (due to?! Gallbladder stasis , hypoperfusion , infection) occur in ill pt after sever burn , prolonged TPN ,major surgery ,trauma , Dehydration .

▶ Risk factors

- Gallstone (Female ,>40,obesity, pregnancy , rapid weight loss)

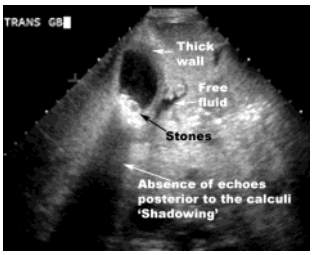
▶ Symptoms / Signs

- ◇ Persistent pain (unlike biliary colic)
- ◇ Murphy sign (pain when asking the patient to take in and hold a deep breath while palpating the RUQ).
- ◇ Pain may radiate to right shoulder and scapula (due to irritation of phrenic nerve)
- ◇ RUQ tenderness
- ◇ N/V
- ◇ Loss of appetite.
  # Attacks occur after fatty meal.
- ◇ Low grade fever
- ◇ Leukocytosis
- ◇ Hypoactive bowel sound

▶ Note

⇒ Pt presents with RUQ pain that last for <6 hours = Biliary colic (Transient cystic duct obstruction due to passage of gallstone)

⇒ Pt presents with RUQ pain that lasts for >6 hours = cholecystitis



▶ Diagnosis

- ▪ Ultrasound
  Gallbladder wall thickening >3mm , Pericholecystic fluid , Distended gallbladder, Stones.
- ▪ MRCP to see common bile duct stone not seen in U/S.
- ▪ Cholscintigraphy (HIDA scan) = failure to visualize gallbladder on HIDA scan suggests Obstruction
- ▪ Elevated ALP(alkaline phosphatase) if bile duct involved like in acute cholangitis.
- ▪ Elevated amylase
- ▪ Elevated WBCs & Inflammatory markers.

▶ Treatment

- ❍ IV fluid, bowel rest ,IV antibiotics, analgesic
- ❍ ERCP to remove the stone

- Cholecystectomy
  + cholecystostomy tube in unstable Pts.

Complications of cholecystitis

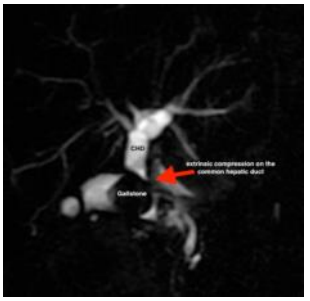
- Gangrenous cholecystitis
- sepsis
- Perforation of gallbladder - peritonitis
- Abscess
- Empyema of gallbladder (pus + infected tissue in gallbladder)
- Cholecystenteric fistula
- Gallstone ileus

Gallstone ileus



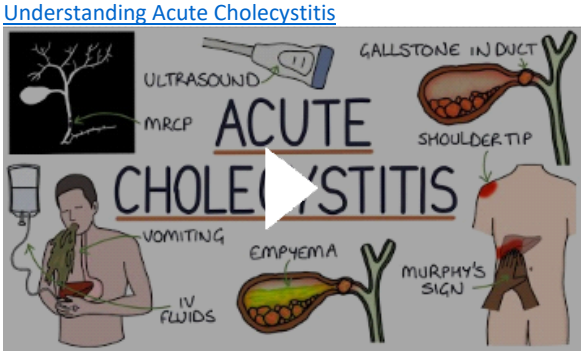
- Definition: fistula between gallbladder &GI tract.
- Pathophysiology: stone enter GI lumen - obstructs at ileocecal valve
- Rigler triad radiographic findings : 1) Pneumobilia (air in biliary tree)
2) Small bowel obstruction 3) Gallstone in iliac fossa.

Mirizzi syndrome

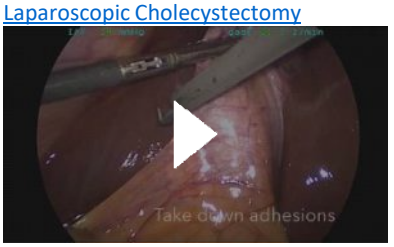


- Definition : A large stone impact in the Hartmann pouch (bulge in the infundibulum of gallbladder) lead to compression of common hepatic duct
- Symptoms: Jaundice, fever , RUQ pain.

Understanding Acute Cholecystitis



Laparoscopic Cholecystectomy



Cholelithiasis

Wednesday, January 31, 2024 8:22 PM

▶ Definition

Stone in the gallbladder, a.k.a Gallstone

▶ Types

1. Cholesterol stone 75%
2. Pigmented stone 25%
- Black (calcium bilirubinate) seen in cirrhosis & Hemolysis .
- Brown , seen in biliary tract infection
3. Mixed stone

▶ Pathophysiology

Involve at least 1 of following 3:

- ➢ Abnormal bile secreted by liver
- ➢ Accelerated nucleation of Microcrystals to Macrocrystals
- ➢ Defective gallbladder emptying

⇒ Elevated Cholesterol &/bilirubin , Decreased Bile salts , Gallbladder stasis .

▶ Risk factors

- ▶ Big 4Fs
  - Fat
  - Female
  - Fertile
  - Forty
- ▶ Other risk factors:
  - Oral contraceptive
  - Infection
  - Cirrhosis
  - Ileal resection
  - Bile stasis
  - Hyperlipidemia (NOT Hypercholesterolemia)

▶ Signs /symptoms



- Most common : Asymptomatic (incidental finding)
- Biliary colic RUQ or epigastrium pain (Last 20-60 min ,after fatty food "not specific"& at night)
- N/V
- Boas sign (referred to RT. subscapular pain of biliary colic)

▶ Diagnosis

- ❖ Ultrasound

- Normal U/S + Normal bilirubin & liver enzymes = Exclude Common bile duct stone

❖ MRCP, Oral Cholcystogram , ERCP , Transhepatic cholangiography (for common bile duct obstruction)

NO elevation in alkaline phosphates & bilirubin (why?! Because the gallstone only block the exit of gallbladder)



▶ Treatment

➢ Cholecystectomy for symptomatic Pt
cholecystostomy (percutaneous drainage) for Pt who's too sick for surgery

▶ How to prevent cholesterol stones

- ASA
- Ursodeoxycholic acid (oral bile acid)

▶ Indication for cholecystectomy in Asymptomatic Pt

✧ Child
✧ Sickle cell disease
✧ Calcified gallbladder (porcelain gallbladder)

▶ Post-cholecystectomy syndrome

After cholecystectomy surgery caused by changes in the flow of bile .
Symptoms:

- Diarrhea
- Indigestion
- RUQ / Epigastric pain
- Nausea
- Flatulence
- Intolerance to fatty food

▶ Complications of gallstone

◇ Acute cholecystitis
◇ Choledocholithiasis
◇ Gallstone pancreatitis
◇ Gallstone ileus
◇ Cholangitis
◇ Mirizzi syndrome

► Choledocholithiasis

- ► Definition: Stone in common bile duct .
- ► Symptoms: Asymptomatic OR RUQ / Epigastric pain & Jaundice.
- ► Diagnosis: - Elevation in alkaline phosphatase &Direct bilirubin - ERCP
- ► Complications: - Gallstone pancreatitis - Cholangitis -Biliary obstruction
- ► Treatment : ERCP with possible Endoscopic sphincterotomy .
- ► Complications of ERCP: - Excessive bleeding - pancreatitis -Cholangitis (infection)



Understanding Gallstones



Cholangitis

Thursday, February 1, 2024 1:35 PM

▶ Definition

Bacterial infection of biliary tract from obstruction
most common organisms that cause it ?! Gram negative organisms (E.cloi , Klebsiella)

▶ Suppurative cholangitis

Pus + Sever infection + Sepsis

▶ Causes

- ❖ Choledocholithiasis
- ❖ Postoperative strictures
- ❖ Neoplasm
- ❖ Pancreatitis (Extrinsic compression)

▶ Symptoms

- Charcot's triad

1. RUQ pain
2. Fever / Chills
3. Jaundice

- Reynold's pentad (Charcot's triad + Altered mental status + shock" Hypotension")

▶ Diagnosis

- ▶ Lab results
  Elevated WBCs ,Bilirubin, Alkaline phosphates .
  # cholestatic picture = Elevated ALP, Bilirubin.
- ▶ Positive blood culture
- ▶ Ultrasound (Dilated CBD) , ERCP

▶ Treatment

⇒ Nonsuppurative

- IV fluid + Antibiotics

⇒ Suppurative

- IV fluid + Antibiotics + Decompression (ERCP + Sphincterotomy + stone extraction) OR (PTC tube " catheter drainage") OR (Laparotomy " T-tube insertion")

Complications

- Renal failure (Due to Sepsis)
- Strictures
- Hepatic abscess

Primary sclerosing cholangitis

Definition

Idiopathic Progressive Multiple inflammatory fibrous thickenings of intra-extrahepatic bile duct walls resulting in biliary strictures.

Complications

- Obstructive jaundice
- Cirrhosis
- Portal HTN
- Liver failure
- Cholangiocarcinoma

Risk factors

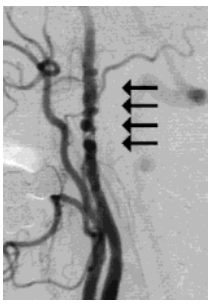
- Inflammatory bowel disease (Mainly Ulcerative colitis but can occur in Crohn disease)
- Male , Middle aged

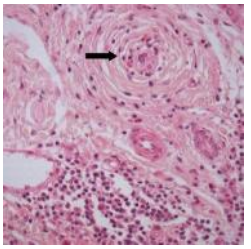
Symptoms / Signs

- Jaundice
- Pruritus (Itching)
- Dark urine
- Light colored stool
- Weight loss
- Fatigue

Diagnosis

- Elevated Alkaline phosphates & Bilirubin .
- Elevated hepatic copper
- Negative antimitochondrial antibody.
- Often positive for anti-nuclear cytoplasmic Ab (ANCA)
- MRCP/ERCP /PTC (Beads on a string appearance)
- Colonoscopy " to check for UC or CD"
- Liver biopsy (onion skin fibrosis)





Treatment

- Liver transplant

Primary biliary cholangitis

Definition

Progressive Autoimmune destruction of intrahepatic bile duct

Risk factors

- Women , middle aged

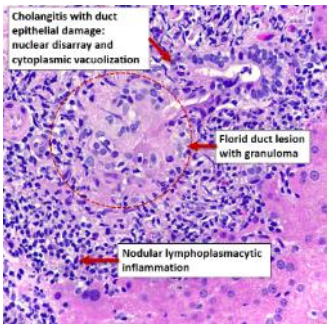
complications

- Obstructive jaundice
- Cirrhosis
- Liver failure

Symptoms / Signs

- Fatigue
- Pruritus (in early course)
- Jaundice (in late course)
- RUQ discomfort
- Xanthomata(yellowish plaques) & Xanthelasma (yellow growth that appears on the corners of your eyelids next to your nose.
- Osteoporosis
- Portal HTN

Diagnosis



- Elevated Alkaline phosphates
- Positive Antimitochondrial antibodies (AMAs)
- Elevated Cholesterol , HDL
- Elevated hepatic copper
- Elevated Immunoglobulin M
- Liver biopsy (Shows Granulomas " Florid duct lesion")

Treatment

- Ursodeoxycholic acid (synthetic bile acid) slows the progression
- Cholestyramine (for pruritus) , calcium bisphosphonates + Vit D (for Osteoporosis)
- Liver transplant

► Secondary biliary cholangitis

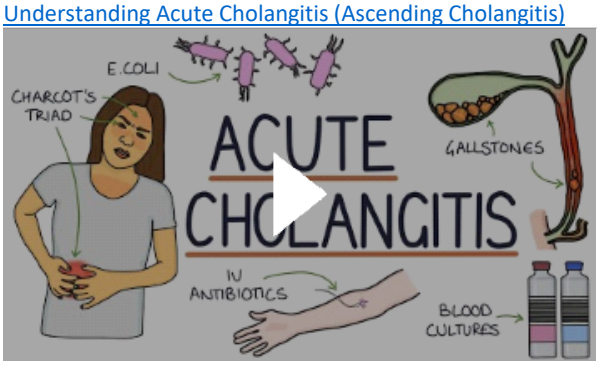
► Definition

Chronic biliary obstruction in Pt with known "Gallstone, strictures, neoplasm, sclerosing cholangitis"

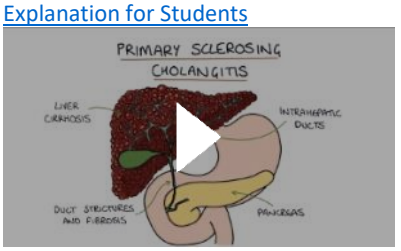
► Revision

	Primary biliary cholangitis	Primary sclerosing cholangitis
sex	Female	Male
IBD	No	Yes (mainly UC)
cancer	Rare	Risk of cholangiocarcinoma
Ursodiol effectiveness	Yes	No
Alkaline phosphates	High	High
Bilirubin	High	High
Hepatic copper	High	High
Antimitochondrial Ab	Positive	Negative
Hyperlipidemia	Present	Variable

Understanding Acute Cholangitis (Ascending Cholangitis)



Primary Sclerosing Cholangitis: Visual Explanation for Students



Neoplasm of biliary system

Thursday, February 1, 2024 5:07 PM

- Palpable gallbladder + Lymph node enlargement in supraclavicular " Virchow's node" = Malignancy

Gallbladder adenocarcinoma

Risk factors

- Gallstones
- Porcelain gallbladder
- Cholecystenteric fistula
- Female

The most common site involved in gallbladder

The fundus

Most common site of metastasis

Liver

Symptoms / Signs

- Jaundice
- RUQ pain
- Weight loss
- Anorexia

Diagnosis

- Ultrasound - CT - ERCP

Treatment

- Cholecystectomy (if muscle not involved " confined to mucosa")
- Wedge resection of segment Ivb & V (if in muscle but not beyond)
- Femoral resection of segment Ivb & V (if beyond the muscle)

Complication of laparoscopic cholecystectomy for gallbladder CA

Tumor implants in trocar site (incision site for laparoscopic surgery)

Cholangiocarcinoma

Definition

Malignancy of Extra-Intra hepatic bile duct
most common ?! Adenocarcinoma

Most common site

Proximal 1/3 of common bile duct (which is called Klatskin tumor " involve junction between Rt &Lt hepatic duct , worst prognosis)

Risk factors

- Primary sclerosing cholangitis
- Liver flukes " parasitic infection"
- Ulcerative colitis
- Choledochal cyst
- Chronic bile duct infection
- Male , Elderly

symptoms

- Dark urine
- Light colored stool
- Pruritus
- Weight loss
- Fatigue
- Abdominal pain

Diagnosis

- MRCP/ERCP /PTC
- Elevated Alkaline phosphates & Bilirubin
- Biopsy

Treatment

- Resection + Hepaticojejunal anastomy " if proximal"
- Whipple procedure " if distal"

Choledochal cyst

Definition

Cystic dilation of biliary tree involving Extra-Intrahepatic duct

Risk factors

- Female , Asian

complications

- Cholangiocarcinoma
- Hepatic abscess
- Recurrent cholangitis / pancreatitis
- Rupture
- Biliary obstruction
- Cirrhosis
- Portal HTN

Symptoms

- Epigastric pain
- Jaundice
- Fever

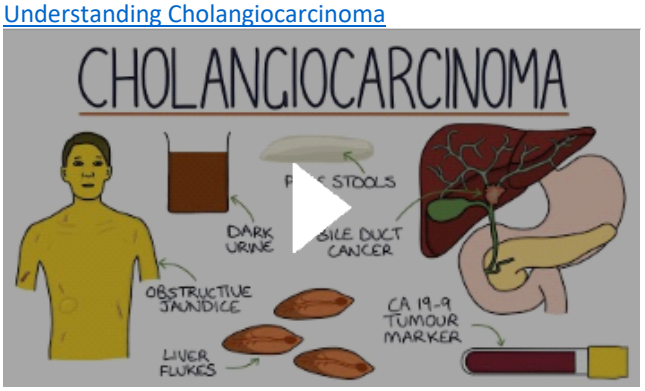
Diagnosis

- Ultrasound /ERCP

Treatment

- Complete resection of the cyst

Understanding Cholangiocarcinoma

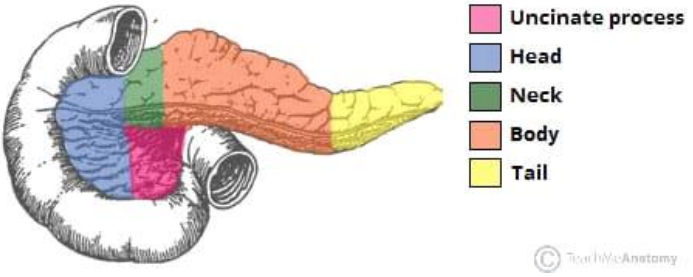


Pancreas

Tuesday, March 19, 2024 2:30 AM

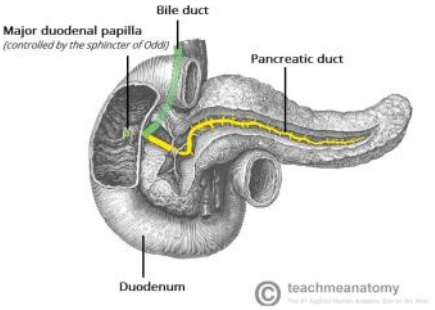
▶ Parts

- Head
- Uncinate process
- Neck
- Body
- Tail



▶ Duct system

1. The intercalated ducts unite & drain into intralobular collecting ducts
2. They drain into main pancreatic duct.
3. The pancreatic duct unites with the common bile duct, forming the hepatopancreatic ampulla of Vater



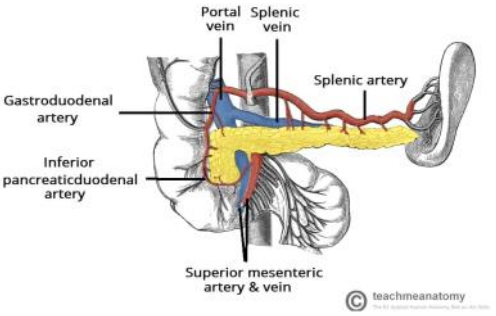
▶ Vasculature

⇒ Blood supply
Pancreatic branches of the splenic artery.
The head is additionally supplied by : Superior pancreaticoduodenal A (branch of the gastroduodenal A) & Inferior pancreaticoduodenal A (branch of superior mesenteric A)

⇒ Venous drainage
Head of pancreas = superior mesenteric branches of the hepatic portal vein.
Rest of pancreas = Splenic V

⇒ Lymphatic drainage
Pancreaticosplenal nodes and the pyloric nodes which drain into superior mesenteric and coeliac lymph nodes.

⇒ Nerve supply
Parasympathetic = celiac branch of vagal trunk
Sympathetic = Thoracic splanchnic nerves and the celiac plexus.



Pancreatitis

Tuesday, February 6, 2024 10:35 PM

Acute pancreatitis

Definition

Inflammation of pancreas due to insult that lead to premature activation of pancreatic enzymes & autodigestion of peri pancreatic tissue

cause

I GET SMASHED

- Idiopathic
- Gallstone
- Ethanol
- Trauma
- Scorpion bite
- Mumps " virus"
- Autoimmune
- Steroids
- Hyperlipidemia / Hypercalcemia
- ERCP
- Drugs (Diuretics , Estrogen , Antibiotics , Anti-HIV , Azathioprine .....)

Symptoms / Signs

- Epigastric pain (radiates to the back)
  # Leaning forward relieve the pain
- Epigastric tenderness
- Abdominal distention
- N/V
- Low grade Fever , Tachycardia
- Grey turner sign" Flank ecchymoses"
- Cullen sign " Periumbilical ecchymoses"
- Fox sign " Inguinal ecchymoses "



Diagnosis

- Diagnosed by 2 of 3 criteria : 1- acute epigastric pain radiating to the back 2- 3x serum lipase or amylase 3- calcification on imaging
- Elevated (x3) Amylase & Lipase " more specific" & WBC
- X-ray (Sentinel coop , colon cutoff , Gallstone)
- Ultrasound (Phlegmon, cholelithiasis)
- CT(Phlegmon, pancreatic necrosis)

Treatment

- Self-limited
- Alcohol withdrawal
- NPO " nothing by mouth"
- IV fluid
- NG tube
- Analgesia

Glasgow score for pancreatitis

- PaO2 = < 8 KPa
- Age = > 55
- Neutrophils = > 15 x 10^9
- Calcium = <2
- Raised urea = > 16
- Enzyme (lactate dehydrogenase)= >600 OR ALT/AST = >200
- Albumin = <32
- Sugar = >10

- 0-1 = Mild pancreatitis
- 2 = Moderate pancreatitis
- +3 = Sever pancreatitis

Complications

- Pseudocyst
- Abscess / Infection
- Pancreatic necrosis
- Splenic / mesenteric /portal vessel rupture or thrombosis
- Pancreatic ascites / pancreatic pleural effusion
- Diabetes

chronic pancreatitis

Definition

Chronic of inflammation which lead to destruction of parenchyma & fibrosis & calcification which lead to loss of Endo-Exocrine fissure

Subtypes

- Chronic calcific pancreatitis
- Chronic obstructive pancreatitis

cause

- Long term alcohol abuse
- Idiopathic
- Hypercalcemia "Hyperparathyroidism "
- Cystic fibrosis
- Pancreatic tumor
- Hyperlipidemia
- Familial
- Trauma
- Iatrogenic
- Gallstone

Symptoms

- Epigastric & back pain
- N/V
- Weight loss
- Steatorrhea "Exocrine"
- DM type 1 "Endocrine"

► Diagnosis

- Elevated Amylase & Lipase
  # Normal Amylase & Lipase seen In extensive pancreatic tissue loss
- 72-hour fecal fat analysis
- Glucose tolerance test
- CT (for gland enlargement/atrophy, calcifications, masses, pseudocysts)
- Endoscopic ultrasound "EUS"
- KUP(Calcification in the pancreas)
- ERCP(Chain of lacks , pseudocysts)
- MRCP(Chain of lacks)
- Pancreatic secretin stimulation test

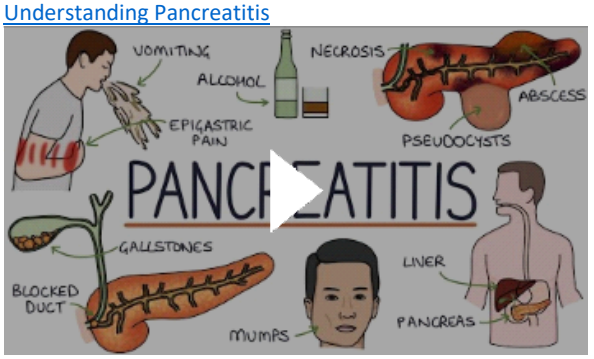
► Treatment

- Discontinuation of alcohol use
- Insulin for type 1 diabetes mellitus
- Pancreatic enzymes replacement & H2 blockers (to prevent gastric acid secretion that degrade pancreatic enzymes)
- Narcotics for pain
- Surgery (Puestow " pancreatojejunostomy " , Duval , Near - total pancreatectomy)

► Complications

- Insulin dependent diabetes mellitus
- Steatorrhea
- Malnutrition
- Biliary obstruction
- Splenic vein thrombosis
- Gastric varices
- Pancreatic pseudocyst/abscess
- Narcotic addiction
- Pancreatic ascites/pleural effusion
- Splenic artery aneurysm

Understanding Pancreatitis



Other pancreatic disease / Tumor

Thursday, February 8, 2024 3:28 PM

Pancreatic abscess

- Definition: Infected peripancreatic purulent
- Symptoms: Fever , Unresolving pancreatitis , Epigastric mass
- Diagnosis : Abdominal CT & aspiration "positive gram stain & culture ", Abdominal X-ray (soap bubble appearance)
- Treatment : surgical drainage & Antibiotics

Pancreatic necrosis

- Definition : Dead pancreatic tissue following acute pancreatitis
  # Dead pancreatic tissue doesn't take up IV contrast
- Treatment : Antibiotic , Surgical debridement , Gram stain/ culture (to distinguish between sterile vs infected necrosis)

Pancreatic pseudocyst

- Definition : Walled off collection of fluid with NO epithelium lining
- Symptoms : Epigastric pain/ mass , Emesis , weight loss , Mild fever
- Complication : rupture , infection , gastric outlet obstruction , fistula , pancreatic ascites
- Diagnosis : CT scan, Ultrasound , Serum amylase / lipase , CBC(Leukocytosis) , bilirubin
- Treatment : < 5 cm = observation > 5 cm = drain

Pancreatic carcinoma

- Definition : Adenocarcinoma of pancreas arising from duct cell.
- Site : 66% Head , 33% Body & Tail
  # Metastasis early to liver , peritoneum , bone , lung
- Risk factors: Smoking (x3),Chronic pancreatitis, DM, Alcohol ,Previous gastrectomy , Diet(High fried meat) , Elderly , African American.
- Diagnosis: Tumor marker (CA-19-9 OR CEA) , ERCP , CT
- Treatment : Surgical resection (Whipple procedure)

	Pancreatic head tumor	Pancreatic tail tumor
Time for symptoms to appear	Biliary obstruction ,so they draw attention earlier	No symptoms until it's too late "Already spread"
Symptoms / Signs	• Painless jaundice • Abdominal Pain (radiate to the back) • Weight loss • Pruritus • Anorexia • Courvoisier's sign (palpable , nontender distended gallbladder)	• Weight loss • Pain • Migratory Thrombophlebitis (Trousseau's sign) • N/V • Fatigue

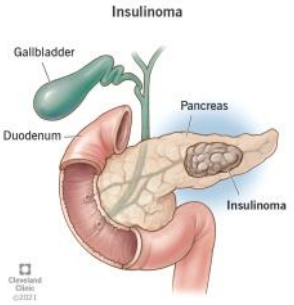
Understanding Pancreatic Cancer



Functional Pancreatic tumors

Friday, March 8, 2024 3:18 PM

Insulinoma



- Definition: Insulin producing tumor arising from B-cells.
- Associated risk: MEN-1 syndrome
- Symptoms/Signs: Sympathetic nervous system symptoms "from hypoglycemia" (Palpitations, Diaphoresis, Tremulousness, Irritability, Weakness), Neurologic symptoms(Personality changes, Confusion, Seizure, Coma)
- Whipple's triad:

1. Hypoglycemic symptoms produced by fasting
2. Blood glucose <50 during symptomatic attack
3. Relief of symptoms by administration of glucose

- Diagnosis: Fating hypoglycemia with inappropriately high levels of insulin (72-h fast then check glucose & insulin every 6 h) , C-peptide & proinsulin levels (if self-insulin injection is a concern because insulin injection doesn't have proinsulin or C-peptide), CT scan , A-gram , Endoscopic ultrasound .
  # Diagnostic fasting insulin to glucose ratio?! > 0.4
- Treatment: Diazoxide (to suppress insulin release), Surgical resection

Glucagonoma



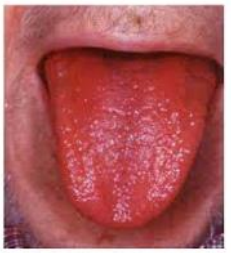


Figure 2. Glossitis. (Case 1).

- Definition: Glucagon producing tumor , present in the tail of the pancreas
- Symptoms/Signs: Necrotizing migratory erythema(red, psoriatic -appearing rash, with serpiginous borders over the trunk &limbs, usually below the waist), Glossitis, Stomatitis, Diabetes
- 6 D's : Dermatitis(Necrotizing migratory erythema), Diabetes, DVT, Decline in weight, Depression, Diarrhea.
- Diagnosis: Tolbutamide stimulation test (IV tolbutamide results in elevated glucagon levels), CT scan
- Treatment: Somatostatin, IV amino acid, Surgical resection.

Somatostatinoma



- Definition: Pancreatic tumor that secrets somatostatin
- Diagnostic triad "DDD"

1. Diabetes
2. Diarrhea (Steatorrhea)
3. Dilation of gallbladder with gallstones

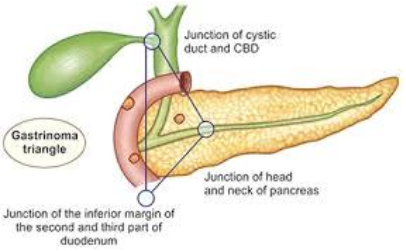
- Diagnosis: Ct scan , Somatostatin levels
- Treatment: Resection

Gastrinoma (Zollinger-Ellison syndrome)

- Definition: Non-B islet cell Gastrin - secreting tumor in duodenal &/or pancreas which lead to Acid hypersecretion this lead to recurrent ulcers in duodenum & jejunum
- Risk factors: MEN-1
  # What lab test should be ordered to screen for MEN-1?! Calcium levels, Parathyroid hormone levels
- Location of gastinoma : Passaro's/gastrinoma triangle:

1. Cystic duct /Common bile duct junction
2. Junction at the 2&3 portions of duodenum
3. Neck of pancreas

- Symptoms: peptic ulcer, Burning abdominal pain ,Diarrhea +/- steatorrhea , N/V, Fatigue , Weakness , Wight loss , GI bleeding(Hematemesis, melena, hematochezia)
- Complications: GI hemorrhage/perforation, Gastric outlet obstruction/stricture.



- Diagnosis: Elevation in serum gastrin levels(200-1000), Positive secretin stimulation test (increase gastrin with administration of secretin), CT , Nuclear oclerotide (to facilitate localization of gastrinomas)
- Treatment: Moderate to high dose of PPIs ,Surgical resection

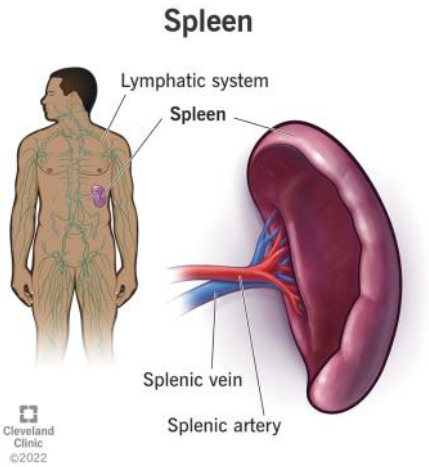
VIPoma (Verner-Morrison syndrome)



- Definition: Non-beta pancreatic islet cell tumor secreting vasoactive intestinal peptide (VIP)
- Most are malignant, Most are in Distal pancreas
- Symptoms(WDHA): Watery Diarrhea, Hypokalemia, Achlorhydria
- Diagnosis: Elevated VIP levels , CT scan , Endoscopic ultrasound
- Treatment: Surgical resection

Spleen

Tuesday, March 19, 2024 3:21 AM



- In enlargement of the spleen (known as splenomegaly), the superior border moves inferomedially, and its notches can be palpated.

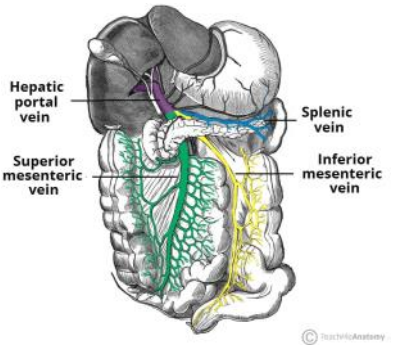
► Vasculature

⇒ **Blood supply**
Splenic artery.
As the artery reaches the spleen, it branches into five vessels – each supplying a different part of the organ which allow the surgeon to remove one of these segments without affecting the others

⇒ **Venous drainage**
Splenic V (which join the superior mesenteric V to form hepatic portal V)

⇒ **Lymphatic drainage**
Pancreaticosplenic lymph nodes into coeliac node

⇒ **Nerve supply**
Coeliac plexus.



Splenic injury

Wednesday, March 13, 2024 12:13 AM

▶ Delayed splenic rupture

Subcapsular hematoma or pseudoaneurysm may rupture after blunt trauma, the rupture classically occur 2 weeks post injury
The Pt present with shock, Abdominal pain.

▶ Grades of splenic injury (AAST grade)

Grade 1	• Sub-capsular hematoma < 10% of surface area • Parenchymal laceration < 1cm depth • Capsular tears
Grade 2	• Sub-capsular hematoma 10-50% of surface area • Parenchymal laceration 1-3cm depth • Intraparenchymal hematoma < 5cm
Grade 3	• Sub-capsular hematoma > 50% of surface area • Parenchymal laceration > 3cm depth • Intraparenchymal hematoma >/= 5cm • Deep tears • Rupture of the hematoma
Grade 4	• Splenic vascular injury or active bleed confined within splenic capsule • Laceration involving segmental or hilar vessels producing >25% devascularisation
Grade 5	• Shattered spleen • Splenic vascular injury with active bleed into the peritoneum

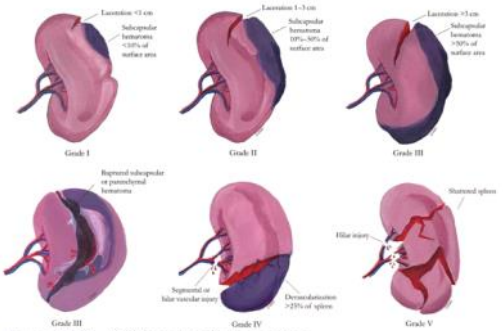


Figure 170.1. AAST grades of splenic injury.

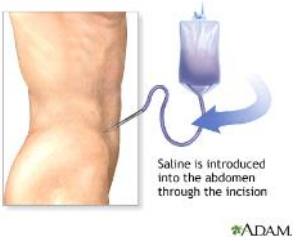
▶ Symptoms/Signs

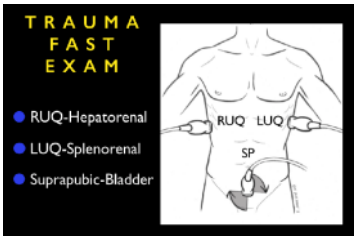




- Hemoperitoneum
- Kehr's sign (Lt shoulder pain, hyperesthesia form diaphragmatic irritation)
- LUQ abdominal pain
- Balance's sign (Fixed Dullness on Left upper quadrant (clots, hematoma)
- Cullen's sign (Bluish discoloration around the umbilicus)
- On physical examination (Rigidity, Rebound tenderness, Shifting dullness, Diminished abdominal sounds)

▶ Diagnosis





- Abdominal CT scan (if the Pt stable)
- DPL or FAST exam (if the Pt is unstable)
  # DPL "Diagnostic peritoneal lavage " : a rapid and easily performed but invasive bedside procedure, highly accurate test for evaluating intraperitoneal hemorrhage or a ruptured hollow viscus
  Mechanism: A catheter is introduced through the incision into the abdomen. Saline is infused into the abdomen through the catheter, and then removed. If blood is present in the saline after removal, it is highly probable that there is a serious intra-abdominal injury.
  # FAST "Focused assessment with sonography in trauma ": rapid bedside ultrasound examination, test for blood around the abdominal organs.

▶ Treatment

- ABC management
- DPL/FAST laparotomy with splenorrhaphy or splenectomy
- Embolization
- # Splenorrhaphy: Splenic salvage operation

▶ Indication for splenectomy

- Rupture spleen after trauma
- Splenic tumors/cyst
- Gastric varices
- Hereditary spherocytosis
- Thalassemia
- Autoimmune hemolytic anemia
- ITP (Idiopathic thrombocytopenic purpura)
- TTP (Thrombotic thrombocytopenic purpura)
- Staging of hematological malignancies (Hodgkin's disease)
- Malaria, Schistosomiasis, Leishmaniasis
- Splenic artery aneurysm

▶ Post splenectomy labs findings

- Elevated WBCs by 50%
- Thrombocytosis
- Elevated RBCs
- Abnormal RBC smear (pappenheimer bodies , Howell-jolly bodies, Heinz bodies)

▶ Post splenectomy complication

- Hemorrhage
- Thrombocytosis
- Subphrenic abscess
- Atelectasis
- Pancreatitis
- Gastric dilation
- Overwhelming post splenectomy sepsis (OPSS)
- Pancreatic injury
- Pancreatic fistula

▶ OPSS

- Cause: Increased susceptibility to fulminant bacteremia , meningitis, pneumonia because of loss of splenic function & lack of immunity (IgM)
- Symptoms: Fever, Lethargy, Common cold, Sore throat, URI followed by confusion, Shock, Coma
- Common organism associated: Encapsulated(S. pneumonia, Neisseria meningitis , Hemophiles influenza)
- Preventive treatment: Vaccinations (Pneumococcus, H. Influenza, Meningococcus)"2 weeks before surgery" , Prophylactic penicillin for all minor infections

▶ ITP (idiopathic thrombocytopenic purpura)

- Definition: Autoimmune platelet destruction leading to troublesome bleeding & destruction, it's either acute(in children) or chronic (in women ,20-40 years)
- Symptoms: Petechia, Gingival bleeding, Bruising, Soft tissue ecchymosis
- Antibodies found?! Antiplatelet antibodies IgG
- Diagnosis: Platelet count, Peripheral smear , antiplatelet Ab, Bone marrow

aspiration (increased megakaryocytes)
- Normal PT , PTT
- Treatment: Steroids, Gamma globulin, Splenectomy (if steroids fail to remove IgG), Romiplostim & Eltrombopag (in splenectomy resistant Pt , work as thrombopoietin receptor agonist which increase platelet production)
- 4 I's:

1. Immune etiology (IgG antiplatelet Ab)
2. Immunosuppressive treatment (initially with steroids)
3. Immune globulin
4. Improvement with splenectomy

► TTP (thrombotic thrombocytopenic purpura)

- Mechanism: loss of platelet inhibition(deficiency of ADAMTSI3 " vWF metalloprotease") which leads to thrombosis & infraction & profound thrombocytopenia
- More common in females
- Causes: Medical reaction, Infections, Inflammation, Autoimmune disease
- Symptoms: Purpura, Fever, Mental staus change, Renal dysfunction, Hematuria, Hemolytic anemia.
- Triad (Thrombocytopenia + Microangiopathic hemolytic anemia + Acute kidney injury) + Fever + Neurological symptoms
- No consumption of clotting factors , so Normal PT, PTT
- Treatment: Plasmapheresis, Immunosuppression, Splenectomy (last resort, rare)

- What is hypersplenism?! Large "splenomegaly" hyperfunctioning spleen with documented loss of blood elements (WBC, Hct, Platelets) & Hyperactive bone marrow(to keep up with loss of blood elements)

► Causes of splenomegaly

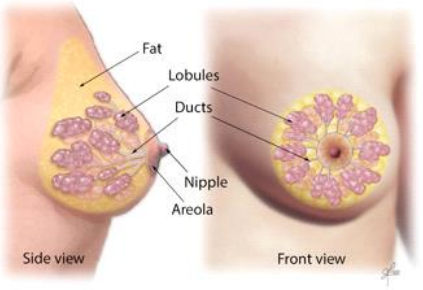
⇒ Infection
(Viral "EBV, CMV, Hepatitis", Bacterial, Protozoal)
⇒ Hemolytic anemia
⇒ Portal HTN
(Thrombosis of portal vein, Liver cirrhosis)
⇒ Immunological inflammatory disorders
(Felty's syndrome, SLE, Sarcoidosis, Thyroiditis, Amyloidosis)
Felty's syndrome: Rheumatoid arthrits + Hepatomegaly + Splenomegaly + Pancytopenia.
⇒ Immune thrombocytopenia
⇒ Primary metastatic neoplasm
(Leukemia, Hodgkin's lymphoma, Sarcoma)

Breast anatomy

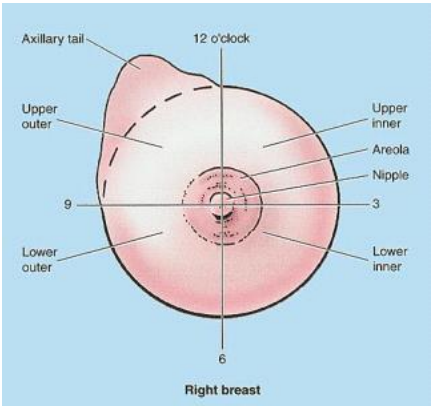
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► Breast structure

- Glands (Ducts & Lobules)
- Fat
- Connective tissue
- Lymphatic tissue

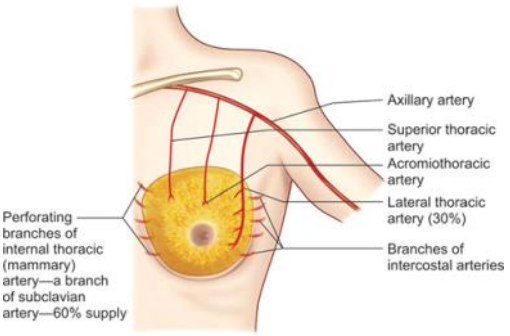


► Breast quadrants

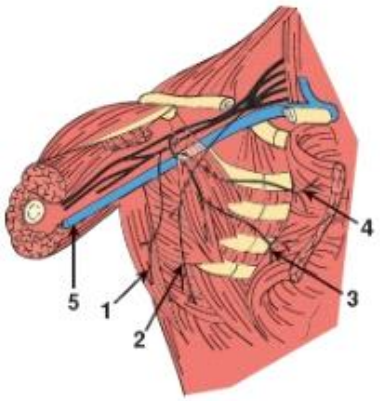


► Blood supply of the breast

- Internal thoracic artery (branch of subclavian A) through its perforating branches.
- Lateral thoracic , superior thoracic, thoracoacromial artery (branch of axillary A)
- Posterior Intercostal arteries (lateral branches)



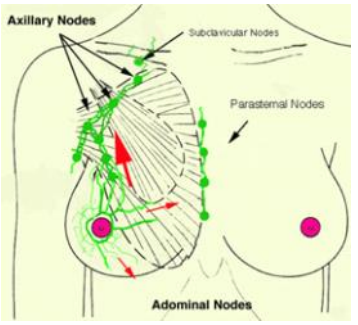
► Nerves in the axilla



1. Thoracodorsal nerve
2. Long thoracic nerve
3. Medial pectoral nerve
4. Lateral pectoral nerve
   # 5- Axillary vein

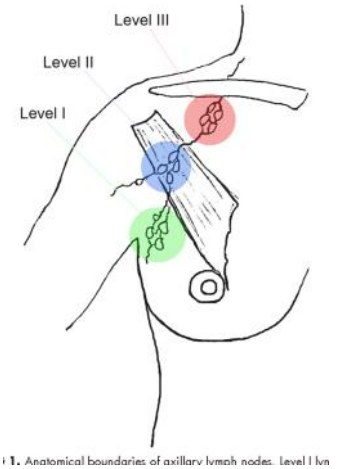
Nerve	Location	Muscle innervated
Long thoracic nerve	Along lateral chest wall in midaxillary line on serratus anterior muscle	Serratus anterior muscle
Thoracodorsal nerve	Lateral to long thoracic nerve on latissimus dorsi muscle	Latissimus dorsi muscle
Medial pectoral nerve	Lateral to OR through pectoral minor muscle Lateral to lateral pectoral nerve	Pectoral minor & major muscles
Lateral pectoral nerve	Medial to medial pectoral nerve	Pectoral major muscle

Lymphatic drainage of the breast



- Lateral = Axillary LNs
- Medial = Parasternal nodes

Levels of axillary LNs



- Level I "low" (lateral to pectoral minor)
- Level II "middle" (deep to pectoral minor)
- Level III "high" (medial to pectoral minor)

Breast cancer 1

Saturday, March 2, 2024 12:38 AM

Definition

Cancer that forms in tissues of breast, usually ducts (tubes that carry milk to nipple) and lobules (glands that make milk)

Most common site of breast cancer?!

50% of cancers develop in upper outer quadrant

Most common breast tumor in Pt < 30 years?!

Fibroadenoma

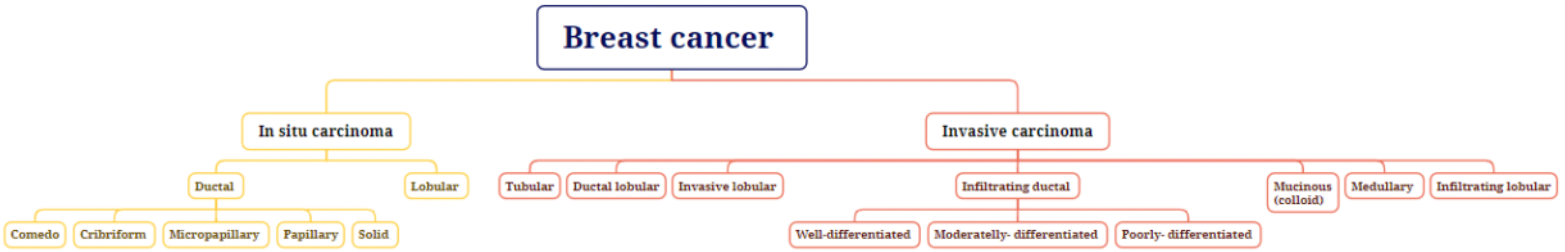
Most common cause of breast mass after breast trauma ?!

Fat necrosis

Most common sites for breast metastasis?!

Bone , Lung , Liver , Brain

Types of breast cancer



Non-modifiable Risk factors

- Age > 50 years (most common risk factor)
- Race (white)
- Family history of Breast cancer or ovarian cancer
- Confirmed Atypical hyperplasia by biopsy
- Menstrual history
  - Age of menarche < 13 years
  - Age of menopause > 55 years
- Breast density
- Radiation exposure
- Genetic factors (BRCA 1&2)

▶ Modifiable Risk factors

- Obesity
- Nulliparity (state in which a woman has never given birth to a child, or has never carried a pregnancy)
- Alcohol
- Breastfeeding (most common protective factor)
- OCB (use of OCP "combined E & P pill" is associated with a small increase in BC risk, particularly among women who begin use before 20 years of age or before first pregnancy).

▶ Factors affecting breast density

Decrease in breast density	Increase in breast density
• Genetics • Increase age • Pregnancy • Menopause • Obesity • Tamoxifen	• Genetics • Alcohol • Combined HRT "Hormone replacement therapy"

▶ Breast cancer risk

Greatly increased risk (> 4)	Moderately increased risk (2-4)	Lower increased risk (<2)
• female • >65 • BRCA gene mutation in pt with family history of breast CA • >/= primary relatives with bilateral or premenopausal breast CA • DCIS , LCIS • Fibrocystic disease with atypical hyperplasia	• Prior breast CA • Radiation exposure • First degree relative with breast CA • >35 age when first birth • Breast density>50%	• Early menarche • Late menopause • Nulliparity • Proliferative benign disease • Obesity • Alcohol • HRT • No breastfeeding

▶ Symptoms /Signs

- No symptoms
- Mass in the breast
- Pain (most are painless)
- Nipple discharge
  # Most common cause of Bloody nipple discharge?! Intraductal papilloma
  # Most common cause of green , straw colored or brown nipple discharge?! Fibrocystic disease
- Local edema
  # Type of edema in inflammatory carcinoma?! Peau d'orange (orange peel)
- Nipple retraction , why?! Because the tumor involve the cooper's ligament & subsequent traction on ligament pull the skin inward
- Dimple
- Nipple rash
- Inflammatory changes
- Axillary / Supraclavicular node enlargement

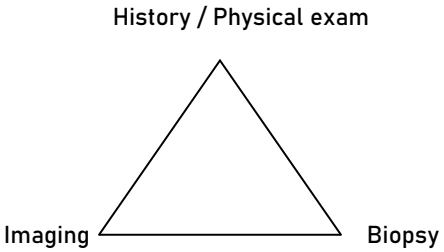




Pathological Vs physiological nipple discharge

Pathological	Physiological
• Bloody • Clear • Unilateral • Single duct • Palpable breast mass • Skin/nipple changes	• Bilateral • Nonspontaneous • Milky, green, yellow, brown • Mult ductal • Negative physical exam

Triple assessment



Biopsies types:
- Core biopsy
- Vac biopsy
- Open biopsy

Screening

Breast self-exam
- 20-40 years of age = breast exam every 2-3 year by physician
- > 40 years of age = annual breast exam by physician

Best time of self-breast exam?! 1 week after menstrual period .

Mammogram
- > 40 years old = every year

why more useful in older women than in younger?! Because breast tissue undergoes fatty replacement with age which make the mass more visible while in young women they have more fibrous tissue which makes mammogram harder to interrupt .

Diagnosis

- Mammography
- Brest ultrasound " best in women <30"
- MRI
- FNA (first needle aspiration)
- Core biopsy
- Mammotome stereotactic biopsy (mammogram guided computerized stereotactic core biopsy)
- Open biopsy (Incisional OR Excisional)

▶ BI-RADS grading of breast cancer on mammogram

Category 0	Incomplete ; needs further evaluation
Category 1	Negative mammogram
Category 2	Benign findings
Category 3	Probably benign finding, short- interval follow up is suggested
Category 4	Suspicious abnormality - Biopsy should be considered.
Category 5	Highly suggestive of malignancy , Appropriate action should be taken
Category 6	Proven malignancy

▶ Indication for biopsy

- Persistent mass after aspiration
- Solid mass
- Blood in cyst aspiration
- Suspicious lesion by mammography/MRI/Ultrasound
- Bloody nipple discharge
- Ulcer / Dermatitis of the nipple

▶ What are the suspicious mammogram findings?!

- Dense mass
- Asymmetrical density of breast tissue
- Microcalcifications /Clustered calcifications
- Stellate/Spiculated mass
- Skin thickening
- Retraction (skin or nipple pulling inwards)
- Focal distortion (something is pressing on the tissue)

▶ Simple Staging of breast cancer (**TMN** : **T**umor/**M**etastasis/ **N**odes)

Stage I	• Tumor </= 2 cm • No metastasis • No nodes
Stage II A	• Tumor </= 2 cm ,With mobile axillary nodes Or • Tumor 2-5 cm with no nodes
Stage II B	• Tumor 2-5 cm with mobile axillary node Or • Tumor > 5 cm with no nodes
Stage III A	• Tumor > 5cm with mobile axillary node Or • Any sized node with fixed axillary , No metastases
Stage III B	• Peau's orange (skin edema) • Chest wall invasion/ fixation • Inflammatory cancer • Breast skin ulceration • Breast skin satellite metastases • Any tumor+ ipsilateral internal mammary LNs
Stage III C	• Any size tumor • No metastasis • Positive (supraclavicular, infraclavicular or internal mammary LNs)
Stage IV	• Distant metastasis (including ipsilateral supraclavicular nodes)

Stage 1 to 3a = Operable
Stage 3b-c (locally advance) = Adjuvant chemotherapy
Stage 4 (advance) = Palliative chemotherapy

► Treatment

- Modified radical mastectomy + axilla & chest tube (the breast , axillary node level 1&2 , nipple -areolar complex are removed / NO removal of pectoralis major &minor)
  # How much should be drained ?! < 30 cc/day
- Lumpectomy & Radiation + sentinel LN dissection
  # Lumpectomy & Radiation : segmental mastectomy " removal of a part of the breast" , axillary node dissection & course of radiation after the operation
- +/- Postop chemotherapy

► Male breast cancer

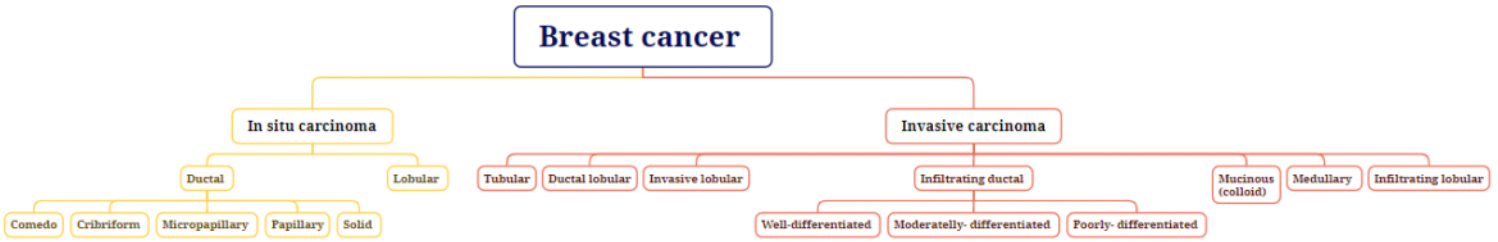
➢ Type of cancer developed : Ductal carcinoma
➢ Risk factors:
- Increased estrogen
- Estrogen therapy
- Gynecomastia from increased estrogen
- Radiation
- Klinefelter's syndrome (XXY)
- BRCA2 carriers

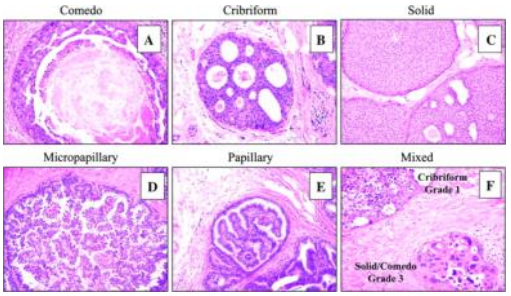
➢ Symptoms/Signs:
- Painless breast mass
- Breast skin changes(Ulcers, retraction)
- Nipple discharge (blood or blood tinged discharge)

➢ Diagnosis: Biopsy & Mammogram
➢ Treatment:
- Mastectomy
- Sentinel LN dissection (if axilla LN is clinically negative)
- Axillary dissection (if Axillary LN is clinically positive)

Breast cancer 2

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Difference between benign & malignant ?!
Malignant invades the basement membrane

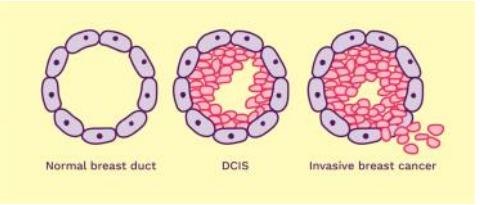
► Ductal Carcinoma In situ (DCIS)

- Definition : Cancer cells in the duct without invasion (considered Precancerous lesion)
- No symptoms , Not palpable
- Mammogram finding: Microcalcification
- Diagnosis: Core or Open biopsy
- Most aggressive histological type?! Comedo
- Major risk of DCIS?! Development of infiltrating ductal carcinoma in the same breast
- Treatment:

• < 1 cm tumor = Removal with 1 cm margin & XRT
• >1 cm tumor = lumpectomy with 1 c margin & Radiation OR total mastectomy (No axillary dissection)
Safety margin = 2 milli , Why?! Because the microcalcification have distance between them so we take a large safety margin to insure we removed as much as possible
when do we perform total mastectomy?!
- Diffuse breast involvement
- >1 cm & contraindication to radiation

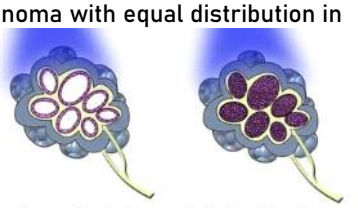
❖ Paget's disease: Scaling rash / dermatitis of the nipple caused by invasion of skin by cells from ductal carcinoma



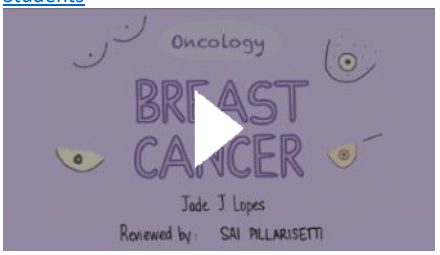


► Lobular Carcinoma In situ (LCIS)

- Definition: Carcinoma cells in the lobules of the breast without invasion
- No symptoms , No mammogram findings(no calcifications)
- Not premalignant itself (it's considered as a marker for development of breast CA)
- Diagnosis: found incidentally on Biopsy
- Major risk of LCIS?! Carcinoma of either breast , mainly infiltrating ductal carcinoma with equal distribution in both breasts
- Medication that lower the risk of LCIS?! Tamoxifen
- Treatment : close follow up OR simple bilateral mastectomy



ONCOLOGY - Breast Cancer for Healthcare Students



Benign breast conditions / anomalies

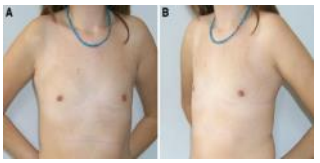
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▶ Congenital breast anomalies

Polythelia	supernumerary nipple
Athelia	Congenital absence of nipple and areola
Polymastia	Accessory breast along milk line
Amastia	Absence of breast (no breast development)
Amazia	No breast development but nipple is developed







▶ Breast hypoplasia

➢ Primary
- Insufficient mammary glandular tissue
- Ulnar-mammary syndrome
- Poland's syndrome
- Turner's syndrome
- Congenital adrenal hyperplasia

➢ Secondary
- Radiation treatment
- History of breast surgery
- Sever mastitis / abscess / fat necrosis



▶ Breast hypertrophy (Macromastia)

- Excessive development of glandular tissue during puberty
- Secondary to weight gain OR natural fat deposition of breast tissue that takes place with aging.



▶ Fibroadenoma

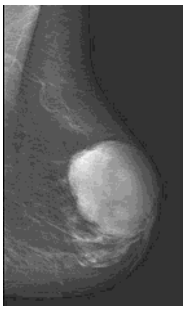
➢ Definition: Benign tumor of the breast consisting of stromal overgrowth & collagen arranged in swirls, usually affects 20-30 years of age "young women"
➢ Estrogen sensitive
➢ Symptoms /Signs: Solid & rubbery,-- mobile , well-circumscribed , round mass
➢ Diagnosis: Ultrasound, Core biopsy , Needle aspiration (Negative)
➢ Treatment: Close observation (for small mass) , Surgical resection (for large mass)

► Cystosarcoma phyllodes

- Definition: Mesenchymal tumor arising from breast lobular tissue, Affect Pt at the age of 35-55 years of age , Mostly they are benign

Criteria	Benign	Borderline	Malignant
Stromal cellularity and atypia	Minimal	Moderate	Marked
Stromal overgrowth	Minimal	Moderate	Marked
Mitoses/10 high power fields	0-4	5-9	≥10
Tumor margins	Well circumscribed with pushing tumor margins	Zone of microscopic invasion around tumor margins	Infiltrative tumor margins

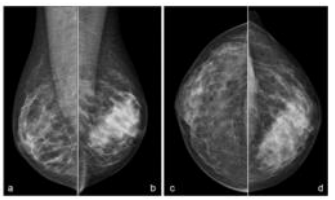




- Symptoms/Signs: Mobile, smooth breast mass (Looks like fibroadenoma)
- Diagnosis: Core biopsy OR excision
- Treatment:
  - Benign = wide local excision
  - Malignant = total mastectomy
  - Chemotherapy (if tumor > 5cm & stromal overgrowth)

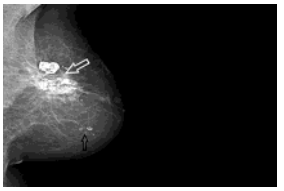
► Fibrocystic disease

- Definition: Common benign breast condition that consist of fibrous (rubbery) & cystic changes in the breast., usually occur in per-menopausal
- Types: Fibromatosis, Sclerosing adenosis, Duct adenosis , Epithelial/ductal/lobular hyperplasia , Apocrine metaplasia.
- Symptoms/Signs: Breast pain/tenderness (that varies with menstrual cycle), Cysts& fibrous(nodular) fullness, Nipple discharge (Yellow to brown),
- Diagnosis: Breast exam/history, Ultrasound, Mammogram , Aspirated cyst (straw colored or green fluid) , Open biopsy (if recurrent cyst or bloody aspiration)
- Treatment: Stop caffeine , Analgesia, Vitamin E & evening Primrose oil
  Needle drainage (if there's breast cyst) .



► Fat necrosis

- Definition: benign nonsuppurative inflammatory process of adipose tissue
- Causes: Secondary to trauma(Accidental, Surgical, Radiation therapy) , Associated with breast pathology.
- Symptoms: Ill-defined or spiculated dense mass ,Skin retraction, Ecchymosis, Erythema, Skin thickness
- Diagnosis: Ultrasound (hypoechoic mass with well-defined margins +/- mural nodule) +/- mammogram (ill-defined and irregular, spiculated mass-like area +/- calcifications) "calcified oil cyst"



► Breast infection

- Mastitis
  - Definition: Superficial infection of the breast (Cellulitis)
  - Most common cause: Staphylococcus aureus
  - Often occur during Breastfeeding
  - Treatment: Stop breastfeeding, Breast pump, Apply heat, Antibiotics.



➢ Breast abscess

- Causes: Mastitis, Mammary ductal ectasia (stenosis of breast duct).
- Bacteria responsible: if nursing = S.aureus , Nonlactating = mixed infections
- Treatment: Antibiotics, Needle or open drainage with culture , Resection of involved duct (if recurrent)

  # Mammary duct ectasia Symptoms: Nipple discharge (bloody, serous, creamy white, yellow), Palpable subareolar mass , Noncyclical mastalgia, Nipple inversion or retraction.





➢ Granulomatous mastitis

- Definition: rare benign inflammatory breast disease
- Causes: Caseating granulomas = TB
  Noncaseating granulomas = Sarcoidosis, Crohn's disease , Leprosy
- Symptoms: Ill-defined painful mass, Skin thickness, sinus and abscess formation, Axillary lymphadenopathy, Nipple retraction
- Diagnosis: Ultrasound +/- mammogram , Biopsy
- Treatment: Surgical excision + steroid therapy , Abscess drainage



➢ Zuska's disease (Recurring subareolar abscess)

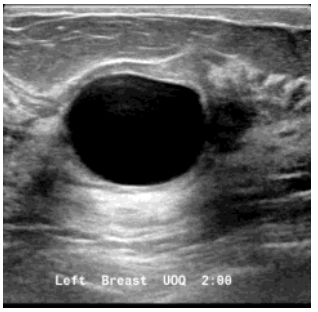
- Definition: Rare, benign bacterial infection of the breast, 90% of pt are smokers
- Triad of:

1. Draining cutaneous fistula from the subareolar tissue
2. Chronic thick, pasty discharge from the nipple
3. History of multiple, recurrent mammary abscesses

- Treatment : Surgical drainage, Complete excision of the affected duct and sinus tract (fistulectomy [Hadfield operation]) , Smoking cessation



► Breast cyst



➢ Definition: Fluid-filled, round or ovoid structures
➢ Classification according to the size:

1. Subclinical (microcysts)
2. Palpable (gross) cysts

➢ Classification according to the structure:

A. Simple cysts
B. Complex / atypical cysts

► Breast epithelial hyperplasia

1. Ductal hyperplasia

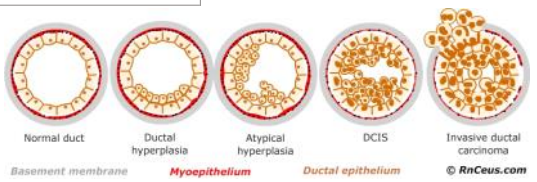
- Usual (simple) ducal hyperplasia

Mild hyperplasia	3-4 cell layers, no luminal distention
Moderate hyperplasia	> 4 cell layers thickness, bridging of luminal space
Florid hyperplasia	distended and possible obliterated lumen

- Atypical Hyperplasia (Uniform population of cells)

2. Lobular hyperplasia
   More common in premenopausal women

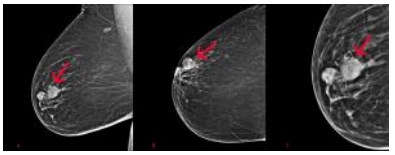
- Atypical Lobular Hyperplasia (ALH)
- Classic Lobular carcinoma in situ (cLCIS)

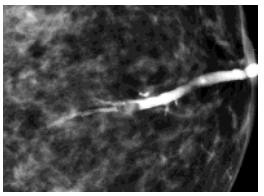


	ALH	LCIS
Extent of proliferation	Proliferation not including the lumen	Lumen is included
Risk of BC	4-5X	8-10X
Site of BC	Ipsilateral : contralateral = 3:1	Risk is equal in both breast

► Intraductal papilloma

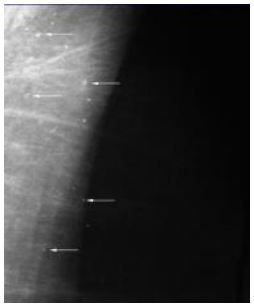
- Benign rare neoplasms,
- Usually age 30-55 " pre-menopausal"
- Develop within the mammary duct "Subareolar region"; most common cause of bloody nipple discharge
- Classification:
  - Solitary (50-60 years old) or Multiple "papillomatosis" (Young age)
  - Central (subareolar) or peripheral.
- Diagnosis: Mammogram , Ultrasound, Ductogram
  # Ductogram findings: Completely obstructed duct , Duct expansion and distortion, Intraductal filling defects ,Wall irregularity
- Treatment: Surgical excision



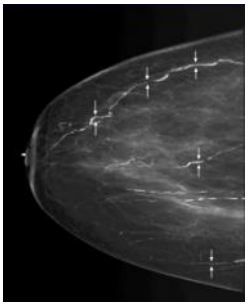


► Benign breast calcification

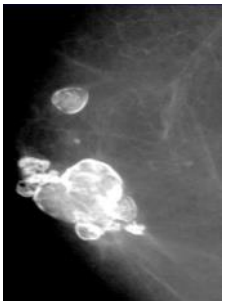
- Skin or dermal calcifications
- Vascular calcifications.
- Lucent-centered calcifications (Fat necrosis)
- Egg-shell or rim calcifications(Fat necrosis or calcification in cyst wall).
- Coarse or popcorn calcification(Fibroadenoma).
- Large rod like calcifications or secretory calcifications
- Round or punctate calcification (less than 0.5mm).
- Milk of calcium.
- Suture calcification.
- Dystrophic calcifications (Trauma, surgery and irradiation).



Dermal calcification



Vascular calcification



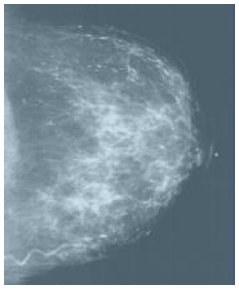
Lucent-centered calcification



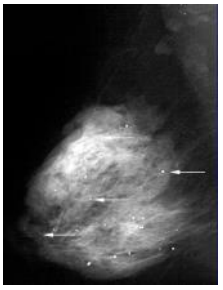
Egg-shell calcification



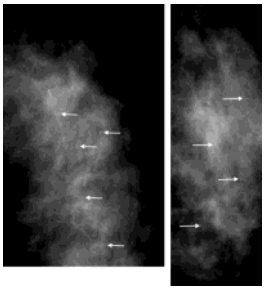
Popcorn calcification



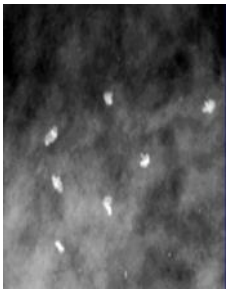
Secretory calcification



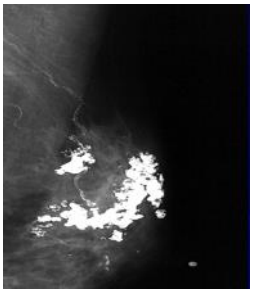
Punctate calcification



Milk of calcium



Suture calcification



Dystrophic calcification

► Gynecomastia

1. Neonatal gynecomastia:
- Placental transfer of maternal estrogen into fetal circulation
- Transient process , Resolve spontaneously

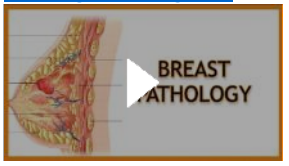
2. Adolescent gynecomastia:
- Peak age 13 – 14
- Peripheral aromatization of circulation androgen
- Transient process; resolves with 1-3 years
- Causes: Medications, Liver failure, Increased estrogen, Decrease testosterone , Hypogonadism

➢ Alarming features
- Unilateral
- Eccentric growth pattern
- Skin or nipple changes
- Nipple discharge
- lymphadenopathy
- Family history of breast cancer



➢ Gynecomastia stages:
- Nodular pattern (recent < 1 year , Reversible , No fibrosis)
- Dendritic pattern (Chronic stage , Irreversible fibrosis)
- Diffuse glandular pattern (U/S + mammogram similar to female breast in pt treated with high dose estrogen)
- Florid phase (Reversible, In 1 year of onset, No fibrosis, No surgical ttt)
- Fibrotic phase (Irreversible, start after 6 m, Surgical ttt)

Breast Pathology (Inflammatory vs. Benign vs. Malignant)



Mediastinum

Saturday, March 9, 2024 7:52 PM

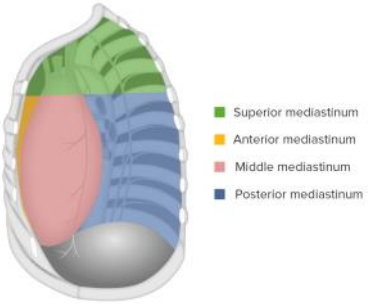
▶ Definition

The space between the two lungs; it is demarcated by:

- The thoracic inlet superiorly
- The diaphragm inferiorly
- The sternum anteriorly
- The spine and paravertebral thoracic sulci posteriorly.

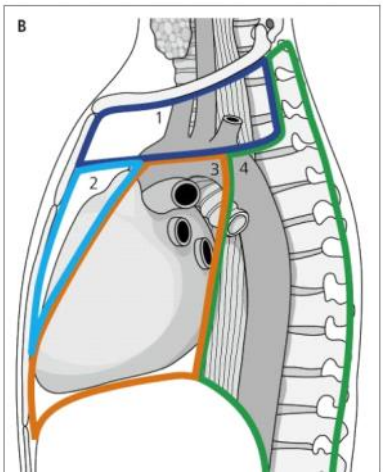
▶ Compartment model

- Superior
- Anterior
- Middle
- Posterior



▶ Boundaries & contents

	Boundaries	Contents
Superior mediastinum	Thoracic inlet to line drawn from angle of louis to T4	• Aorta & great vessels • Trachea • Upper third of the esophagus • Upper thymus
Anterior mediastinum	Anterior to pericardium & posterior to body of sternum	• Mediastinal fat • Thymus
Middle mediastinum	Bounded anteriorly & posteriorly by pericardium	• Pericardium & contents • Carina • Lymph node
Posterior mediastinum	Dorsal surface of pericardium to anterior surfaces of T4-T12	• Esophagus • Descending thoracic aorta • Azygos vein • Thoracic duct

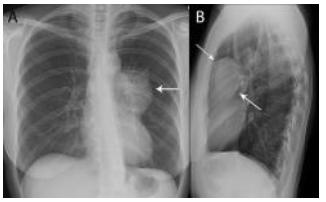


mediastinum disorders

Friday, March 8, 2024 7:55 PM

Anterior mediastinal mass	Middle mediastinal mass	Posterior mediastinal mass
• Thymoma • Terrible Lymphoma • Thyroid (Retrosternal goiter or CA). • Teratoma. • Parathyroid adenoma • Diaphragmatic hernia (Morgagni hernia	• Lymph node enlargement: - lymphoma - primary tuberculosis - sarcoidosis • Bronchogenic cyst. • Pericardial cyst. • Aneurysm of aortic arch.	• Neurogenic tumors - Neurofibroma - Ganglioneuroma • Aneurysm of descending aorta. • Hiatus hernia. • Dilated esophagus (especially achalasia). • Paravertebral mass or abscess.

► Thymoma





- ➢ Where do we find it?! In the Anterior mediastinum
- ➢ Common age affected ?! Adult of age 50 years
- ➢ Types:

1. Type A thymoma.
   - Called spindle cell thymoma or medullary thymoma
   - NO atypia , NO lymphocytes
2. Type AB thymoma.
   - Called mixed thymoma
   - Has lymphocytes
3. Type B1 thymoma.
   - Called lymphocyte-rich thymoma, lymphocytic thymoma, predominantly cortical thymoma, and organoid thymoma
   - Has many lymphocytes in the tumor
4. Type B2 thymoma
   - Called cortical thymoma and polygonal cell thymoma
   - Has many lymphocytes
5. Type B3 thymoma
   - Called epithelial thymoma, atypical thymoma, squamoid thymoma, and well-differentiated thymic carcinoma.
   - No or mild atypia, little lymphocytes
6. Type C thymoma
   - Called Thymic carcinoma
   - Middle-aged men.
   - Early local invasion and metastatic spread.

- ➢ Masaoka staging system for thymoma
- ➢ Diagnosis: CT scan
- ➢ 30% of Pt with thymoma have Myasthenia gravis
- ➢ Pt can also have other paraneoplastic disorders such as pure red cell aplasia , hypogammaglobulinemia, SLE, Cushing's syndrome, SIADH.
- ➢ Treatment: Surgical resection

Masaoka stage	Criteria
I	Encapsulated tumor
IIA	Microscopic capsular invasion
IIB	Macroscopic invasion into fatty tissue
III	Invasion into great vessels, pericardium, or lung
IVA	Pleural and/or pericardial dissemination
IVB	Lymphatic or hematogenous metastases

► Germ cell tumor



- ➢ Definition: Group of tumors with histology identical to that of some neoplasms of the testicle and the ovary (derive from common primary germ cells).
- ➢ Common age affected?! in young adults in the 3rd -5th decade.
- ➢ Types:
  - Teratoma (mature or immature)
  - Seminoma " most common malignant"
  - Non- seminoma (yolk sac tumor, Embryonal carcinoma, choriocarcinoma, mixed germ cell tumor)
- ➢ Diagnosis: serum α-fetoprotein and (β-HCG)
- ➢ Treatment: Radiation therapy , Chemotherapy , Surgical resection

► Teratomas





- Definition: Tumor of branchial cleft cells (the tumors contain ectoderm, endoderm, mesoderm), could be solid or cyst.
  #Dermoid cyst: Teratoma made up of ectodermal derivatives (teeth, skin, hair)
- Where do we find it?! In the Anterior mediastinum
- Immature teratomas tend to be more aggressive
- Most age affected?! Adolescents
- Diagnosis: X-ray (calcifications or teeth , solid or cyst), CT scan
- Treatment: Surgical excision +/- preoperative chemotherapy (until tumor markers are normal)
- What are the tumor markers in malignant teratomas?! AFP , CEA

► Lymphoma



- Where do we find it?! In the Anterosuperior mediastinum OR hilum in the middle mediastinum.
- Most common type?! Hodgkin's lymphoma
- Other Non-Hodgkin's type we can find in the anterior mediastinum?! large B-cell lymphoma and lymphoblastic lymphoma
- Symptoms: Cough, Fever, Chest pain, Weight loss, SVC syndrome, Chylothorax (lymph formed in the digestive system (chyle) accumulates in your chest cavity)
- Diagnosis: CXR, CT scan , Mediastinoscopy , Mediastinotomy with node biopsy.
- Treatment: Chemotherapy , Radiation or both

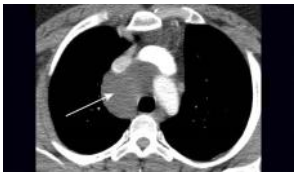
► Lymph node enlargement



- Location: around the tracheobronchial tree, the lower esophagus, or the aortopulmonary window
- Causes: Malignancy (metastatic from lung CA, lymphoma), Inflammatory lymph node changes due to infection(TB) , COPD, Granulomatous disease (sarcoidosis)
- Diagnosis: CT scan (calcifications "TB" or necrosis "lymphomas")

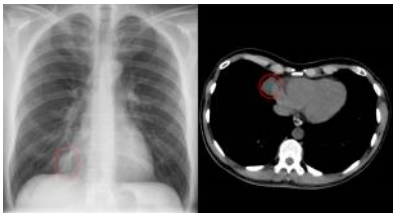
► Cyst





⇒ Bronchiogenic cyst

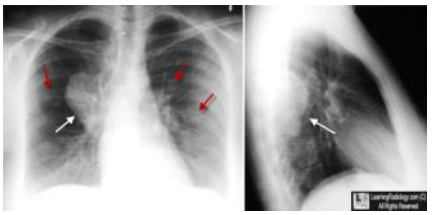
- Location: Posterior to carina (adjacent to the tracheobronchial tree)
- Cause: from abnormal budding of the tracheal diverticulum between the 3rd&6th weeks of gestation.
- Diagnosis: CXR (discrete, round, sharply defined, fluid filled densities "air filled if infected"), CT scan (well-defined, round masses with a homogeneous density similar to water).
- Treatment: Surgical resection



⇒ Pericardial cyst

- Location: At the right cardiophrenic angle
- Cause : congenital , Acquired after cardiothoracic surgery.
- Symptoms: Asymptomatic, chest discomfort, Cough, Dyspnea, Cardiac tamponade.
- Diagnosis: CT scan, Echo

► Neurogenic tumors



- ➢ Where do we find it?! In the Posterior mediastinum (in the paravertebral gutters)
- ➢ Types: Neurolemmoma (schwannoma) , Paraganglioma , Neuroblastoma , Neurofibromas.

⇒ Neuroblastoma

- Is highly malignant
- Most common age : < 2 year old
- Most common site : Adrenal gland but it can arise in the thorax & extend into the spinal canal
- Most common extracranial solid malignancy in pediatric patients.
- The most common intrathoracic malignancy of childhood.
- Treatment: Surgical resection

► Mediastinitis

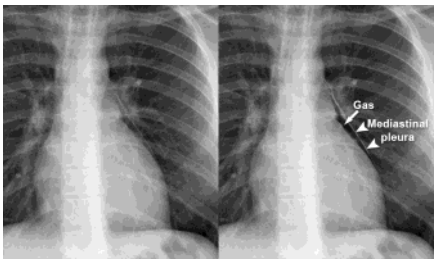
⇒ Acute mediastinitis

- ➢ Definition: Acute suppurative mediastinal infection
- ➢ Causes: Esophageal perforation (Boerhaave's syndrome), Postoperative wound infection, Head& neck infection, Lung or pleural infection, Rib or vertebral infection, Distant infection.
- ➢ Symptoms: Fever, Tachycardia, Chest pain, Dysphagia, Respiratory distress, Leukocytosis.
- ➢ Treatment: Wide drainage(via thoracscopy or thoracotomy or transcervical mediastinal drainage) , ttt of primary cause, Antibiotics

⇒ Chronic mediastinitis / Fibrosing mediastinitis

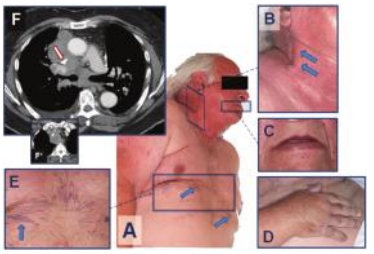
- ➢ Definition: Mediastinal fibrosis secondary to chronic granulomatosis infection
- ➢ Cause: Histoplasma capsulatum
- ➢ Symptoms: Asymptomatic, Symptoms related to compression of adjacent structures(SVC syndrome, Bronchial & esophageal strictures, Constrictive pericarditis)
- ➢ Treatment: Antibiotics

► Pneumomediastinum



- ➢ Definition: Presence of gas in the mediastinum
- ➢ Causes: Spontaneous (due to rapture of pulmonary bleb)or 2 to trauma, Boerhaave syndrome)
- ➢ Symptoms/Signs: Chest pain, Dyspnea, Voice changes, Subcutaneous emphysema, + Hamman sign (Crepitus on cardiac auscultation)

► Superior vena cava syndrome





- ➢ Definition: Obstruction of the superior vena cava by extrinsic compression.
- ➢ Cause: Lung cancer , Thymoma, Lymphoma, Hodgkin's disease
- ➢ Symptoms/Signs:

1. Blue discoloration & puffiness of the face (plethora) , arm, shoulders
2. CNS manifestation (Headache, N/V, Visual distortion, Stupor, Convulsions)
3. Cough, Hoarseness , Dyspnea
4. Cyanosis of lips
5. JVD
6. Distention of thoracic veins
7. Pemberton's sign (positive when bilateral arm elevation causes facial plethora)

- Treatment: Relieve the symptoms by elevation of head, supplemental of oxygen , Steroids & Diuretics (for laryngeal or cerebral edema), Radiation +/- chemotherapy for any causative cancer

Pleural diseases

Sunday, March 10, 2024 11:09 PM

► Pleural effusion

	Transudative effusion " Clear fluid"	Exudative effusion "Cloudy fluid"
Causes	• Congestive HF • Constrictive pericarditis • Nephrotic syndrome • Cirrhosis (hypoalbuminemia)	• Infection • Malignancy • Trauma • Pancreatitis
Light's criteria	⇒ Pleural fluid to serum protein ratio = </= 0.5 ⇒ Pleural fluid to serum LDH ratio = </= 0.6 ⇒ Pleural LDH </= 2/3 of upper limit of normal serum LDH	⇒ Pleural fluid to serum protein ratio = > 0.5 ⇒ Pleural fluid to serum LDH ratio = > 0.6 ⇒ Pleural LDH > 2/3 of upper limit of normal serum LDH





- ➢ Definition: Excess accumulation of fluid between pleural layers
- ➢ Symptoms/Signs: SOB, Dullness on percussion, decrease tactile vocal fremitus, Decrease breath sounds, Tracheal deviation (away from side of lesion)
- ➢ Diagnosis: CXR(blunting of costophrenic angle, Meniscus "crescent-shaped inclusion of air surrounded by consolidated lung tissue."), Thoracentesis (needle drainage) with pleural fluid study & cytology
- ➢ Treatment: Pigtail catheter or thoracostomy (chest tube), treat underlying cause
  # Empyema : Infected pleural effusion , must be drained with chest tube or Decortication (Thoracotomy & removal of infected fibrosis from around the lung)

Malignant pleural effusion: complication from direct extension of cancer into the pleural space, or they are due to inflammation induced by malignancy

- They are most commonly secondary to lung cancer in men
- They are most commonly secondary to breast cancer in women

► Pleural space infection / parapneumonic effusion PPE

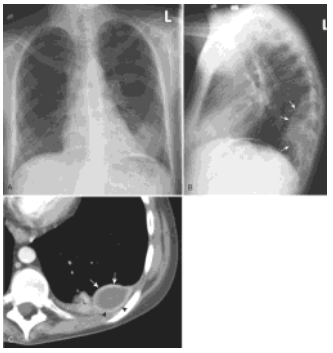
- ➢ Definition: any pleural effusion associated with pneumonia.
- ➢ Most common community acquired organism?! Streptococcus ssp
- ➢ Most common hospital acquired organism?! MRSA
- ➢ Symptoms/Signs: fever, dyspnea, chest pain, and cough with mucopurulent sputum, Decreased breaths sounds, Dull percussion, Rales or crepitations ,pleural friction rub
- ➢ Types:

⇒ Simple effusion
- Uninfected, free-flowing fluid collections

⇒ Complicated effusion
- Early infected fluid collections

⇒ Empyema
- Well-established collections of pus within the pleural cavity.
- Stages:

1. Exudative phase (1st week) : treat with antibiotics, chest tube
2. Fibro-proliferative phase(2nd week): treat with antibiotics, chest tube, VATS
3. Organized phase(3-4th week): treat with decortication ,VATS, Antibiotics



- ➢ Prognosis is worse in : The elderly, Coexistent cardiac, pulmonary, or renal disease, Patients with hospital-acquired or culture-positive empyema
- ➢ Diagnosis: Lab (elevated WBC,CRP), positive gram stain , CXR, Thoracocentesis, Video-Assisted Thoracoscopic Surgery "VATS"

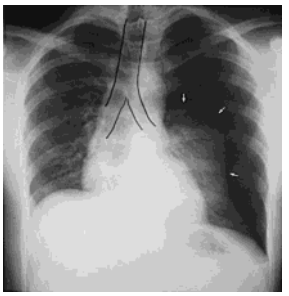
► Chylothorax



- ➢ Definition: Accumulation of lymph within the pleural space
- ➢ Causes: 2 to Trauma, Tumor (lymphoma), Thoracic surgical procedure, Infection
  - If injury above T5-6 = Lt sided chylothorax
  - If injury below T5-6 = Rt sided chylothorax

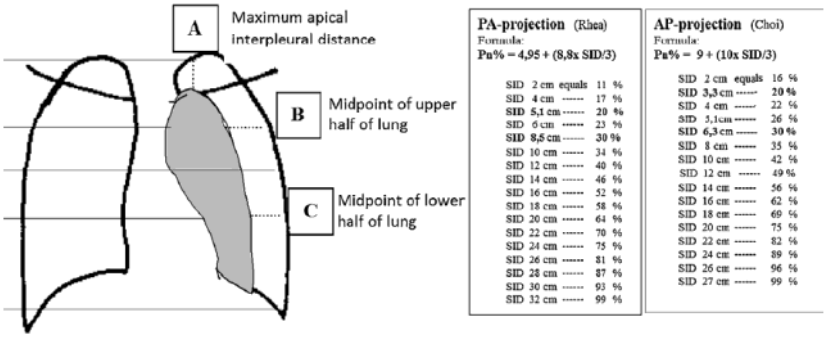
  # Which side is more common &why?! Rt side due to location of thoracic duct
- ➢ Characteristics of the fluid?! Milky white fluid, elevated lymphocytes & TAGs
- ➢ Treatment: conservative therapy (chest tube, octreotide, low fat diet, TPN), Ligation of thoracic duct ,Pleurectomy & Pleurodesis, Chemotherapy +/- XRT (if due to tumor)

► Pneumothorax



- ➢ Definition: Accumulation of air in pleural space
- ➢ Symptoms/Signs: Dyspnea, Uneven chest expansion, Chest pain, Decrease in tactile fremitus, Hyperresonance, Diminished breath sound.
- ➢ Diagnosis: CXR
- ➢ How to estimate pneumothorax size?!

1. We measure the pneumothorax rim in cm using A,B,C (A: maximal apical interpleural distance, B: midpoint of upper half lung, C: midpoint of lower half lung)
2. Sum interpleural distance (SID = A+B+C)
3. Read size from AP or PA table



Types	Info
Primary spontaneous pneumothorax	• Due to rupture of apical subpleural cyst/bleb • Mostly in tall, thin, young male • Associated with smoking • Mostly the Rt lung • Treatment: Chest tube, Surgery(Thoracoscopy, Apical blebectomy & mechanical pleurodesis) • Who need surgery?! High risk profession (pilot, Diver), recurrency, no expansion despite chest tube, bilateral PTX
Secondary spontaneous pneumothorax	• Due to diseased lung(COPD, emphysema) or Barotrauma (mechanical ventilation with high pressure)
Traumatic pneumothorax	• Due to blunt (rib fracture) , penetrating (gunshot), Iatrogenic(central line placement, lung biopsy)
Tension pneumothorax	• Any cause from above (air enter the pleural space but can't exit) • Trachea deviates away from affected lung • May lead to obstructive shock, JVD • Treatment: Immediate needle decompression & chest tube
Catamenial pneumothorax	• Due to intrathoracic endometriosis • Occur in relation to menstruation

► Subcutaneous emphysema

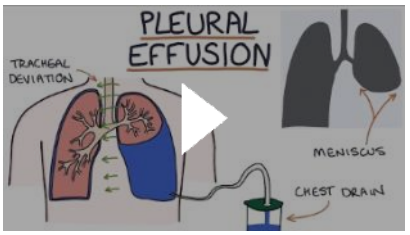


- Definition: occurs when air gets into tissues under the skin. This most often occurs in the skin covering the chest or neck,
- Causes: Pneumothorax, Tumor, Trauma, Certain medical procedures that insert a tube into the body
- Symptoms: crepitus on palpation, Distention in the abdomen, chest, neck, and face.
- Diagnosis: Physical examination, CXR, CT scan
- Treatment: Small cuts, or "blow holes", may be made in the skin to release the gas, Suction may also be applied to the tube to remove air faster "VAC (Vacuum-assisted closure)

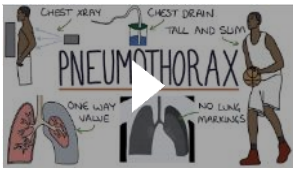
Pleural tapping; Pleural fluid aspiration; Thoracentesis



Understanding Pleural Effusions



Pneumothorax



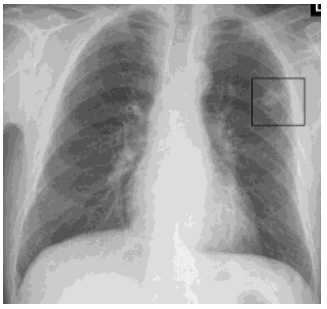
Other lung-chest disorders

Wednesday, March 6, 2024 12:16 AM

► Pectus deformity

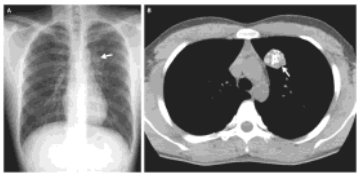
Type	Pectus excavatum	Pectus carinatum
Definition	Chest wall deformity with sternum caving inward	Chest wall deformity with sternum outward
Heart abnormality associated	Mitral valve prolapse	Mitral valve prolapse
Treatment	• Open perichondrium (remove abnormal cartilage & place substernal strut so new cartilage grows back in perichondrium in normal position then remove strut 6 months later) • NUSS procedure (removal of metal strut to elevate sternum without removing the cartilage)	• Open perichondrium & remove abnormal cartilage ,place substernal strut so new cartilage grows back in perichondrium in normal position then remove strut 6 months later
Picture		

► Solitary pulmonary nodules (coin lesion)

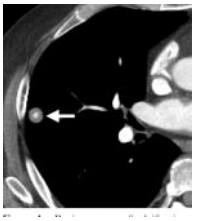


- Definition: Intraparenchymal pulmonary lesion that is < 3cm ,it could be benign (60%) or malignant
- Causes: Infectious granuloma , Hamartoma
- The risk is 3-9x higher in Men
- Risk factors for malignancy: Size of lesion (> 4 cm) , Indistinct margins, Documented growth on follow up, Increase age , Pulmonary hypertrophic osteoarthropathy .
- Diagnosis: CXR (popcorn calcification = hamartoma , Bull's eye = granuloma) , CT scan, CT guided biopsy, Navigational bronchoscopy, Thoracoscopic or open thoracotomy with wedge resection

popcorn calcification



Bull's eye



► Lung abscess



- Definition: localized collection of pus within parenchyma (Narcotic area following infection)
- Cause: Aspiration of organism from oropharynx
- Risk factors for aspiration: Seizures, Alcoholism, bronchial obstruction
- Most common location : Superior segment of RLL
- Most common organism: Staph aureus
- Symptoms/Signs: Fever, Productive cough, Sepsis, Fatigue
- Diagnosis: CXR (air-fluid level), CT scan (to differentiate from empyema), Bronchoscopy
- Treatment: Antibiotics + Bronchoscopy for culture & drainage , Percutaneous drainage, Surgical resection.

Lung cancer

Saturday, March 9, 2024 10:00 PM

▶ Risk factors

- Smoking
- Asbestos exposure
- 2 exposure to smoking
- Old age > 70
- Male
- African American
- Radiation
- Pulmonary fibrosis
- Family history

▶ Common location for lung cancer

→ Right lung > left lung
→ Upper lobes > lower lobes

▶ Symptoms/Signs

- Chronic cough
- Hemoptysis , Chest pain, Dyspnea, Wheezing
- Pleural effusion (suggest chest wall involvement)
- Hoarseness (recurrent laryngeal nerve involvement)
- SVC syndrome
- Diaphragmatic paralysis (phrenic nerve involvement)
- Symptoms of metastasis/paraneoplastic syndrome
- Finger clubbing
- Weight loss

▶ Most common site for metastasis

- Brain
- Bone
- Adrenal
- Liver
- Kidney

▶ Complication of lung CA

- SVC syndrome
- Pancoast tumor
- Horner syndrome
- Endocrine(paraneoplastic)
- Recurrent laryngeal nerve involvement (hoarseness)
- Effusion (pleural, pericardia)

▶ Diagnosis

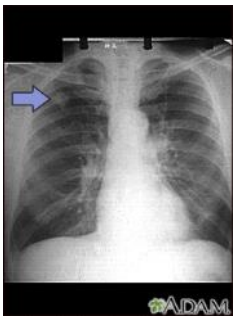
- CXR, CT scan , PET scan
- Needle biopsy (CT or Fluoro guidance)
- Bronchoscopy with brushing & biopsy
- +/- Mediastinoscopy , Mediastinotomy, Scalene node biopsy , Thoracoscopic/open lung biopsy

▶ Contraindication to surgery for lung cancer

SSSTOP IT

- Superior vena cave syndrome
- Supraclavicular node metastasis
- Scalene node metastasis
- Tracheal carina involvement
- Oat cell carcinoma (treated with chemotherapy +/- radiation)
- Pulmonary function test shows FEV1 < 0.8
- Infraction (myocardial)
- Tumor elsewhere (metastatic disease)

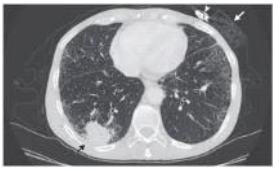
▶ Small cell/Oat cell carcinoma



- ➢ Often centrally located
- ➢ Extremely aggressive
- ➢ It can cause :
  - Neurologic paraneoplastic syndrome (Lambert-Eaton myasthenic syndrome, Myelitis, Encephalitis)
  - Endocrine paraneoplastic syndrome (Cushing syndrome, SIADH)
- ➢ Treatment: Chemotherapy +/- XRT , if small isolated lesion = surgical resection

▶ Non-Small cell carcinoma







- ➢ Most common type of lung cancer
- ➢ Types:

⇒ Adenocarcinoma
- More peripheral
- Most common cause in non-smokers
- Most common in females
- It can cause hypertrophic pulmonary osteoarthropathy (syndrome characterized by the triad of periostitis, digital clubbing and painful arthropathy of the large joints)
- Mutations : KRAS, EGFR, ALK
- Most likely to metastasis to CNS

Bronchioloalveolar (adenocarcinoma in situ) : On CXR it shows hazy infiltrates similar to pneumonia .

⇒ Squamous cell carcinoma
- More central / hilar mass
- Tumor undergo central necrosis with cavity formation
- It can cause hypercalcemia

⇒ Large cell carcinoma
- Location: Peripheral
- Highly anaplastic undifferentiated tumor
- May produce hCG (gynecomastia)
- Treatment: surgical resection (Less responsive to chemotherapy)

▶ Carcinoid

- ➢ Definition: it's APUD(Amine- precursor uptake & Decarboxylation) cell tumor of bronchus
- ➢ Location: central or peripheral
- ➢ Symptoms: Asymptomatic (if peripheral) , if central in location = due to mass effect (wheezing, atelectasis, cough) or carcinoid syndrome (flushing, diarrhea)
- ➢ Types:

⇒ Typical
- More common
- Central in location

⇒ Atypical
- Less common , usually large at presentation
- Peripheral in location

- ➢ Diagnosis: Bronchoscopy (red-yellow-purple mass protrude into the bronchial lumen)
- ➢ Treatment: Surgical resection (lobectomy with lymph node dissection) , Sleeve resection for proximal lesion (resection of ring segment of bronchus with the tumor inside)

▶ Pancoast / superior sulcus tumor

- ➢ Definition : it's tumor at the apex of the lung or superior sulcus that may involve the brachial plexus, Sympathetic ganglia , vertebral bodies.
- ➢ Symptoms/Signs:



- Recurrent laryngeal nerve = Hoarseness
- Brachia plexus = Pain, Upper extremity weakness
- Stellate ganglion = Horner's syndrome
- Superior vena cava = SVC syndrome
- Phrenic nerve = Hemidiaphragm paralysis

Horner's syndrome: Injury to the cervical sympathetic chain (MAP: Miosis , Anhidrosis of ipsilateral face , Ptosis)

▶ Paraneoplastic syndrome

- ➢ Definition: Syndrome that are associated with tumors but affect distant parts of the body
- ➢ Causes: by hormones released from endocrinologically active tumor , Uncertain etiology
- ➢ Types:
- Metabolic (Cushing's , SIADH, Hypercalcemia)
- Neuromuscular (Eaton-Lambert , Cerebellar ataxia)
- Skeletal (Hypertrophic osteoarthropathy)
- Dermatologic (Acanthosis nigricans)
- Vascular (Thrombophlebitis)

▶ Simple Staging of lung cancer (**TMN** : **T**umor/**M**etastasis/ **N**odes)

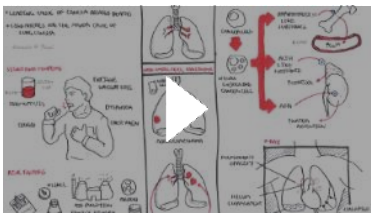
T	N	M
T1 = </= 3cm (T1a = </= 1cm, T1b = >1 but </=2cm, T1c = >2 but </= 3cm) T2 = 3-5cm but away from carina T3 = 5-7 cm ,invasion of chest wall, pericardium, diaphragm OR < 2cm away carina T4 => 7cm, invades mediastinum, esophagus, trachea, vertebra, heart, great vessels, malignant effusion	N0 = none N1 = ipsilateral hilum node N2 = ipsilateral mediastinal, subcarinal, aortopulmonary window N3 = contralateral mediastinal or supraclavicular	M0 = absent M1 = distant metastasis

Stage	TMN status
Stage I	T1-2,N0,M0
Stage IIa	T2,N0,M0
Stage IIb	T1-2,N1,M0 T3,N0,M0
Stage IIIa	T1-3,N2,M0 T3,N1,M0
Stage IIIb	Any T4 & N3
Stage IV	M1

► Treatment for each stage

- Stage IA = Surgery
- Stage IB = Surgery ± Chemotherapy
- Stage IC = Surgery + chemotherapy
- Stage IIA and IIB = Surgery + Chemotherapy
- Stage IIIA = Chemotherapy ± Surgery ± Radiotherapy
- Stage IIIB = Radiochemotherapy
- Stage IV = Palliative chemotherapy

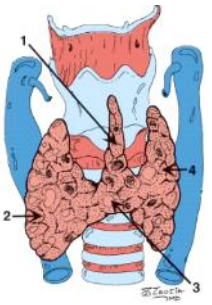
Lung Cancer - Overview



Thyroid

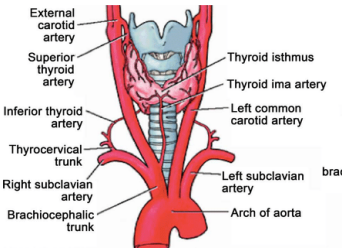
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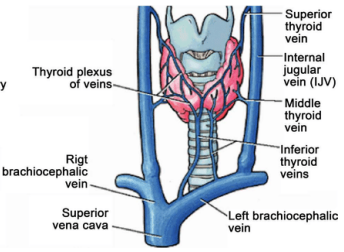
▶ Parts



1. Pyramidal lobe
2. Rt lobe
3. Isthmus
4. Lt lobe

▶ Vasculature





⇒ **Blood supply**
Superior thyroid A (branch of external carotid A)
Inferior thyroid A (branch of thyrocervical trunk)

⇒ **Venous drainage**
Superior thyroid V (into internal jugular V)
Middle thyroid V (into internal jugular V)
Inferior thyroid V (into brachiocephalic V)

⇒ **Lymphatic drainage**
Paratracheal and deep cervical nodes

⇒ **Nerve supply**
Sympathetic trunk

Thyroid disorders 1

Monday, March 11, 2024 11:38 PM

► Hypothyroidism vs Hyperthyroidism

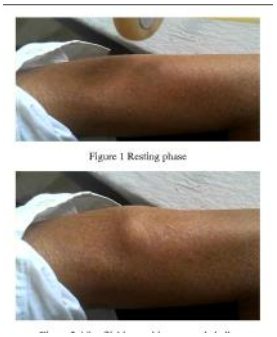
	Hypothyroidism	Hyperthyroidism
Causes	Primary: → Hashimoto thyroiditis → Iodine deficiency → Thyroiditis types → Euthyroid sick syndrome → Iodine excess (Wolff-Chaikoff effect) → Prior ttt of hyperthyroidism with radioiodine , thyroidectomy, medication(lithium, amiodarone) Secondary: → Pituitary disease (deficiency of TS	→ Graves' disease → Toxic multinodular goiter → Thyroid storm → Toxic thyroid adenoma → Excessive dose of levothyroxine → Iodine induced hyperthyroidism
Metabolic symptoms	- Cold intolerance - Decrease sweating - Weight gain - Hyponatremia	- Heat intolerance - Increase sweating - Weight loss
Skin/Hair symptoms	▪ Dry, cool skin ▪ Coarse, brittle hair ▪ Diffuse alopecia ▪ Brittle nails ▪ Puffy face & generalized nonpitting edema (myxedema)	▪ Warm, moist skin ▪ Fine hair ▪ Onycholysis (nail separates from its nail bed) ▪ Pretibial myxedema " in graves' disease"
Ocular symptoms	- Periorbital edema	- Ophthalmopathy (periorbital edema, exophthalmos) - Lid lag/ retraction
GI symptoms	▪ Constipation ▪ Decrease appetite	▪ Hyperdefecation/ Diarrhea ▪ Increase appetite
Musculoskeletal symptoms	- Hypothyroid myopathy (Proximal weakness + elevated CK) - Carpal tunnel syndrome - Myoedema (small lump on the surface of muscle when struck with hammer)	- Thyrotoxic myopathy (proximal weakness + normal CK) - Osteoporosis/ increase fracture rate
Reproductive symptoms	▪ Abnormal uterine bleeding ▪ Decrease libido ▪ Infertility	▪ Abnormal uterine bleeding ▪ Gynecomastia ▪ Decrease libido ▪ Infertility
Neuropsychiatric symptoms	- Hypoactivity - Lethargy - Fatigue - Weakness - Depressed mood - Decrease reflexes (delayed relaxing)	- Hyperactivity - Restlessness - Anxiety - Insomnia - Fine tremors - Increase reflexes (Brisk)

CVS symptoms	▪ Bradycardia ▪ Dyspnea on exertion	▪ Tachycardia, Palpitation ▪ Dyspnea , Arrhythmias" A-Fib" ▪ Chest pain , Systolic HTN
Labs	→ High TSH (if primary) → Low T3 & T4 → Hypercholesterolemia	→ Low TSH (if primary) → High T3 & T4 → Low LDL, HDL, Total cholesterol
Treatment	• levothyroxine(T4)	• Thioamides (Methimazole, Propylthiouracil) # side effects: Agranulocytosis, Aplastic anemia, Skin rash, Arthralgias, Hepatotoxicity. • B-blocker to manage palpitations, tremor • Sodium ipodate or iopanoic acid (acute management of sever hyper) • Radioiodine 131 (131 I) # most common complication is Hypothyroidism # contraindicated in pregnancy & breastfeeding • Subtotal thyroidectomy # side effect: Permanent hypothyroidism, Recurrent laryngeal nerve palsy , Hypocalcemia

	TSH	T4
Primary hypothyroidism	↑	↓
Secondary hypothyroidism	↓	↓
Subclinical hypothyroidism	↑	Normal

	TSH	T4
Primary hyperthyroidism	↓	↑
Secondary hyperthyroidism	↑	↑
Subclinical hyperthyroidism	↓	Normal



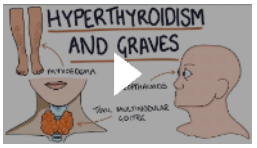

Figure 1 Resting phase



[Hypothyroidism and Hashimoto's Thyroiditis: Visual Explanation for Students]



[Understanding Hyperthyroidism and Graves Disease]



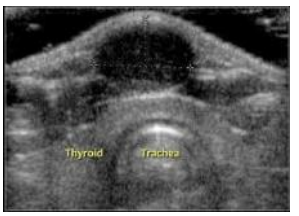
Thyroid disorders 2

Monday, March 11, 2024 8:57 PM

► Thyroglossal duct cyst

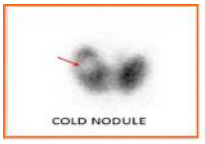
- Definition: Remanent of the diverticulum formed by migration of thyroid tissue
- Location: Almost always in the Midline (between hyoid bone & thyroid isthmus)
- The mass moves with Swallowing & Protrusion of the tongue
- Age affected: 5 years of age
- Diagnosis: Ultrasound
- Treatment: Antibiotic (if infected), surgical excision (Sistrunk procedure = lateral neck incision that Include removal of the midportion of the hyoid bone & entire tract to foramen cecum & the cyst)

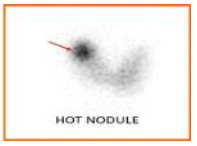




► Thyroid nodule /adenoma

- Diagnosis: Ultrasound(solid or cyst), Fine needle aspiration "FNA" (send for cytology), 123 I scintiscan (Hot or cold nodule)
- Hot vs Cold nodule?!
  - Hot nodule = Increase 123 I uptake = functioning/hyperfunctioning nodule , most likely benign
  - Cold nodule = Decreased 123 I uptake = nonfunctioning nodule, most likely malignant
- Indication for 123 I scintiscan : Nodule with multiple nondiagnostic FNA & low TSH, Nodule with thyrotoxicosis & low TSH





► Thyroid carcinoma

- Oncogenes associated?! Ras gene family, RAT proto-oncogene, MEN-II
- Types:
  1. Papillary carcinoma
  2. Follicular carcinoma
  3. Medullary carcinoma
  4. Hurthle cell carcinoma
  5. Anaplastic/ undifferentiated carcinoma
- What suggest thyroid carcinoma?!

→ History
- Neck radiation
- Family history (thyroid CA , MEN-II)
- Young age
- Male

→ Signs
- Single nodule
- Cold nodule
- Increased calcitonin levels
- Lymphadenopathy
- Hard, immobile nodule

→ Symptoms
- Voice change (vocal cord paralysis)
- Dysphagia
- Discomfort in neck
- Rapid enlargement

- Diagnosis: FNA, thyroid ultrasound, TSH level, calcium level, CXR, +/- 123 I scintiscan

► Papillary adenocarcinoma

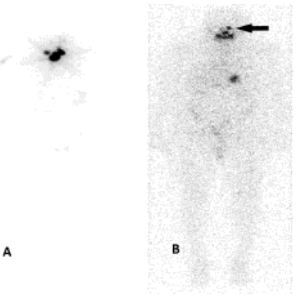
- Most common thyroid cancer
- Risk factors: Radiation exposure, Age (30-40), Female
- Histological findings: Psammoma bodies , Orphan Annie eyes
- Good uptake of 131 I scintiscan
- Route of spread: Via Lymphatics
- Commonest site for metastasis: Lung
- Treatment:

⇒ < 1.5cm & no history of neck radiation = Thyroid lobectomy & isthmectomy, Near total thyroidectomy, Total thyroidectomy

⇒ > 1.5cm , bilateral+ cervical node metastasis or history of neck radiation = Total thyroidectomy + Selective neck dissection

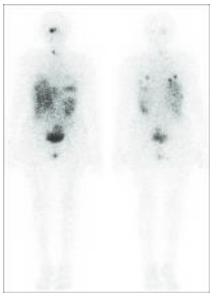
⇒ Postoperative medication = thyroid hormone replacement , postoperative 131 I scan

- 7 P's :



- Popular (most common)
- Psammoma bodies
- Palpable LN's (spread most commonly through lymphatics)
- Positive 131 I uptake
- Positive prognosis
- Postoperative 131 I scan to diagnose/treat metastases
- Pulmonary metastases

► Follicular adenocarcinoma



- Description to the nodule consistency : Rubbery , encapsulated
- Route of spread : Hematogenous
- Good uptake 131 I scintiscan
- More aggressive than papillary adenocarcinoma
- More common in female
- Histological findings: Capsular or blood vessel invasion
- Most common site for distance metastasis : Bone
- Treatment: Total thyroidectomy , postoperative 131 I scan
- 4 F's :
  - Far away metastasis
  - Female
  - FNA cannot diagnose, why?! Because tissue structure is needed for diagnosis
  - Favorable prognosis

► Hurthle cell carcinoma

- Definition: Thyroid cancer of the Hurthle cells (follicular cell in origin)
- It doesn't take 131 I scintiscan
- Diagnosis: FNA (identify cells), Tissue histology (to determine if malignant)
- Route of spread: Lymphatic
- Treatment: Total thyroidectomy

► Medullary carcinoma

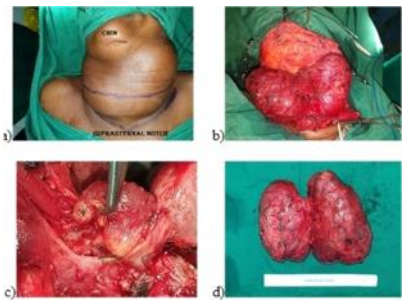
- Definition: CA of parafollicular cell "C-cell"
- Associated with: MEN-II , RET proto-oncogene
- More common in females
- Histological findings: Amyloid
- Route of spread: Lymphatic & Hematogenous
- What does this tumor secretes: Calcitonin (tumor marker)
- Diagnosis: Pentagastrin stimulation test(it cause increase in calcitonin), FNA
- Poorly take 131 I scintiscan

- Treatment: Total thyroidectomy & median LN dissection , Modified neck dissection (if lateral cervical nodes are positive)
- 4 M's
- MEN-II (Pt should always be screened for Pheochromocytoma)
- Amyloid
- Median LN dissection
- Modified neck dissection (if lateral cervical nodes are positive)

Anaplastic carcinoma

- Definition: undifferentiated CA arising from previously differentiated thyroid CA most commonly Follicular CA
- Highly malignant
- More common in females
- Histological findings: Giant cells, Spindle cell
- Very poorly take up 131 I scintiscan
- Diagnosis: FNA
- Treatment: Total thyroidectomy + XRT/chemotherapy (if small), Debulking surgery & Tracheostomy , XRT/chemotherapy (if airway compromised)

Toxic multinodular goiter / Plummer's disease



- Definition: Multiple thyroid nodules with one or more nodules producing thyroid hormone resulting in hyperfunctioning thyroid
- More common in elderly, More common in women
- Most common cause of thyroid enlargement
- Symptoms: Tachycardia, Weight loss, Insomnia, Airway compromise
- Diagnosis: 123 I radionuclide scan (patchy uptake), High T3-T4, Low TSH
- Treatment: Surgically remove hyperfunctioning nodules with lobectomy OR near total thyroidectomy
  # Pt with multinodular goiter may develop hyperthyroidism if they take Iodine containing medication/contrast (Amiodarone)

Thyroiditis

	Acute thyroiditis	Subacute granulomatous thyroiditis (De Quervain's thyroiditis)
Causes	• Bacteria (strep, staph) caused by thyroglossal cyst or anatomic variant • Trauma (physical or radiation)	• Viral infection following URI
Symptoms	- Painful, swollen thyroid - Fever - Overlying skin erythema - Dysphagia	- Flu like symptoms - Glandular - Swelling - Tenderness/ painful - Jaw/neck pain
Diagnosis		• Low uptake of radioiodine • Elevated ESR • Low TSH, High T3-4
Treatment	→ Antibiotics → Drainage of abscess → Needle aspiration for culture → Surgical removal of the fistula	→ NSAIDs+/- Steroids, ASA

- Pt with thyroiditis generally have initial hyperthyroid phase (due to leakage of hormone from inflammation) then followed by euthyroid then hypothyroid phase

	Hashimoto thyroiditis	Riedel's thyroiditis
Another name	Chronic autoimmune lymphocytic thyroiditis	Invasive fibrosis thyroiditis # invasive = extend to esophagus , trachea
causes	Autoimmune	Inflammatory " part of IgG4 disease
Findings	• Moderately enlarged • Nontender thyroid • More in female # postpartum thyroiditis : arise < 1 year after delivery	• Painless , slowly enlarged thyroid • Hard " rock like" • Fixed
Diagnosis	• + Antithyroid peroxidase (antimicrosomal) • + Antithyroglobulin Ab	Biopsy (to rule out thyroid CA , lymphoma)
Treatment	• Thyroxin • Partial thyroidectomy	• Surgical tracheal decompression • Thyroid hormone replacement , • Steroid/Tamoxifen if refractory

	Chronic thyroiditis
Types	1. Hashimoto's thyroiditis 2. Riedel's thyroiditis

► Graves' disease

- ➢ Definition: Autoimmune Diffuse goiter with hyperthyroidism, Exophthalmos, Pretibial myxedema & thyroid bruit
- ➢ Cause: Circulating thyroid stimulating immunoglobulin Ab that stimulate TSH receptors on follicular cells of the thyroid.
- ➢ Signs: Diffuse symmetric enlargement of thyroid gland , Non-tender , may present with Bruit
- ➢ More common in younger females
- ➢ Diagnosis: Increased T3-24, Anti-TSH receptor Ab, Decreased TSH, Diffuse uptake of 131
- ➢ Treatment:

⇒ Medical blockade (Iodide, Propranolol, Propylthiouracil" PTU", Methimazole, Lugol's solution "potassium iodide")
How does PTU work?! Inhibit incorporation of iodine into T4/T3 (by blocking peroxides oxidation of iodide to iodine), Inhibit peripheral conversion of T4 to T3
How does methimazole work?! Inhibit incorporation of iodine into T3/T4 only.

⇒ Radioiodide ablation:

⇒ Surgical resection (Bilateral subtotal thyroidectomy)
Indication for surgery?! Suspicious nodule, if Pt noncompliant of refractory to medicine, Pregnant, Child



► Thyroid storm / Thyrotoxic crisis

- ➢ Definition: Rare life threatening complication of thyrotoxicosis, characterized by acute exacerbation of hyperthyroidism
- ➢ Precipitating factors: Infection, Diabetic ketoacidosis, Stress (trauma, surgery, childbirth)
- ➢ Symptoms: Fever, Tachycardia, Agitation/psychosis, confusion, N/V, Diarrhea
- ➢ Diagnosis: low TSH, High T4
- ➢ Treatment: supportive therapy, Antithyroid agents(PTU every 2h) followed with iodine, B-blocker (to control HR), Dexamethasone (to prevent peripheral generation of T3-T4)

treatment with 4 P's :

- Propranolol (B-blocker)
- Propylthiouracil
- Prednisolone (glucocorticoids)
- Potassium iodide (Lugol iodine)

► Euthyroid sick syndrome / nonthyroidal illness syndrome

- Mechanism: the body doesn't need much T3 so the body convert T4 to reverse T3 (rT3)
- Causes: Starvation, Severe trauma, Sepsis, MI, DKA
- Symptoms similar to hypothyroidism but more severe
- Diagnosis: low T3, low-normal T4 & TSH, low thyroid binding globulin , High rT3
- Treatment with thyroid hormone replacement is not appropriate. When the underlying disorder is treated, results of thyroid tests normalize.

Parathyroid disorders

Thursday, March 14, 2024 3:44 PM

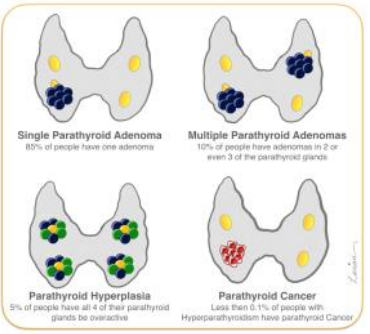
► Hyperparathyroidism

Primary HPTH	Secondary HPTH	Tertiary HPTH
Increased secretion of PTH by parathyroid gland # most common cause?! Adenoma, Hyperplasia, Carcinoma. • Elevated calcium , Low phosphorus, Elevated urinary cAMP	Increased serum PTH from calcium wasting caused by renal failure or decreased GI calcium absorption , Rickets, Osteomalacia. • Low calcium	Persistent HPTH after correction of secondary HPTH which results from autonomous PTH secretion not responsive to normal negative feedback • Elevated calcium
⇒Treatment of primary HPTH from parathyroid Adenoma: • Surgical removal & biopsy all abnormally enlarged parathyroid glands. ⇒Treatment of primary HPTH from Hyperplasia: • Neck exploration removing all para thyroid gland leaving at least 30 mg of parathyroid tissue in the nondominant forearm muscle ⇒Treatment of primary HPTH from Carcinoma: • Surgical removal of carcinoma & ipsilateral thyroid lobe & all enlarged LN	⇒Treatment: • Correct calcium & phosphate • Perform renal transplantation	⇒Treatment: • Correct calcium & phosphate • Remove all parathyroid gland & reimplant 30-40 mg in forearm

	Primary HPTH	Secondary HPTH	Tertiary HPTH
Calcium	↑	↓/ N	↑
PTH	↑	↑	↑↑
Phosphate	↓	↑/ N	↑

► Number of gland affected in each disorder

- Parathyroid hyperplasia = 4
- Parathyroid adenoma = 1
- Parathyroid carcinoma = 1



► Risk factors for primary HPTH

- Family history
- MEN-I ,MEN-IIa
- Irradiation

▶ Symptoms/Signs

Stones, Bones, Groans, Psychiatric overtones

- Stones : Kidney stones
- Bones: Bone pain, Pathologic fractures, Subperiosteal resorption
- Groans: Muscle pain & weakness, Pancreatitis, Gout, Constipation
- Psychiatric overtones: Depression, Anorexia, Anxiety
- Others: Polydipsia, Weight loss, HTN, Polyuria, Lethargy

▶ Diagnosis

- x-ray (Subperiosteal bone resorption in hand digits)
- Labs (Elevated PTH , Hypercalcemia, low phosphorus, High chloride)
  # 33-to-1 rule: most Pt with primary HPTH have ratio of serum (Cl) to phosphate >/= 33
- Urine calcium
  # Familial hypocalciuric hypercalcemia: Autosomal dominant of asymptomatic hypercalcemia & low calcium urine, in contrast to HPTH with lead to high urine calcium .
- Ultrasound
- Sestamibi scan
- 201 Tl (technetium) - thallium subtraction scan
- CT scan /MRI

▶ When does the surgery become mandatory

ROACH

- Renal insufficiency (CR decreased by 30%)
- Osteoporosis (T score < -2.5)
- Age <50
- Calcium > 1 mg/dl above upper limit of normal
- Hypercalciuria (> 400 mg/day ca+ excretion)

▶ Why do we place 30-40 mg of sliced parathyroid gland in the forearm?!

To retain parathyroid function , so if HPTH recurs we remove some of parathyroid gland from easily accessible forearm

▶ Postoperative complication of parathyroidectomy

- Recurrent nerve injury (unilateral = voice change, bilateral = airway obstruction)
- Neck hematoma
- Hypocalcemia
  # symptoms /signs: Perioral tingling, Paresthesia, + Chvostek's sign , + Trousseau's sign , + Tetany
  **Chvostek's sign : the abnormal twitching of muscles that are activated (innervated) by the facial nerve
  **Trousseau's sign: a carpopedal spasm induced by ischemia secondary to the inflation of a sphygmomanometer cuff, to 20 mmHg over their systolic blood pressure for 3 minutes
  **Tetany :involuntary contraction of muscles
- Superior laryngeal nerve injury
- Hungry bone syndrome
  (it's sever hypocalcemia seen after surgical correction of HPTH, as chronically calcium deprived the bone aggressively absorbs calcium)







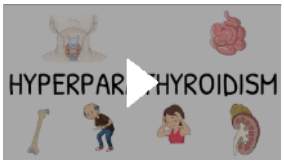
► Hypoparathyroidism

- Causes: Head & Neck surgery , Autoimmune destruction, DiGeorge syndrome
- Symptoms: Rickets, Osteomalacia, Cardia arrhythmia, Numbness/Tingling, Tetany, Chvostek sign, Trousseau sign, Cataract , Seizure
- Diagnosis: Low calcium, High phosphate, Low PTH, Low urine cAMP
- Treatment: Acute = IV calcium , Chronic = PO calcium & Vitamin D

► Parathyroid carcinoma

- Definition: Primary carcinoma of parathyroid gland
- Usually affect 1 gland
- Most common site for metastasis: Lung
- Tumor marker: Human chorionic gonadotropin (HCG)
- Symptoms/Signs: Hypercalcemia, Elevated PTH, Palpable parathyroid gland, Pain in neck, Recurrent laryngeal nerve paralysis(change in voice), Hypercalcemic crisis (calcium level < 14)
- Diagnosis: Low calcium, Low PTH, Low alkaline phosphatase
- Treatment: Surgical resection of parathyroid mass + ipsilateral thyroid lobectomy + ipsilateral LN resection .

Hyperparathyroidism Primary, Secondary, and Tertiary - Simple and easy to understand



Adrenal gland disorders

Friday, March 1, 2024 1:47 PM



► Cushing's syndrome

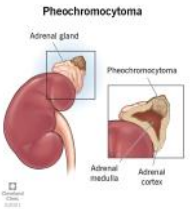
- Definition: Excessive cortisol production.
- Causes: Iatrogenic (prescribed prednisone) , Cushing's disease , Adrenal tumor.
  # Cushing's disease: Excess production of ACTH by anterior pituitary OR ectopic ACTH (from tumor not found in pituitary but they causes the adrenal to secrete cortisol without negative feedback , most commonly oat cell tumor of the lung)
- Symptoms/Signs: Truncal obesity , Hirsutism , Moon face, Acne , Buffalo hump , Purple stria, HTN, DM, Weakness, Depression , Easy bruising , Myopathy , Thin skin, Facial plethora
- Diagnosis: -Quick Indirect measure = by measuring the 24-hour Urine cortisol OR the breakdown product of cortisol (17-OHCS) in urine.
  -Direct measure: serum cortisol level (in healthy people it's highest in the morning & lowest at night)
  -low dose dexamethasone suppression test(Cushing's pt do not suppress their cortisol secretion)
  -Brain MRI , Chest CT to localize the tumor



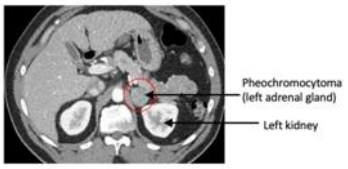
ACTH levels	Cortisol levels	Cause
↓	↑	Cortisol secreting lesion (Adrenal adenoma)
↑	↑	Pituitary adenoma OR ectopic source ACTH

  # How to differentiate between Pituitary Vs ectopic ACTH producing tumor ?!
  High dose dexamethasone test, In case of pituitary source there will be cortisol suppression while in ectopic ACTH source there will be no suppression.
- Treatment : Transsphenoidal adenomectomy , Surgical adrenalectomy
  # Common complication of Bilateral adenomectomy?!
  Nelson's syndrome (when the functional pituitary adenoma produce excessive ACTH & the mass effect produce visual disturbance , Hyperpigmentation, Amenorrhea).

► Pheochromocytoma

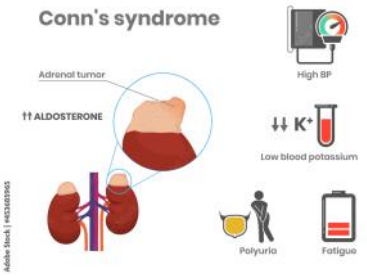


- Definition: Tumor of adrenal medulla & sympathetic ganglion (from chromaffin cell lines) that produces catecholamine (mainly norepinephrine), affect people at any age mainly at 40-60 years.
- Sites for pheochromocytoma: Adrenal , Organ of Zuckerkandl, Thorax, Bladder, Scrotum.
  # Organ of Zuckerkandl: Body of chromaffin cells around abdominal aorta near inferior mesenteric artery .
- Risk factors: MEN-II , Family history , Von-Hippel Lindau disease
- Symptoms/Signs: Triad of "Palpitation+ Headache+ Episodic diaphoresis ", HTN, Pallor, Flushing , Anxiety, Weight loss, Tachycardia, Hyperglycemia.



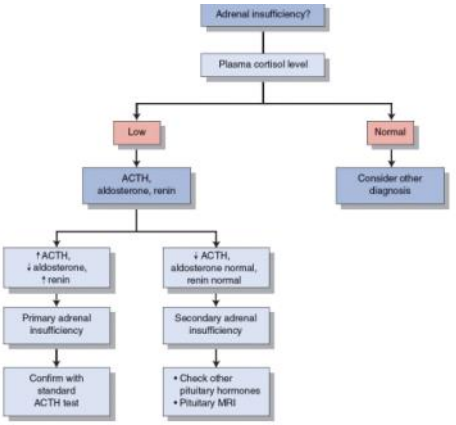
- Diagnosis: - Urine screen for VMA(Vanillylmandelic Acid), Metanephrine &normetanephrine (breakdown product of catecholamine)
  -Urine/serum epinephrine-norepinephrine levels
  -Lab for hyperglycemia , why?! Because epinephrin increase glucose &norepinephrine decrease insulin.
  -CT /MRI , I-MIBG (Norepinephric analog that collect in adrenergic vesicles as in pheochromocytoma), PET scan for tumor localization.
- Rules of 10's : 10% malignancy , 10% bilateral , 10% in Children , 10% Multiple tumors , 10% Extra-adrenal.
- Treatment: a-blocker "Phenoxybenzamine or Prazosin" (to increase intravascular volume to allow reduction I catecholamine induced VC &result in volume depletion)+/-B-blocker (to avoid hypertensive crisis) , Tumor resection
  # It's so important to start a-blocker then B-blocker to avoid crisis

► Conn's syndrome



- ➢ Definition: primary hyperaldosteronism due to high aldosterone production.
- ➢ Causes: primary (renin is low) = Adrenal adenoma or Adrenal hyperplasia or Adrenal cancer
  Secondary(renin is high) = CHF, renal stenosis , liver failure , Bartter's syndrome(Renin secreting tumor)
- ➢ Symptoms/Signs: HTN, Headache, Polyuria, Weakness , Hypokalemia
- ➢ Diagnosis: Plasma aldosterone concentration , Plasma renin activity (Aldosterone: renin ration >30 in primary hyperaldosteronism) CT/MRI (for tumor), CT Angio/Doppler (for renal stenosis), Saline infusion test(saline infusion will decrease aldosterone level in normal people but not in Conn's Pt)
- ➢ Treatment: Spironolactone (aldosterone antagonist) , K+ supplementation , surgery (adrenalectomy)

► Adrenal insufficiency

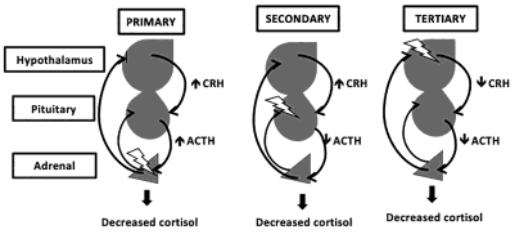


- Definition: Inability of adrenal gland to generate enough glucocorticoid+/- mineralocorticoids for the body's need.
- Symptoms: Weakness, Fatigue, Orthostatic hypotension, Muscle aches, Weight loss, GI disturbance , Sugar &/or salt craving
- Diagnosis : Plasma cortisol level (Decreased) , Plasma ACTH level , standard ACTH stimulation test (IV infusion of synthetic ACTH, in 1 no significant increase in cortisol level , in 2 cortisol fail to respond to the test) , Brain CT/ MRI
- Treatment: Glucocorticoids +/- mineralocorticoids supplementation.

► Primary adrenal insufficiency

- ➢ Cause: ↓ gland function -↓ cortisol -↓ aldosterone
- ➢ Symptoms: Hypotension, Hyperkalemia, Metabolic acidosis, Skin/mucosal hyperpigmentation
- ➢ Addison's disease: Chronic primary adrenal insufficiency , Caused by Adrenal atrophy or destruction due to autoimmune adrenalitis or TB , Pt present with hyperkalemia & hyponatremia

► Secondary or tertiary adrenal insufficiency

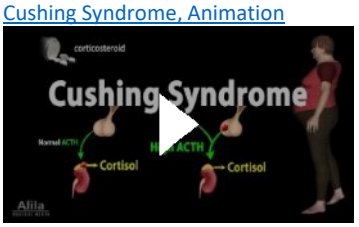


- ➢ Causes : 2 = ↓ pituitary ACTH secretion due to pituitary pathologies
  3 = ↓ hypothalamic CRH secretion due to abrupt cessation of glucocorticoids therapy
- ➢ No Hyperkalemia , No Hyperpigmentation

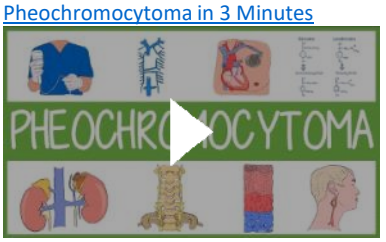
► Acute adrenal insufficiency " Addisonian crisis"

- ➢ Cause: Acute stressor that increase glucocorticoids requirements (infection) in Pt with pre-existing adrenal insufficiency or on glucocorticoids therapy
- ➢ Symptoms: Sever hypotension, Abdominal pain , N/V, Altered mental status, Shock .
- ➢ Treatment: IV hydrocortisone, IV fluids
  # Waterhouse-Friedrichsen syndrome: it's bilateral adrenal hemorrhage in setting of sepsis which lead to acute primary adrenal insufficiency.

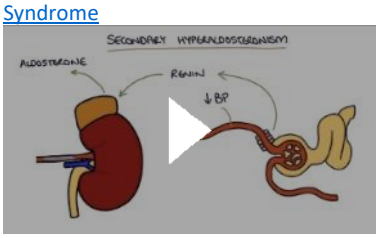
[Cushing Syndrome, Animation]



[Pheochromocytoma in 3 Minutes]



[Hyperaldosteronism and Conn's Syndrome]



[Adrenal insufficiency (Year of the Zebra)]



[Addison's Disease, Causes, Signs and Symptoms, Diagnosis and Treatment.]



Salivary gland tumor

Tuesday, March 19, 2024 8:34 PM

▶ Most common gland affected

1. Parotid gland (80%)
2. Submandibular gland
3. Minor salivary gland
   # Minor salivary gland has the highest potential for malignant
   # Parotid gland has the highest potential for being benign

▶ Benign vs Malignant tumors

⇒ Benign :
Mobile, Nontender, No node involvement, No facial weakness
Most common benign?! Pleomorphic adenoma , Warthin's tumor

⇒ Malignant :
Painful, Fixed , Local metastasis, Facial paresis/paralysis
Most common malignant?! Mucoepidermoid carcinoma , Adenoid cystic carcinoma

▶ Diagnosis

- FNA
- MRI
  # Never perform excisional biopsy on parotid gland , Why?!
  Increase risk of recurrence & nerve damage

▶ Treatment

- Surgical resection (Superficial parotidectomy "Patey's procedure")
  # Facial N is preserved
- Neck dissection (for node positive neck)
- +/- postoperative XRT
  # Indication?! High grade cancer, Recurrent cancer, Invasion of adjacent structure , Any T3-T4 parotid tumors

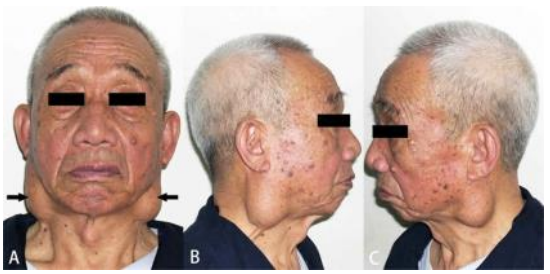


▶ Pleomorphic adenoma

- Most common location?! Parotid gland
- More common in Male (young-middle aged)
- Characteristics: Rubbery-hard, does not fluctuate, limited mobility , No lymph node involved

▶ Warthin's tumor

- Occur only in parotid gland (Parotid tail)
- More common in Males (> 50), Smokers
- Characteristics: Soft, Fluctuant



Multiple endocrine neoplasia (MEN syndrome)

Friday, March 8, 2024 5:44 PM

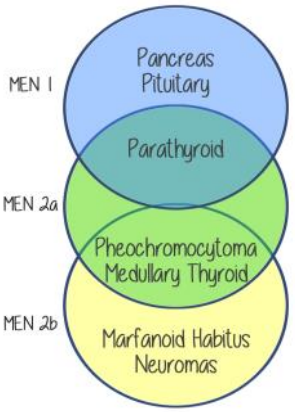
▶ Inherited pattern

Autosomal dominant

	MEN-1	MEN-2A	MEN-2B
Tumors	3 P's • Parathyroid hyperplasia • Pituitary tumors • Pancreatic islet cell tumor (Gastrinoma, Insulinoma)	2 P's & 1 M's • Parathyroid hyperplasia (Hypercalcemia) • Medullary thyroid carcinoma (calcitonin secreted) • Pheochromocytoma (excess catecholamine)	1 P's & 3 M's • Mucosal neuroma • Medullary thyroid carcinoma • Marfanoid habitus • Pheochromocytoma
Mutations	Mutation in MEN-1(tumor suppressor, on chromosome 11, codes for Menin)	Mutation in RET(protooncogene, on chromosome 10, codes for receptor tyrosine kinase)	Mutation in RET gene
Lab Screening tests	• Calcium • PTH • Gastrin • Prolactin (in females)	• Calcitonin level(+/- stimulation) • Calcium levels • PTH • Catecholamines & metabolites • RET gene testing	

Multiple endocrine neoplasia - causes, symptoms, diagnosis, treatment, pathology



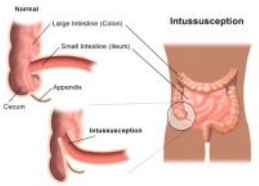


Pediatric disorders 1

Wednesday, February 28, 2024 12:56 PM

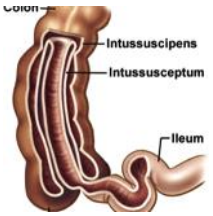
Intussusception

Definition



Obstruction due to Telescoping of proximal bowel segment into distal segment , may result when peristalsis carries a lead point downstream .
Most common site ?! Terminal ileum At ileocecal junction/valve .
More common in boys between age of 6m-2y.

Intussuscipiens Vs Intussusceptum



- Intussuscipiens : Recipient segment of bowel .
- Intussusceptum : Leading point or bowel that enters the intussucipiens.

Causes

- Idiopathic
- Viral illness (Rotavirus → Hypertrophic Peyer's patches (which act as lead point))
- Meckel's diverticulum , Small bowel wall hematoma (IgA vasculitis) in children
- Intraluminal mass/ tumor in adult

Symptoms / Signs

- Alternating lethargy & irritability (colic)
- Bilious vomiting
- Currant jelly stool
- RUQ pain
  # When pt draw their legs to their chest this will ease pain.
- Abdominal distention
- Empty RLQ on palpation (Dance's sign)
- Sausage shaped mass in right abdomen

Diagnosis



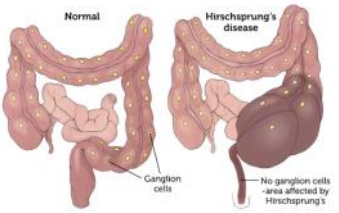
- Ultrasound / CT (Target sign)

Treatment

- Air or Barium enema
- Laparotomy & Reduction by milking the ileum from the colon

Hirschsprung disease

Definition



Congenital megacolon , it's neurogenic form of intestinal obstruction because of inadequate relaxation & peristalsis due to absence of normal ganglion cells/ enteric nervous plexus (Auerbach & Meissner plexuses) of rectum and colon .
Most common in boys
Risk increases with Down syndrome
Associated with mutation in RET gene

Symptoms /Signs

- Abdominal distention
- Bilious vomiting
- Failure to pass meconium in first 24 hour
- Chronic constipation
- Squirt sign (Explosive expulsion of watery stool with anorectal digital exam)
- Decrease growth

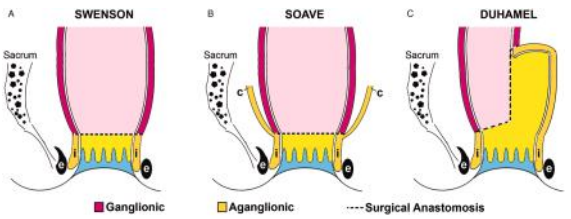
Diagnosis





- Abdominal X-ray (Revels Dilated colon)
- Unprepared barium enema (Revels colonic transition zone which is constricted Aganglionic segment with dilated proximal normal segment " may not develop until 3-6 weeks)
- Rectal biopsy (Absence of ganglionic cell)

Treatment



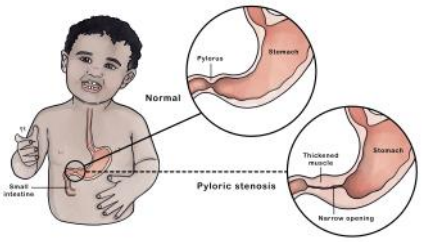
- Colostomy proximal to transitional zone to allow pelvic growth & dilate the bowel to return to normal size.
- Swenson OR Soave OR Duhamel procedure (to connect the colon to anus without removing the rectum)
- Swenson = Involving anastomosing the anal canal to healthy bowel after rectal removal .
- Soave = Involve bringing proximal normal colon through aganglionic rectum which has been stripped from its mucosa.
- Duhamel = involve anastomosing the anterior aganglionic region of rectum to the posterior healthy bowel & a functional rectal pouch is created

Hirschsprung associated enterocolitis

- Definition : It's life threatening inflammation & obstruction of intestine seen in 20% of Hirschsprung Pts.
- Symptoms: Fever , Abdominal distention , Foul-smiling Diarrhea, Sepsis .
- Treatment : Urgent antibiotics, Fluid resuscitation, Decompression of obstructed bowel , Emergency colectomy

Congenital Pyloric stenosis

Definition



Hypertrophy of smooth muscle of pylorus which lead to obstruction of the outflow

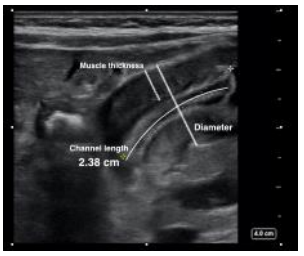
Risk factors

- Family history
- Males
- Age from 3w-3m

Symptoms/Signs

- Nonbilious projectile vomiting at 2-6 weeks, why nonbilious?! Because obstruction is proximal to ampulla of vater.
- Olive mass in epigastric region
- Hypokalemic hypochloremic metabolic alkalosis
- Icterus /Jaundice
- Visible gastric peristalsis
- Paradoxical aciduria
- Hematemesis

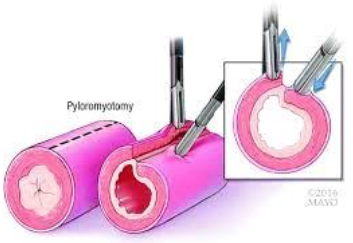
Diagnosis





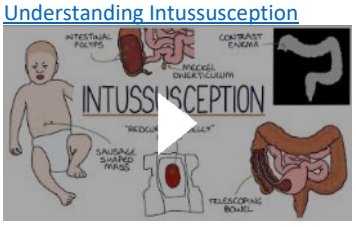
- History /PE
- Ultrasound (shows elongated >15mm pyloric channel & thickened muscle wall > 3.5mm)
- Barium swallow (string sign OR double railroad track sign)

Treatment

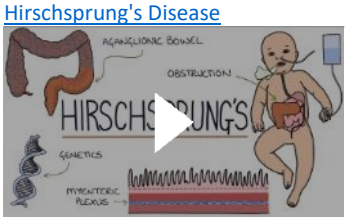


- Hydration & correct alkalosis
- Surgical " Fredet- Ramstedt pyloromyotomy (Division of circular muscle fibers without entering the lumen)

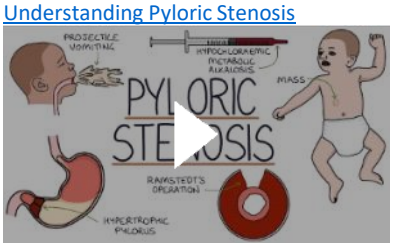
Understanding Intussusception



Hirschsprung's Disease



Understanding Pyloric Stenosis



Pediatric disorders 2

Tuesday, March 5, 2024 11:28 PM

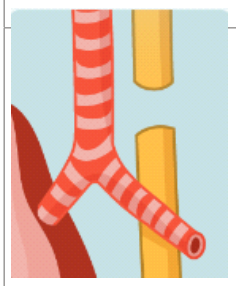
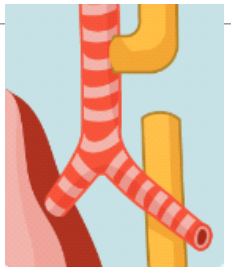
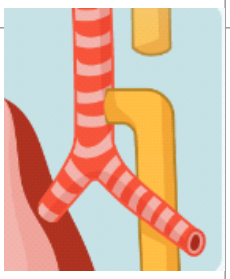
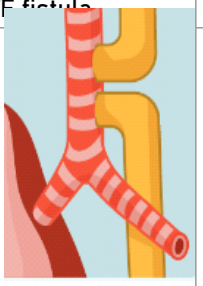
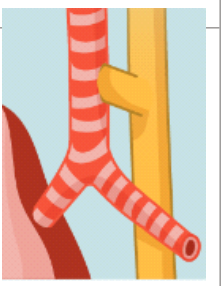
► Esophageal atresia

⇒ Esophageal atresia WITHOUT tracheoesophageal fistula

- Definition: Blind-ending esophagus from atresia
- Signs: Excessive oral secretions & Inability to keep food down
- Diagnosis: X-ray (coiled NG tube in upper esophagus , No gas in the abdomen)
- Treatment: Surgical with primary anastomosis & preoperative stretching of blind pouch

⇒ Esophageal atresia WITH tracheoesophageal fistula

- Definition: Esophageal atresia occurring with a fistula to the trachea
- Often present as Polyhydramnios (too much amniotic fluid around the baby during pregnancy)
- Most common type?! Type C
- Types:

Type A	Type B	Type C	Type D	Type E
Esophageal atresia without TE fistula	Proximal esophageal atresia with proximal TE fistula	Proximal esophageal atresia with distal TE fistula	Proximal esophageal atresia with both proximal & distal TE fistula	TE fistula without esophageal atresia
				

- Diagnosis: X-ray (gasless stomach= no Tracheoesophageal fistula)
- Treatment: Initially= 1. Suction blind pouch (NPO/TPN) 2. upright position of child 3.Prophylactic antibiotics
  Definitive ttt = Thoracotomy with division of fistula & end to end esophageal anastomosis

► Congenital diaphragmatic hernia



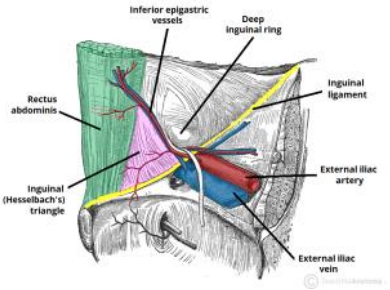
- Definition: Failure of complete formation of the diaphragm leading to a defect through which abdominal organs are herniated.
- Symptoms: Respiratory distress , Portal HTN
- Types & the position:
  - Bochdalek = Posterolateral with Lt > Rt
  - Morgagni = Anterior parasternal hernia

  # Why the left side is more common?! Because the right side is protected by the liver .



- Diagnosis: CXR (bowel in chest)
- Treatment: NG tube, ET tube, Stabilization, Surgical repair.

Inguinal hernia



- Definition: Hernia lateral to Hesselbach's triangle into the internal inguinal ring & down the inguinal canal due to failure of processus vaginalis to close
  # Hesselbach's triangle: Epigastric vessels + Inguinal ligament+ Lateral border of rectus sheath
- Most common inguinal hernia in children?! Indirect
- Which side is affected more?! Right
- Male to female ratio ?! 6:1
- Risk factors: Male , Ascites, V-P shunt, Prematurity, Family history, Meconium ileus, Abdominal wall defect, Connective tissue disease, Undescended testicle , Cystic fibrosis, Bladder exstrophy.
- Symptoms/Signs: Groin blue, Scrotal mass, Thickened cord, Silk glove sign
  # Silk glove sign: Hernia sac rolls under the finger like the finger of a silk glove
- Treatment: High ligation of hernia sac with NO repair of abdominal wall floor



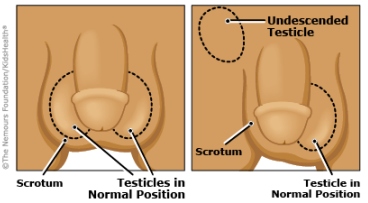
Umbilical hernia



- Definition: Fascial defect at the umbilical ring(failure of closure if Linea alba)
- Risk factors: African American , Premature infant
- Indication for surgical repair:

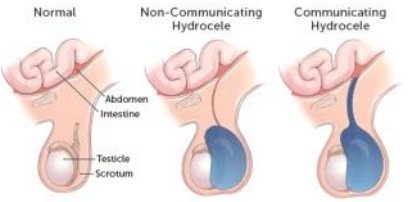
1. > 1.5cm defect
2. Bowel incarceration
3. >4 years of age

Cryptorchidism



- Definition: Failure of the testicle to descend into the scrotum.
- More common Unilaterally , more common in premature infants
- Diagnosis: Physical examination (empty scrotum, palpable or not), Laparoscopy (both diagnostic & therapeutic)
- Treatment: wait 6 months , if still not brought back into the scrotum perform Orchiopexy .

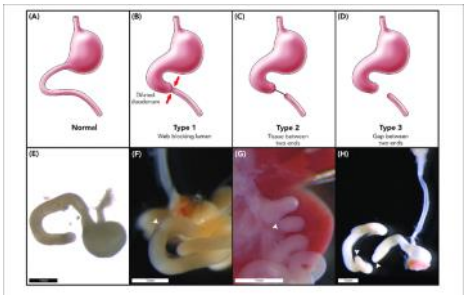
Hydrocele



- Definition: Fluid filled sac (fluid in patent processus vaginalis OR in tunica vaginalis around the testicle)
- Types:
  - Communicating hydrocele: Hydrocele that communicate with peritoneal cavity & thus fills & drains peritoneal fluid (gets bigger then smaller)
  - Non-communicating hydrocele: Hydrocele that doesn't communicate with peritoneal cavity (stay the same size)
- Treatment: most disappear at 1 year if not or it's communicating then perform surgery (resect hydrocele & ligate processus vaginalis)



► Duodenal atresia



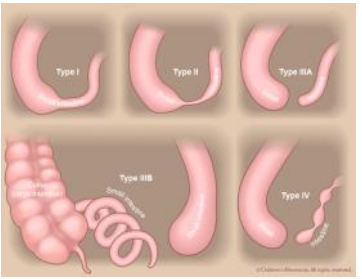


- Definition: Complete obstruction or stenosis of duodenum caused by an ischemic insult during development of failure of recanalization
- Often present as Polyhydramnios
- Types:

1. Type I = They have a web formed by mucosa and submucosa with no defect in the muscle coat
2. Type II = The duodenal ends are atretic, separated by some distance but attached by a fibrous cord.
3. Type III = The duodenal ends are atretic, separated by some distance but without any tissue attachment

- Signs: Bilious vomiting , Epigastric distention, Visual peristaltic wave
- Associated anomalies: Malrotation, Esophageal atresia, Congenital heart disease, Anorectal and renal anomalies, Down syndrome.
- Diagnosis: Abdominal X-ray (Double bubble sign)
- Treatment: Duodenoduodenostomy OR Duodenojejunostomy

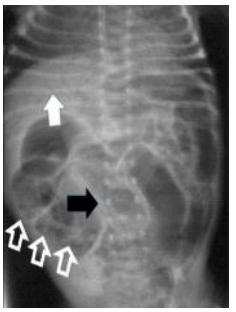
► Jejunoileal atresia

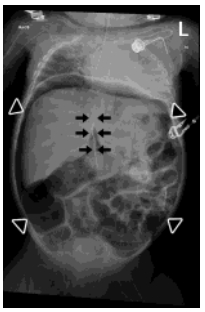




- Definition: obstruction of the jejunum or ileum of the small intestine due to ischemic necrosis of fetal intestine due to disruption of Superior mesenteric vessels
- Types:
- Type I consists of a membrane completely occluding the lumen with the intestine intact (proximal tube is dilated)
- Type II is a gap in the intestine with a fibrous cord between the proximal and distal segments of intestine.
- Type IIIA is a mesenteric gap without any connection between the segments.
- Type IIIB is jejunal atresia with absence of the distal superior mesenteric artery; the distal small bowel is coiled like an apple peel, and the gut is short.
- Type IV consists of multiple atretic segments (resembling a string of sausages).
- Causes: Smoking or Use of vasoconstrictive drugs(cocaine) during pregnancy
- Often present as Polyhydramnios
- Associated with: Cystic fibrosis , Gastroschisis.
- Symptoms: Bilious vomiting , Abdominal distention within first 1-2 days of life.
- Diagnosis: Abdominal X-ray (triple bubble sign " Dilated stomach, duodenum, proximal jejunum", Gasless colon)
- Treatment: NG tube, nothing by mouth, and providing IV fluids, Surgical repair (removal of the blind intestinal segments, and the remaining ends are anastomosed)

► Meconium ileus





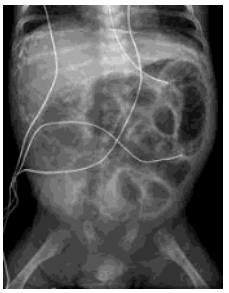
- Definition: Intestinal obstruction of distal ileum from solid meconium concretions
- >95% of Pt with meconium ileus have Cystic fibrosis
- Symptoms/Signs: Bilious vomiting, Abdominal distention, Failure to pass meconium, Peritoneal calcification, Neuhauser's sign (a soap bubble/grand glass appearance).
- Complication: perforation , meconium pseudocyst , volvulus.
- Diagnosis: Abdominal X-ray (a soap bubble/grand glass appearance) &(Peritoneal calcification) & (football sign due Pneumoperitoneum)
- Treatment: Gastrografin enema +/- acetylcysteine , Enterotomy (intraoperative catheter irrigation using acetylcysteine) , Pancreatic enzyme replacement.

Meconium plug syndrome



- Definition: Colonic obstruction from meconium forming a plug
- Symptoms/Signs: Abdominal distention & Failure to pass meconium within the first 24h of life
- Diagnosis: Abdominal X-ray (Many loops of distended bowel , Air-fluid level), Contrast enema (both diagnostic & therapeutic)

Meconium peritonitis

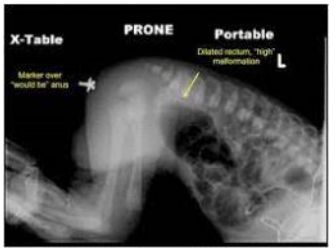


- Definition: Sign of Intrauterine bowel perforation (sterile meconium leads to intense local inflammatory reaction with eventual formation of calcification)
- Diagnosis: Abdominal X-ray (Calcification)

Pediatric disorders 3

Wednesday, March 6, 2024 10:48 PM

► Anorectal malformation (ARM)





- ➢ Definition: complex group of congenital anomalies involving the distal anus and rectum, as well as the urinary and genital tracts and the spine and spinal cord in number of cases.
- ➢ Symptoms/Signs: Absence of meconium, Abdominal distention, Unable to insert the finger when performing the rectum examination, stool that leaks from their vagina or is visible in their urine.
- ➢ Krickenbeck classification in male infants:

⇒ Low type ARM (external opening in the scrotum (1) or perineum (2, 3).)

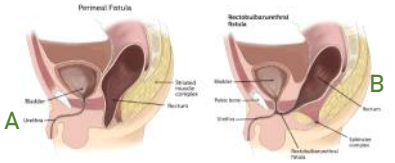
⇒ Intermediate /high type ARM (extend anteriorly to the base of the penis (1), the bulbar (2) or prostatic (3) urethra, or the urinary bladder (4))

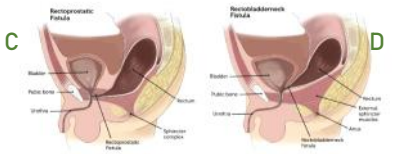
- ➢ Krickenbeck classification in female infants:

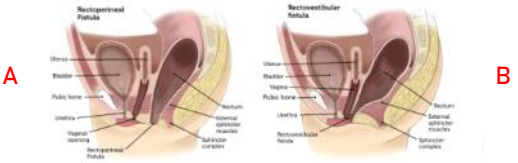
⇒ Low type ARM (external opening in the perineum (1) or vestibular area (2))

⇒ Cloacal type ARM (external perineal opening with a short (1) or long (2) common canal for the genital, urinary, and digestive systems)

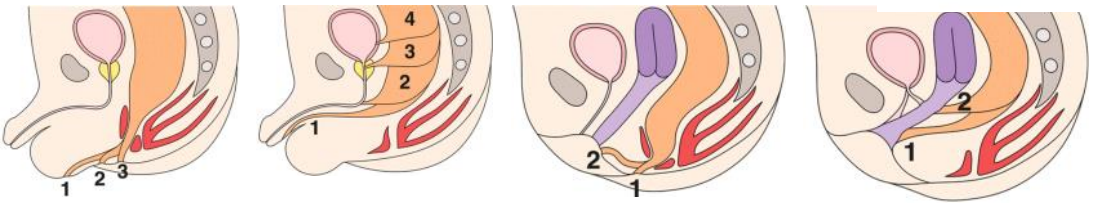
Classification of Anorectal Malformations	
Males	***Females***
Perineal fistula A	Perineal fistula A
Rectourethral fistula	Vestibular fistula B
Bulbar B	Persistent cloaca
Prostatic C	≤3 cm common channel
Rectobladder neck fistula D	>3 cm common channel
Imperforate anus without fistula	Imperforate anus without fistula
Rectal atresia	Rectal atresia
Complex defects	Complex defects







- ➢ Diagnosis: Physical examination , Ultrasound , Invertogram, Contrast studies (distal loopogram)
- ➢ Treatment: Colostomy (for high anomalies), Local procedure(for low anomalies)



► Imperforate anus

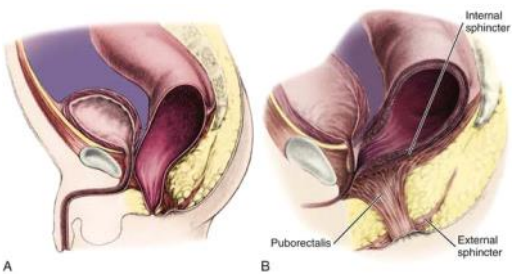
- ➢ Definition: Congenital absence of normal anus (complete absence or fistula)

⇒ High imperforate anus = Rectum patent to level above puborectalis sling

⇒ Low imperforate anus = Rectum patent to below puborectalis sling ,have external opening "more common in women"

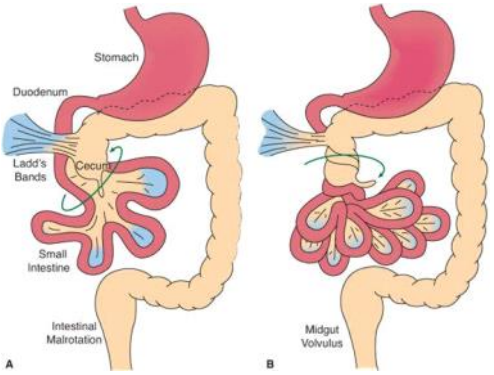
- ➢ Associated anomalies(VACTERL): Vertebral abnormalities, Anal abnormalities, TE fistula, Esophageal atresia, Radia/Renal abnormalities, Lumber abnormalities .
- ➢ Symptoms/Signs: No anus, Fistula to anal skin or bladder, UTIs, Fistula to vagina or urethra, Bowel obstruction, Distended abdomen, Hyperchloremic acidosis.
- ➢ Diagnosis: Physical exam, Perianal ultrasound

A = Low B = High



- Treatment of low imperforate anus with anal fistula = Dilatation of anal fistula & anoplasty
- Treatment of High imperforate anus = Diverting colostomy &mucous fistula

Malrotation &midgut volvulus

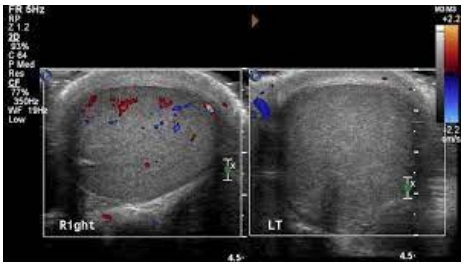


- Definition: Failure of the normal 270 counterclockwise bowel rotation with resultant abnormal intestinal attachment & anatomic position .
- Where does the cecum end?! Usually ends up in the RUQ
- Ladd's bands: Fibrous bands that extend from the abnormally placed cecum in RUQ & cross over the duodenal causing obstruction
- Symptoms: Sudden onset of bilious vomiting (why bilious vomiting?! Because the twist is distal to ampulla of vater)
- It's the most common cause of bilious vomiting in infants
- Diagnosis: Upper GI contrast (cutoff duodenum), Barium enema (abnormal position of cecum)
- Complications: Volvulus with midgut infraction which lead to necessitating massive enterectomy
- Treatment: IV antibiotics & fluid resuscitation with Lactated Ringer's solution , Emergent laparotomy with Ladd's procedure
  # Ladd's procedure : 1. Counterclockwise reduction of midgut volvulus
  2.Splitting of Ladd's band
  3.Division of peritoneal attachments to the cecum, ascending colon
  4.Appendictomy
- Where is the cecum after the reduction?! LLQ



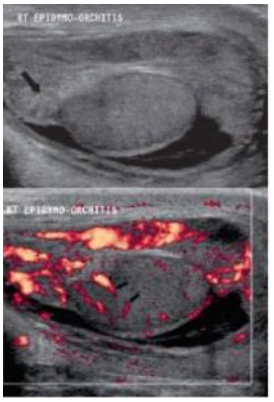


Testicular torsion



- Definition: Rotation of testicle around spermatic cord & vascular pedicle.
  # 2 peaks = Peripubertal & Perinatal
- Which side is more affected?! Left side
- Symptoms/Signs: Lower abdominal pain, Vomiting, Hemiscrotum pain, Red& swollen hemiscrotum , Tender, Loss of cremasteric reflex.
- Diagnosis: Color doppler ultrasound
- Treatment: surgical correction (bilateral Orchiopexy) within 6 h, if the testis not viable = orchiectomy.
  # why bilateral orchiopexy?! Because the contralateral testis is at risk for subsequent torsion

Epidimo-orchitis



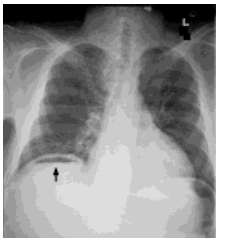
- Definition: Inflammation of epididymis & Testis due to infection or trauma
- Symptoms/Signs: Sudden onset of hemiscrotum pain , Thick& tender epididymis, Prehn's sign (Pain relief by elevation of hemiscrotum)
- Diagnosis: Color doppler ultrasound (Excessive blood flow to Epididymis, Normal Testicular parenchymal blood flow), Scrotum ultrasound (Thickened Epididymis, Reactive Hydrocele, Thick Scrotal wall)
- Treatment: Antibiotics &Anti-inflammatory drugs,

► Omphalocele vs Gastroschisis

	Omphalocele	Gastroschisis
Definition	Herniation of abdominal contacts "mainly the liver" through the umbilicus due to defect of abdominal wall at umbilical ring # Sac (peritoneum & Amnion) covers extruded viscera	Paraumbilical herniation of abdominal contact through abdominal wall defect # Sac does not cover the extruded viscera # 2-4 cm in size
Association	Associated with congenital anomalies (Trisomy's 13 & 18) & structural abnormalities (Cardiac, GU)	Not associated with chromosomal abnormalities
Location	At the Umbilicus	Lateral to the umbilicus "Rt side"
Complication	• Malrotation of the gut • Anomalies	• Thick edematous peritoneum (from exposure to amnionic fluid) • Malrotation of the gut • Shock • Prolonged ileus • Metabolic acidosis
Diagnosis	Prenatal ultrasound (after 13 week's gestation , with elevated maternal alpha fetoprotein)	Prenatal ultrasound (after 13 week's gestation , with elevated maternal alpha fetoprotein)
Treatment	• NG tube for decompression • IV fluids • Prophylactic antibiotics • Surgical repair - < 2cm = closure of abdominal wall - 2-10cm = removal of outer membrane& placement of silicon patch . - > 10cm = skin flaps or ttt with Betadine spray or silver sulfadiazine over defect to form eschar which epithelize over time	• NG tube for decompression • IV fluids • IV antibiotics • Surgical reduction of viscera & abdominal closure
Picture		

Necrotizing enterocolitis





- Definition: Necrosis of intestinal mucosa(most commonly terminal ileum & proximal colon) often with bleeding with can lead to pneumatosis intestinalis, pneumoperitoneum, Portal venous gas
- Seen in premature , formula-fed with immature immune system
- Most common cause of emergent laparotomy in neonate
- Complications: transmural intestinal necrosis , shock/sepsis, DIC, Death
- Predisposing conditions: Prematurity , Stress, Shock/Sepsis, Hypoxia, Cyanotic heart disease, Polycythemia.
- Symptoms/Signs: Abdominal distention, Vomiting , bloody stool after first feeding, Heme+ or gross rectal bleeding, Fever or hypothermia, Jaundice, Abdominal wall erythema.
- Diagnosis: X-ray(fixed, dilated intestinal loops, pneumatosis intestinalis " air in bowel wall", Free air, portal vein air), Labs(low hematocrit, glucose, platelets)
- Treatment: Cessation of feedings, OG tube, IV fluids, IV antibiotics, Ventilator support, Surgery (resect, stoma)
- Surgical indication:

1. Free air in abdomen revealing perforation
2. Positive peritoneal tap revealing transmural bowel necrosis

