



Surgery Team
MED 433

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Midterm
**Surgery
Summary**

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L1: Emergency in urology (non-traumatic)

Hematuria: blood in the urine which could be visible or microscopic.

- Hx of hematuria:
 - Timing of hematuria:
 - initial blood in micturition: usually urethral cause
 - Diffused in the urine: urinary bladder or above.
 - End of micturition: usually base of bladder (trigone)
 - Presence of pain: indicates ischemia e.g. (Stone, UTI etc.)
 - Smoking: risk for transitional cell carcinoma

Renal colic pain: sudden onset, colicky in nature & radiate from flank to groin.

- CT scan is the gold standard and the initial modality for renal colic (unless the patient is pregnant > MRI).
- Management: pain relief (NSAID & opiate), hyper hydration & intervention (ESWL, PCNL, URS & open surgery)
- Indication for intervention: fever, failed analgesics, renal impairment

Acute urinary retention: painful inability to void, with relief after drainage.

- Causes in men: prostate (carcinoma & BPH), urethral stricture & stone.
- Causes in women: Pelvic prolapse, Urethra (stenosis & diverticulum) & surgery.
- Management: urethral catheter & suprapubic catheter.

Chronic urinary retention: Painless obstruction of the bladder.

- It is caused by reduced renal function & upper tract dilation.
- Treatment: renal support & slow rate bladder drainage.
- Most common acute scrotum emergency: Epididymitis

Torsion of the spermatic cord: Irreversible ischemic injury may happen if not treated in 4 hours.

- Acute scrotal pain, and P/E: the affected testis is high riding transverse orientation & cremasteric reflex is absent.
- Investigations: Doppler ultrasounds, Radionuclide image & surgical exploration
- Most serious acute scrotum emergency

Epididymo-orchitis:

- Dysuria, fever, scrotal swelling, erythema & pain.
- P/E: tenderness & normal cremasteric reflex
- Urinalysis: Pyuria & bacteriuria
- Management: rest, parenteral antibiotics

Priapism: persistent erection of the penis for > 4 hours

- Ischemic (veno-occlusive, painful): due to hematological disease or drugs.
- Non-ischemic: (arterial high flow, painless): due to perineal trauma.
- Investigations: CBC, urinalysis, blood gases from either corpora, duplex ultrasonography & penile pudendal arteriography.

L2: Peripheral arterial diseases (PAD)

- Atherosclerosis is a Progressive thickening and hardening of the medium & large sized arteries as a result of fat deposit.
- Main risk factors for endothelial injury are:
 1. Hypertension
 2. Smoking
 3. Hyperlipidemia
 4. High blood glucose
 5. Elderly (+ female > male)
- Foam cell formation is the hall mark for atherosclerosis.
- Presentations of chronic PAD are claudication or critical limb ischemia.
- Critical limb ischemia usually starts with rest pain (not relieved by analgesic), then tissue loss and finally dry gangrene (common in patient who has PAD + comorbidity).
- Acute limb ischemia usually results in thrombus, embolus or trauma
- A people with TIA (blurred vision, drop attacks, pain in abdomen after eating etc.) or renal insufficiency are susceptible for PAD.
- From clinical examination:
 - Inspection: Change of color, atrophy of the calf muscles, loss of extremity hair thickened toenails
 - +ve burger's test
 - Prolong capillary filling (>2 sec) or venous re-filing
 - Absence of the pulse

L3: Adult urinary tract disorder

Urethritis: Common in men; in young men usually the cause is STDs

S&S: Urethral discharge, burning on urination, or 25% asymptomatic

	Gonorrhea	Chlamydia
Organism	Neisseria gonorrhoea	Neisseria gonorrhoea
Organism Type	Gram (-) diplococci	Intracellular facultative organism
Urethral Discharge	Usually profuse, purulent	Usually Scant
Treatment	Ceftriaxone + Azithromycin or Doxycycline	Ceftriaxone or Azithromycin

Epididymitis:

Acute: Pain, swelling of the epididymis < 6 weeks.

Chronic: Longstanding pain in the epididymis and testicle, usually no swelling.

- Must differentiate between Epididymitis and Torsion (especially in young may have same presentation)
- Most common cause of epididymitis in elderly is **E.coli**

Prostatitis: Syndrome that presents with inflammation ± infection of prostate includes:

- Dysuria, frequency, Dysfunctional voiding, Perineal pain, Painful ejaculation

Cystitis: Common in women due to short urethra

S&S: Urinary symptoms, Suprapubic/lower abdominal pain, No fever even if it's severe

Dx: Dipstick (+ nitrate) - Urinalysis - Urine culture

Pyelonephritis: **S&S:** Triad (Fever, Flank pain, Chills)

- In culture, the most common cause is **E.Coli**.
- In urinalysis : ↑ WBCs, RBCs, Bacteria

Urolithiasis: Common in Saudi Arabia, Prevalence 2-3%, Recurrence rate 50% at 10 years

Risk Factors: Genetic, Young people, Male, Low water intake, Climate, Diet

Types: Calcium 75% (**Ca Oxalate**), Uric acid 10% (radiolucent stones), Cystine (rare and inherited stone).

S&S: Renal or ureteric colic (very severe), Frequency, dysuria, Hematuria, Nausea/Vomiting, restless, tachycardia, hypertension, Fever, Tender costovertebral angle

Imaging: **KUB:** Shows only radiopaque stones, **IVP:** Shows both radio- lucent and opaque stones,

CT: The gold standard, most sensitive and specific

Management:

1 - Conservative: Hydration, Analgesia, Antiemetics, Stones (<5mm) >90% undergo spontaneous passage.

2 - Shock Wave lithotripsy (SWL) 3 - Ureteroscopy 4 - Percutaneous Nephrolithotripsy (PNL)

Benign Prostatic Hyperplasia:

S&S: Lower urinary tract symptoms – Poor emptying - Urinary retention - UTI

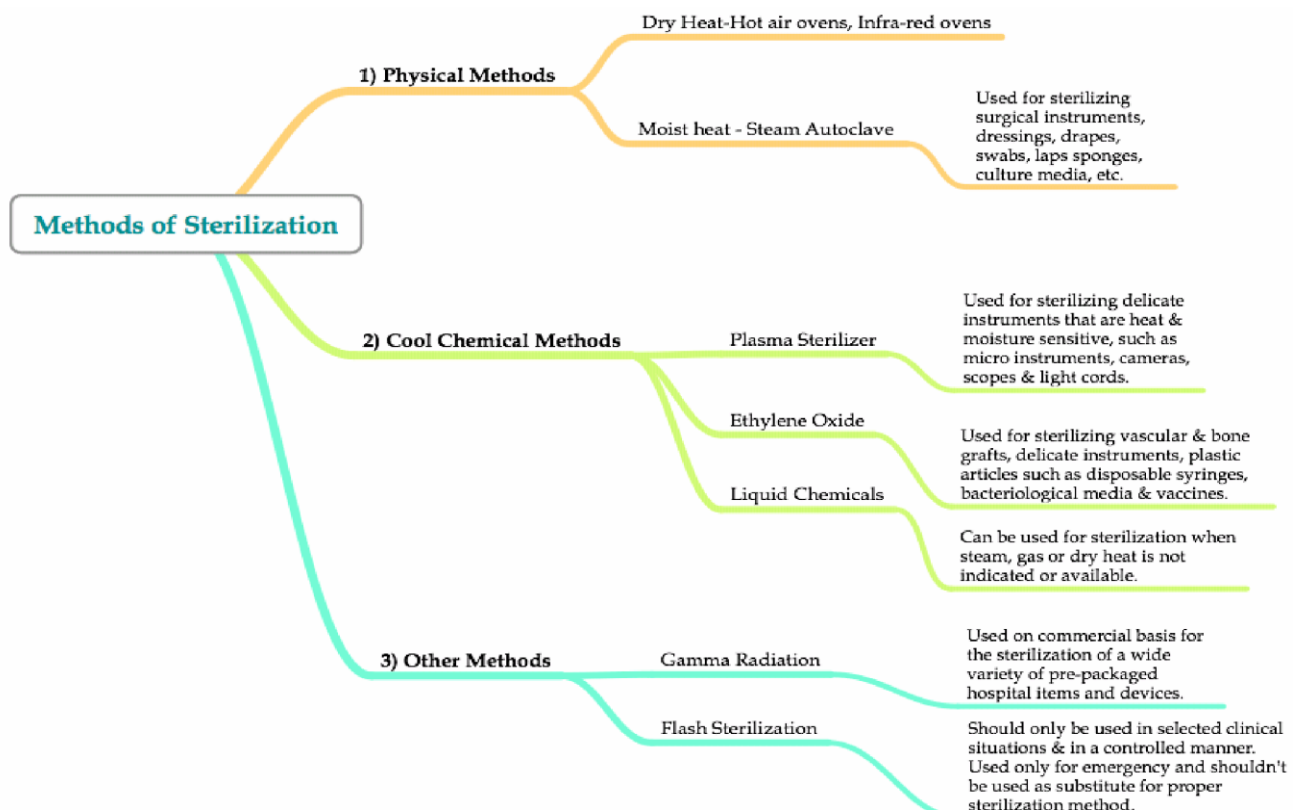
- DRE (Digital rectal Examination) prostate is larger
- Patient may have distended bladder due to retention
- We do PSA (Prostate specific antigen) but maybe elevated in prostatic cancer
- Management: Medical therapy (α-Adrenergic Blockers, Androgen Suppression). or Surgery

L4: Common urogenital Tumors

- Most renal tumors are malignant and usually **seen in men**. The most common histopathological type is **clear (Renal) cell carcinoma**, which is highly associated with **Von Hippel-Lindau syndrome**.
- Can spread hematogenously, especially to the lungs producing **Cannonball** appearance under CXR.
- It can be investigated by using radiological imaging (US and CT contrast).
- Radical nephrectomy is the treatment of choice.
- In children, the most common renal tumor is **Nephroblastoma**; a rapidly growing malignant renal tumor, investigated by CT. Chemotherapy followed by transabdominal nephrectomy could be the management.
- It **should be differentiated from Neuroblastoma** (They act similarly).
- Bladder tumors are malignant as well, Painless and almost always associated with **terminal hematuria**.
- A bladder tumor can be either:
 1. **Transitional cell carcinoma** (highly related to **smoking** and chemical exposure).
 2. **Squamous cell carcinoma** (to develop, it requires long-time irritation of the bladder such as UTI, stones, **Bilharziasis**, and catheterization).
 3. **Adenocarcinoma** (malignant mucosal cells coming from the intestine in case of **Urachal remnant abnormalities** and Crohn's disease).
 - They are treated by radical cystectomy. Therefore a **urinary diversion** procedure is required for micturition. (Ileal conduit is the most common one).
 - Prostate adenocarcinoma is a common malignancy in **elderly**. It arises from the **peripheral zone** of the prostate.
 - The tumor itself is not lethal, but it can spread (usually by lymphatics) and cause serious manifestations.
 - **Bone metastasis** is found in 15% of cases (Lumbar spine and pelvis).
 - Patients with large prostate Adenocarcinoma may present with **acute retention**. However, it's **asymptomatic** in most of the cases.
 - Diagnosis is made by rectal examination and **PSA** plasma levels.
 - Grading, using **Gleason's score** is important to predict prognosis.
 - The option of the treatment depends on the degree of spread, ranging from radical radiotherapy and prostatectomy if local to orchiectomy if metastatic.
 - Testicular tumors are the **commonest in young men**. Most associated risk factor is **cryptorchidism** (Undescended testis).
 - Metastases occur commonly through lymphatics.
 - Classified into germ cell and non-germ cell tumors.
 - **Seminoma** (Radiosensitive) and **Teratoma** (Chemosensitive) are the most common ones, and usually occur together.
 - It's a **painless** lesion, so usually discovered **incidentally**. Diagnosis can often be confirmed by testicular ultrasound and tumor markers (**α -fetoprotein and β -HCG**).
 - **Pheochromocytoma** is the most common adrenal tumor, associated with **MEN-II syndrome, Von Hippel-Lindau disease and neurofibromatosis**.
 - Patients present with severe paroxysmal **hypertension**.
 - Treated by surgical removal.

L5: Sterilization & O.R. Set Up

Asepsis	The freedom from infection or the absence of microorganisms that cause diseases.
Sepsis	Generalized reaction to pathogenic microorganism which is evident clinically by signs of inflammation
Sterile	Absence of all microorganisms including bacteria, spores and viruses.
Aseptic Techniques	Methods by which contamination with microorganisms are prevented
Contamination	Introduction of microorganisms to a sterile field.
Sterilization	Process by which all living microorganisms are killed
Antiseptics	Agents that renders microorganisms on living tissue
Disinfection	Process by which renders inanimate objects free of pathogenic bacteria.
Disinfectants	Agents that kill all growing microorganisms from inanimate objects.



- Testing the Effectiveness of Autoclaves with **Geobacillus stearothermophilus**, which is one of the most heat tolerant species of bacteria.
- **Surgical team is made up of:**
 1. **Sterile members** (Surgeons, Scrub nurse, O.R. Technician).
 2. **Nonsterile members** (Anesthetists, Circulating nurses, Anesthesia Technicians, X-Ray Technician).
- **First surgical hand scrub should be at least 5 minute** & the subsequent hand scrub, at least 2 to 3 minutes.
- **Areas of gown considered unsterile are:**
 1. Gown's neckline.
 2. Shoulders.
 3. Under the arms.
 4. Back.
- There is no degree of sterility it's either sterile or not.
- Exposure period of **5 to 7 hours** is necessary for complete Ethylene Oxide sterilization. **We have to remove residue of EO because it is toxic and can cause lung and skin cancer.**

L6: Shock

Shock: It is the state of altered tissue perfusion severe enough to induce derangements in normal cellular metabolic function.

Types of shock:

- 1- **Hypovolemic shock:** decrease in intravascular volume → decrease in cardiac output and tissue perfusion.
Causes: hemorrhage, dehydration and fluid sequestration.
Sign and symptoms: pale and cool skin, hypotension, tachycardia, oliguria, restless, agitation, confusion, and in **end stage** (bradycardia, arrhythmia, and death).
- 2- **Cardiogenic shock:** progressive loss of myocardium (MI).
Sign and symptoms: hypotension, tachycardia, tachypnea, oliguria, raised JVP, lower limb edema, basal crepitation.
In cardiogenic shock the volume is not the problem, **don't give fluid** → pulmonary edema.
- 3- **Distributive shock:**
 - A) **Septic shock:** severe infection release microbial products. **Early hyperdynamic** (fever, tachycardia, tachypnea, **warm skin**), **late hypodynamic** (**cool skin**, tachycardia, hypotension, oliguria).
 - B) **Neurogenic shock:** Neurogenic shock is usually due to spinal cord injury above T2, mostly C3. This will result in loss of sympathetic tone. **Hypotension and bradycardia is the typical feature.**

*in general the management of shock is fluid replacement and treats the underlying cause.

Diagnosis of shock based in hemodynamic parameters

Type	Central venous pressure	Cardiac output	Systemic vascular Resistance (SVR)
Hypovolemic	Decreased	Decreased	Increased
Cardiogenic	Increased	Decreased	Normal or increased
Septic	Decreased or Increased	Increased	Decreased
Traumatic	Decreased	Decreased or increased	Decreased or increased
Neurogenic	Decreased	Decreased	Decreased
Hypoadrenal	Decreased or increased	Decreased or increased	Decreased or increased

L7: Intravenous Fluid Resuscitation & blood transfusion

I. Intravenous Fluid Resuscitation:

- Up to 30% of blood volume can be replaced by fluid.
- Fluid can be lost by trauma, burn, peritonitis, bleeding.
- Too much fluid can cause peripheral edema and ARDS.
- It divides into two types: Crystalloid and colloid.

Crystalloid solution

Crystalloid solution				
Advantage	No anaphylactic shock, balanced electrolyte solution, easy to administer, and inexpensive.			
Disadvantage	Only $\frac{1}{3}$ remains in plasma (risk of edema).			
Types	NaCl (normal saline)	Hypertonic saline	Lactated Ringer's	Dextrose 5%
Notes about each type	<ul style="list-style-type: none"> - ONLY contain (Na and Cl). - Can cause hyperchloremic acidosis. 	<ul style="list-style-type: none"> - Small volume for resuscitation. - Contain high Na. - Not for hypernatremic patient. - Remain longer in circulation. - Can relieve cerebral edema (contain high Na, that will make fluid shift to plasma). - Can dilate vessels (risk for hemorrhage). 	<ul style="list-style-type: none"> - Contain (Na + Cl + K + lactate + Ca). - Also called Hartmann - Not for diluent blood (due to Ca). 	<ul style="list-style-type: none"> - Only provide calories for pediatric patients. - Not for adult resuscitation.

Colloid solution

Colloid solution				
Advantage	$\frac{1}{2}$ remain in plasma (need less amount), less risk for edema.			
Disadvantage	Risk for anaphylactic shock, expensive, may affect renal function and hemostasis.			
Types	Dextran	Gelatins	Albumin	Starch
Notes about each type	<ul style="list-style-type: none"> - Inhibit platelet aggregation, can cause bleeding. 	<ul style="list-style-type: none"> - Risk for anaphylactic shock and coagulation. - Used in liver transplant. 	<ul style="list-style-type: none"> - Very expensive. - Only given for low serum albumin patient. 	<ul style="list-style-type: none"> - Max dose for Hetastarch is 1500 ml/day. - Max dose for Tetrastarch is 3500ml/day. - If exceed the max dose will cause liver impairment. - Contraindicated in sepsis, burn, and renal impairment patients.

- **ACS protocol:** replace each 1 ml of blood loss with 3 ml of crystalloid fluid. If **NOT** respond add colloid.

II. Blood transfusion:

- Use it when patient loss more than 30% of his blood.
- It improves O₂ transport, restore RBCs, and correct bleeding caused by platelet dysfunction or factor defect.
- **Massive Transfusion (MT)** is transfusion of more than one blood volume/day.
- **Complication of MT** is disseminated intravascular coagulation (**DIC**), which can lead to multi organ failure.
- **Types of auto-transfusion:**
 1. **Pre-deposit transfusion** is blood collection begins 3-5 weeks preoperatively, **only** for elective surgery.
 2. **Intra-operative acute normovolemic hemodilution** is blood removed in OR, and stored in OR, replace by albumin, and then re-infused during or after surgery, for elective surgery.
 3. **Intra-operative cell salvage** is collection of blood that lose during surgery, cleans the blood (they add lots of heparin which may cause bleeding) and returns the blood back to patient. Suitable For **cardiac surgery**.
- **Fresh frozen plasma (FFP)** contains all coagulation factors, and free of RBCs, WBCs, and platelet.
- **Cryoprecipitate** is prepared from plasma and contains fibrinogen, vWF, factor VIII, factor XIII and fibronectin. Indication in hypofibrinogenemia, hemophilia, and vWF diseases.
- **Complications of blood transfusion:** hemolysis, anaphylactic shock, coagulopathy, infection (e.g. HIV, HBV).

L8: Surgical Infections & Antibiotics

- We say "infection" when there is a combination of **microorganism + inflammatory response** against this organism.
- The inflammatory response can be either **local** to the infected area or **systemic** (**Systemic inflammatory response syndrome or SIRS**).
- When there is SIRS due to either local or systemic infection, such condition is called **Sepsis**. Sepsis can result in severe vasodilation and consequent hypoperfusion (**Septic Shock**). Mortality is up to **40%**.

Any surgical procedure may facilitate the occurrence of these conditions. However, patient-specific factors can contribute in these conditions without the need of surgeries (**Community Acquired Infections**). Most commonly **skin infections** including:

-1 **Cellulitis**: Diffuse gram +ve infection with severe inflammation of dermal and subcutaneous layers of the skin. Treated by **antibiotics**.

-2 **Furuncles and carbuncles** are cutaneous abscess that begin in skin glands and hair follicles. Furuncle is a single abscess focus and treated by **drainage**. When multiple microabscesses are formed and connected by fistulous tracts between hair follicles, the condition is called Carbuncle and treated by **antibiotics**.

-3 **Hidradenitis Suppurativa**: Serious skin infection of the **axillae** or groin consisting of multiple abscesses of the apocrine sweat glands. Cause is known but thought to be related to a defect in the **terminal follicular epithelium**. Treated by drainage and good hygiene.

-4 **Breast abscess**: Staph infection with accumulation of **purulent** material (Neutrophils) in a closed cavity.

-5 **Paronychia**: an inflammatory reaction involving the folds of the skin surrounding the fingernail. Characterized by acute or chronic purulent, tender, and painful swellings of the tissues around the nail. Most frequent pathogen is **Candida albicans**. However, bacteria may also cause this condition.

-6 **Necrotizing infections**: Diffuse dangerous infection that usually ends up with limb **amputation**. Usually caused by anaerobes. Classifies into clostridial and non-clostridial.

Pathogenesis: bacterial synergism and endotoxin production leading to several small vessels **thrombi**, Thus severe tissue **destruction** and **necrosis** is the result.

A- Clostridial: Usually there are crepitant (bubbly or air-containing) abscesses, quickly spreading invasion up to the deep fascia, sometimes muscles are involved (**Myositis**) producing severe pain. **Septic shock** is a common sequel.

B- Non-clostridial: **Microaerophilic gram positive, aerobic gram negative and even anaerobic** are all involved.

Treatment: Complete debridement and depress tight fascial compartment. Amputation maybe needed in end stage tissue death. These treatment options should be followed by antibiotics, fluid resuscitation, hyperbaric oxygenation (to kill anaerobes) and **treat diabetes aggressively** if present (as it can be a major risk factor for necrotizing infections).

- **Post-operative infections** (surgical): Usually is one of the five **Ws**:

Wind (Atelectasis)–Water (UTI)–Walking (DVT)–Wonder drug–Wound (surgical site infection).

- Surgical site infection is the **3rd** most common surgical infection and is classified according to the **depth of injury** into:
 - A- **Incisional**: can be **superficial** (Skin and subcutaneous tissue) or **Deep** (Fascia and muscles).
 - B- **Organ/Space**: **Any organ** or body space (e.g. **peritoneum**) beneath the muscles can be affected after surgeries.
- **Risk factors** can be either related to the **surgical procedure** itself such as long duration of the procedure, poor surgical techniques and poor sterilization...etc. Or related to the **patient** like age, diabetes and altered immunity.
- Patients with blood glucose above **300mg/dl**, 48 hours before the surgery are **3 times more susceptible** to skin infections.
- Probability of post-surgical infections varies with different types of procedures.

Type	Example	Probability
Clean	Breast biopsy	1.5%
Clean-Contaminated	Planned bowel resection	2-5%
Contaminated	Non-prepared bowel resection	5-30%
Dirty	Perforation	5-30%

- Occupational blood bourn viral infections include: **HIV, HCV** and **HBV** (HBV is associated with **greatest risk**, However, it's less frequent nowadays due to **vaccination**).

L9: Wound healing & wound infection/Injuries due to burn

- Burn patients die from dehydration
- If the burn > 20% of body area, the patient will develop SIRS
- Causes of burn: flame (from fire), scalded (hot liquid), contact (hot object), electrical, and chemical

Burn depth classification				
Depth	Histology	Appearance	Sensation	Healing
First degree (e.g. Sunburn)	Only epidermis	Erythema	Mild pain	6 days without treatment, no scar
Second degree	Superficial: epidermis and superficial dermis Deep: epidermis and most of dermis	Erythema and blister	Superficial is more painful than deep (due to intact nerve)	Superficial: in 3 weeks, no scar Deep: > 3 weeks with scar
Third degree	Epidermis, all dermis, and skin appendages	White or black skin, NO blister	Painless (due to nerve injury)	Not healing, severe scarring
Four degree	Reach underlying structure such as bone and muscle			

- Total body surface area (**TBSA**) determine by **rule of 9** (e.g. Hand and neck 9%, each hand 9%). It only used in **Adult**.
- To know the **mortality rate** use this equation (**TBSA + age of patient**).
- In burn patient, Hypovolemia is major cause of death, so we use **Parkland formula** to replace the fluid lost. **Parkland formula** = (4) X (Wight in kg.) X (TBSA %). **Half** of that volume is given in the first **8** hours, the **remainder** over the next **16** hours.
- Patient with flamed or scalded burn present with compartment syndrome (compress of tissue in closed space which cause necrotic tissue) we do Escharotomy (Eschar = dead tissue).
- In electrical burn (<1000V cause arrhythmia, >1000V cause cardiac and respiratory arrest). If electrical burn cause compartment syndrome we do fasciotomy (cut in fascia to relive pressure).
- In chemical burn: acid is limited, not go deep (**coagulation necrosis**), while alkaline is more severe because it dissolve the skin and go deep (**liquefactive necrosis**).
- **Hydrofluoric acid** (HFI) is worst kind of chemical burn.

Wound healing			
Phases	Inflammatory	Proliferative	Maturation
Duration	1-10 days	5-21 days	3 weeks – 1 year
Main cell	Platelets	Fibroblast	Fibroblast
Aim of phase	Prevent further injury	Produce collagen	More crosslink of collagen

- In normal skin, collagen type I is more prominent, while in proliferative stage of wound healing collagen type III is more prominent in skin.

Hypertrophic scar	Keloids
Scar limited to original wound	Scar Not limited to original wound
No genetic tendency	Have genetic tendency (autosomal dominant)
Can occur in any part of the body	Usually it occur above clavicle

L10: Common thoracic diseases

1- Congenital:

- Congenital Cystic Adenomatoid Malformation (CCAM):

Entire lobe of lung is replaced by **non-functioning** cystic area of abnormal lung tissue. The presentation is usually respiratory distress or recurrent infections, and it appears on **CXR** as a **mass containing air-filled cysts** (Swiss cheese pattern).

- Pulmonary sequestration:

It consists of a **non-functioning** mass of **normal lung tissue** that lacks normal communication with the airways. Usually present in adolescence or late childhood with **repetitive chest infection** that fail to respond to medical treatment. **Dx: MRI and arteriography**, treated surgically to prevent infection

- Lobar emphysema:

Replacement of a whole lobe by bullae that may compress normal lung tissue, it can cause **mediastinal shift to the opposite site**. Usually in infants and it's an emergency, baby present with tachycardia, tachypnea and hypoxia. **Ventilator will worsen the symptoms**. **Dx:** symptoms and CXR: over inflation, **Tx:** surgically to allow normal lobes to inflate.

- Bronchogenic cyst:

Either mediastinum (paratracheal, subcrinal), or intra parenchymal. **Secrets cheese like material** which is prone to infection, may result in hemorrhage and compression of surrounding structures leads to SOB, stridor, cough and dysphagia. **Tx:** surgical to confirm diagnosis and prevent complication.

2- Infections:

- Lung abscess:

Clinical features: copious amount of foul smelling sputum. Investigation: **air-fluid level on CXR**. **Tx:** antibiotics, drainage and pulmonary resection.

Indications of surgical treatment: failure of medical treatment, giant abscess > 6cm, hemorrhage, inability to rule out carcinoma, and empyema.

- Bronchiectasis:

Surgical indications: failure of medical treatment, cystic dilatation (cylindrical treated medically), localized lesion, and not perfused (assessed by V/Q).

- Tuberculosis:

More in the apex. If it's left untreated will lead to **left bronchus syndrome**, which is a chronic condition that lead to unilateral post TB lung destruction.

Indication of surgery: failure of medical treatment, destroyed lobe, hemorrhage, persistent open cavity with positive sputum and persistent broncho-pulmonary fistula.

- Aspergillosis:

Saprophytic (aspergilloma) → asp infection without invasion. **Clinical features:** chronic productive cough and hemoptysis. Air-crescent sign on CT-scan, **movable mass**.

Indication for surgery: significant aspergilloma, and massive hemoptysis.

- Hydatid cyst:

Caused by echinococcus granulosus (tapeworm). Dogs, cats, sheep are the hosts. **Symptoms** result from the compression. The liver is the most common site followed by the lung.

Treatment: radical surgical excision with chemotherapy using albendazole and/or mebendazole before and after, if multiple cysts chemotherapy indicated. Injection of scoliodal agents such as **hypertonic 20% Saline** is used during surgery to kill scolex.

3- Tumors:

- Primary lung tumors:

Smoking is the most important risk factor. Two types **SCLC**, and **NSCLC** (adenocarcinoma, squamous cell carcinoma, and large cell carcinoma).

SCLC: neuroendocrine origin, centrally located, and **poor prognosis**.

Tx: non-surgical, chemotherapy +/- radiotherapy.

NSCLC: Epithelial origin

- ✓ Adenocarcinoma: “the most common”, peripherally located.
- ✓ Squamous cell carcinoma: centrally located.
- ✓ Large cell carcinoma: “least common”, peripherally located.

Tx:

- ✓ Early: surgery +/- adjuvant chemotherapy.
- ✓ Intermediate: neoadjuvant chemotherapy + surgery.
- ✓ Late: chemo/radiotherapy + palliative management.

Clinical features:

- ✓ Lung: cough, hemoptysis, SOB
- ✓ Compression of surrounding structures: hoarseness, dysphagia, Horner’s syndrome (sympathetic ganglion), arm pain/numbness (C8-T1), pleural pain, and SVC obstruction syndrome (SOB and facial/arm swelling).
- ✓ Distal paraneoplastic syndrome: ADH (hyponatremia), PTH (hypercalcemia), ACTH (Cushing’s syndrome), and hypertrophic pulmonary osteoarthropathy (pain and swelling of joints).

Investigations: CT-scan is the best modality for staging extent of metastasis.

4- Trauma:

- Fracture ribs: most common blunt thoracic injury.
- Flail chest: fractures of several adjacent ribs in two or more places result in paradoxical movement.

5- Mediastinal mass lesion:

- Anterior: 5Ts (thymoma, T-cell lymphoma, TB lymphadenopathy, thyroid goiter, teratoma).
- Middle: cysts (pericardial, and bronchogenic cysts).
- Posterior: neurogenic tumors.

L11: Emergency in urology (traumatic)

Renal injury: Either Blunt or penetrating injury

- **Indication** for renal imaging: Hematuria & Hypotension.
- **Image study:** IVU, CT (spiral & contrast) & Ultrasound.
- **Management:**
 - Conservative for blunt injuries, 50% stab & 25% for gunshot.
 - Surgical exploration indications: persistent bleeding & perirenal hematoma expansion or pulsatile.

Ureteral injury:

- **External trauma:** rare.
- **Internal trauma:** After surgery of surrounding organs (ovaries, uterus etc.).
- **Diagnosis:** ileus (presence of urine within the peritoneal cavity), fever, flank pain & persistent drainage of fluid from abdomen or vagina.
- **Treatment:** JJ stent, fixing ureter through different methods & nephrectomy.

Bladder injury:

- **Causes:**
 - Iatrogenic (transurethral resection of the bladder tumor, cystoscope, transurethral resection of prostate, cystolitholapxy & C-section).
 - Blunt: Seatbelt after deceleration trauma.
 - Penetrating trauma.
- **Types of perforation:**
 - Intra-peritoneal perforation (urine in peritoneum).
 - Extra-peritoneal perforation (No urine in peritoneum).
- **Presentation:** Suprapubic pain, difficulty in passing urine & hematuria.
- **Management:** Extra-peritoneal = drainage & open. Intraperitoneal = Open

Urethral injury:

- **Anterior urethral injury:**
 - straddle injury, inflating catheter balloon & penile fracture
- **Diagnosis:** Retrograde urethrography
- **Posterior urethral injury:** associated with pelvic fracture
 - Type I: stretch > stent with urethral catheter
 - Type II: partial tear > stent with urethral catheter
 - Type III: complete tear > Cystectomy and then try to repair after 7-10 days

External genital:

- Penile fracture & amputation
- Glans injury
- Scrotal injury

L12: Inguinoscrotal Conditions in Infants and Children

1- Inguinal Hernia:

- Congenital (patent processus vaginalis or PPV), Prevalence (1-5% boys), Premature (35%), Male/Female ratio (9:1), Indirect (99%), Right is more common than Left.

History:

- Intermittent groin swelling, Asymptomatic until get complicated.
- In girls, lump in upper part of labia majora.

Physical Examination:

- Examine the testes - Reducibility - Thickened spermatic cord.

Complicated Inguinal Hernia:

- Incarcerated hernia: Irreducible swelling
 - **No** evidence of bowel obstruction or strangulation.
- Obstructed hernia: Irreducible swelling
 - Symptoms and signs of bowel obstruction (bilious vomiting, abdominal distention, constipation).
- Strangulated hernia: Irreducible swelling
 - Symptoms and signs of strangulation (severe pain, fever, tachycardia, skin discoloration).

Management:

- Herniotomy (as soon as it is feasible).
- Incarcerated hernia: +/-Sedation and analgesia, Manual Reduction, Urgent herniotomy.
- Strangulated hernia: Emergent herniotomy, +/- bowel resection.

2- Hydrocele:

History: Scrotal swelling, Asymptomatic, 1% over one year of age.

Examination: Get above the swelling - Not reducible (most accurate) - Transilluminates

Management: Surgery not advised < 2 years of age - Ligation of patent processus vaginalis.

3- Undescended Testis:

Incidence: At birth: 3-4%, at one year: 1%, Pre-term: **30%**

Diagnosis: Parents/Doctors, Clinical features (Empty scrotum /Palpable or not /Milk it down to scrotum), Imaging? (Limited role), Laparoscopy (Diagnostic / Therapeutic)

Indications: Abnormal fertility, Testicular tumor, Cosmetic/Social, Trauma/Torsion

Treatment (after 6 months):

- **Palpable:** open orchiopexy
- **Nonpalpable:** Laparoscopy assisted orchiopexy - Two stages Fowler-Stephens orchiopexy

4- Acute Scrotum:

Causes: Testicular Torsion, Torsion of Appendages (commonest in prepubertal boys)

- Epididymitis (commonest for postpubertal boys) - Idiopathic Scrotal Edema

5- Testicular Torsion:

Management: **Timing** is critical 4 - 6 hours, needs rapid investigation

- Untwist (open book) and assess viability - Fix the other side
- If more than 12 hours, it is likely to be non-viable and may need orchiectomy

6- Torsion of Appendage(s):

Peak age: 10-12 years

Presentation: Swollen and painful (gradual onset) with blue dot sign

Investigation: Color Doppler scan

Management: Conservative or operative if torsion cannot be excluded

L13: IV fluids and acid base disorder

- Fluid and electrolyte balance may be altered in the many patients for **several reasons** (e.g. chronic illnesses like heart and renal failure – Burn – Diuretics – Hyperaldosteronism). **That's why IV fluids are widely used in medical field in order to correct this.**
- First of all we need to know about **normal body water**. It represents 60% or 55% of Total body weight (TBW) in men and women respectively. **This proportion decreases in aging and obesity / increases in athletes and babies.**
- Body water is distributed into 2/3 (40% of TBW) found **intracellularly** and 1/3 (20%) found **extracellularly**. The latter is furtherly subdivided into 3/4 in the **interstitial space** and 1/4 in the **intravascular space**.
- **EXAMPLE:** What is the water distribution in an **80kg male**?

First, he has **48L** (60%) water in his body, **32L** (2/3) is found intracellularly and **16L** (1/3) found extracellularly. 3/4 (**12L**) of this extracellular water is in the interstitial tissue while 1/4 (**4L**) is in the intravascular space.

- ✓ **Please return to the normal levels of plasma electrolytes and the content IV fluid types.**
- Normal daily fluid requirement is (**30–35**) ml/kg/day. Daily required Na is (**1-3**) mEq/kg/day, while daily required K is (**1**) mEq/kg/day (**K is not found in normal saline, it's only found in Ringer's lactate and Hartmann's solution**). However, normal saline is the most used one with 20mEq/L K added to supply basal needs. However, in severe hypokalemia, K is preferred to be given separately).
- **Fluid requirement in patients = Normal requirement + Amount of lost fluids per day + insensible loss.**

(Insensible loss is the water lost by skin and respiratory tract, estimated to be (**500ml/day**), increased by 100ml with every **1°C** rise in body temperature). (**Never exceed the rate of 110ml/h** of IV fluid during resuscitation).

- **Serum osmolality = [sodium in blood x 2] + urea + glucose** (Normally = **280-290** mosm/kg).
- There two types of fluids could be delivered intravenously (other than blood):

1/Colloids: contains water and **large molecules (e.g. protein)**, so they tend to stay within the vascular space. They are used as volume expanders (examples **Dextran, hetastarch, and albumin**), they are effective but expensive.

2/Crystalloids: contains **water and electrolytes**, divided according to tonicity into **Hypotonic/Isotonic/Hypertonic**.

- Common water and electrolytes abnormalities:

1/Water Excess: mostly due to inappropriate use of hypotonic solutions or **SIADH** (diagnosed by urine **Na>20mEq/L**), symptoms are coma and convulsion as a result of cerebral edema, important signs are hypertension/raised JVP/gallop/pleural effusion...etc. Treated by water restriction with normal or hypotonic saline infusion / Demeclocycline.

2/Water deficit: common causes are **bleeding** and GI/Renal losses. Symptoms include thirst, dryness and lethargy, signs can be dryness of tongue and mucous membranes/low consciousness/hypotension/absent JVP. Diagnosed by high serum sodium (**>145 mEq/L**) and treated by resuscitation (**blood when hemoglobin is low**, otherwise IVF is enough).

3/Hyponatremia: either due to increased Na (excessive normal saline, hyperaldosteronism) or due to reduced water (low water intake, water loss in sweat such as pyrexia, DM or diabetes insipidus), others (CHF and Cirrhosis). Diagnosed by high serum Na and treated by water intake + hypotonic saline. (**Symptoms are similar to those in water excess**).

4/Hyponatremia: Caused by volume overload and increased infusion of Na-free fluids. **Hyperglycemia also can cause pseudohyponatremia** (**as the serum glucose drags the water to the intravascular space producing low Na Cons.**). Treated by Normal saline or hypertonic saline in case of severe hyponatremia. (**Infuse slowly to avoid osmotic demyelination**).

5/Hyperkalemia: Caused by increased K infusion, tissue injury releasing K into blood, **metabolic acidosis** and renal failure. It's a serious condition as it can cause **arrhythmia** with peaked T wave in ECG. Diagnosed by increased serum K (**>6mEq/L**). Treatment plan includes: **insulin (+Dextrose)**, calcium oxalate, furosemide and **dialysis when needed**.

6/Hypokalemia: Due to inadequate replacement, **alkalosis**, furosemide, GI/renal loss, Bartter syndrome and RTA. Symptoms are **weakness**, muscle cramps/ pain and **arrhythmias**, diagnosed by (**K<3mEq/L**). Treated by replacement.

- **Important notes about other electrolytes imbalance:** Carpopedal spasm and Chvostek's sign occur in hypocalcemia. K and Ca will be never corrected unless Mg is corrected first. Renal failure is the commonest cause of hyperphosphatemia and hypermagnesemia.

L14: Pediatric urinary disorder

Kidney:

- **Unilateral renal agenesis (URA)** is asymptomatic
- **Bilateral renal agenesis (BRA)**, usually die in intrauterine life(stillbirth), fetus will have potter face due to oligohydramnios, if he survive in intrauterine life, he will die within 48 hours due pulmonary hypoplasia and uremia. Associated with absent ureter, and absent or hypoplasia bladder.
- **Supernumerary kidney**; additional kidney (usually 3)
- **Simple renal ectopic**; usually occur in left kidney, asymptomatic but may associated with hydronephrosis.
- **Crossed ectopia**; kidney is crossed the other side.
- **Horseshow kidney**; 90% attach to lower lobe, usually the isthmus made by parenchymal, and may be fibrous, it's asymptomatic, they have problem in operation (variable blood supply).
- **Accessory renal artery**; additional renal artery, may compress the ureter and obstruct it.

Ureter:

- **Ureteropelvic junction (UPJ) obstruction**; cause hydronephrosis, can detect it in intrauterine life by U.S
- **Pelviureteric Junction (PUJ) Obstruction**; treat it by **pyeloplasty** (cut the area before and after stenotic area and anastomoses the ureter to renal pelvis).
- **Ureterovesical junction (UVJ) obstruction**; cause hydroureteronephrosis, if cause symptoms treat it by **ureteral reimplantation** (cut the stenotic area and anastomose ureter with bladder).
- **Ectopic ureter**; any ureter doesn't enter the corner of trigonal area of bladder. Female present with continuous urinary incontinence while in male doesn't present with it, may present with prostatitis. It diagnosed by **voiding/micturating cystourethrogram (VCUG/MCUG)** consist of catheterizing the person in order to fill the bladder with a radiocontrast agent.
- **Vesicoureteral Reflux (VUR)**; **MCUG** to diagnose it, give prophylaxis antibiotic that excreted by kidney.

Urinary bladder:

- **Urachal abnormalities**; Can be precancerous of Urachal (Adenocarcinoma).
- **Bladder diverticulum**; 1^{ry}; congenital and single, 2^{ry}; acquired and multiple. Use **MCUG** to diagnose it.
- **Bladder extrophy**; Protrusion of the bladder through a defect in the abdominal wall.
- **Spinal deformity**; is the most common cause of neurogenic bladder dysfunction

Urethra:

- **Posterior urethral valve (PUV)**; most common cause of urinary retention in male infants. Can cause bilateral renal failure due to back up pressure. May associate with oligohydramnios, or VUR.
- **Hypospadias**; urethral opening on **ventral part** of penis (**No** circumcision, repair after 6-9 months).
- **Epispadias**; urethral opening on **dorsal part** of penis (**No** circumcision, repair after 6-9 months).
- **Cloacal extrophy**; defect in cloacal membrane. The bowel, bladder and genital organs will be exposed.
- **Prune-Belly Syndrome (or tried syndrome)**; absent of abdominal muscle, large bladder, dilated kidney and both of testis will be in abdomen.
- **Antenatal Hydronephrosis (ANH)**; some of causes are **PUJ** obstruction (most common cause), **UVJ** obstruction, **VUR**, **PUV**. They detected it in intrauterine life by Ultrasound (U.S).

L15: Acute Abdomen (perforated DU, SBO, mesenteric ischemia, appendicitis)

Definition: Acute abdomen denotes any **sudden**, spontaneous, non-traumatic disorder in the abdominal area that requires urgent surgery in some cases.

Pain is not necessary in acute abdomen: Acute abdomen without pain → bowel ischemia in immune-compromised patients (diabetic patients).

- **Certain cases differ according to age:**
 - ✓ Newborn child presents with acute abdominal pain, no meconium and distended abdomen; most likely, it is **Bowel atresia**.
 - ✓ Young patient with sudden acute abdominal pain; **perforated ulcer** is suspected.
 - ✓ 65 year old patient presents with acute abdominal pain the left lower quadrant, tenderness and distention; most likely, it is a tumor (**Colon cancer**) or **acute diverticulitis**.
- **According to the site of pain:** RLQ in female think also about **ruptured ovarian follicle**. Inferior MI and lobar pneumonia can cause epigastric pain.
- **Radiation:** Pain which initially is located in the periumbilical area and then moves to the RLQ occurs with **appendicitis**.
- ✓ Projectile vomiting in adult indicate **pyloric obstruction** due to (Scarring of chronic peptic ulcer, Superior mesenteric artery syndrome).
- **Content of vomits:**
 - ✓ Bilious (greenish) → **distal to duodenum**.
 - ✓ Non bilious → **above the 2nd part of duodenum**.
 - ✓ Coffee ground → old and digested blood (**cancer, gastritis, and chronic peptic ulcer**)
 - ✓ Hematemesis → fresh blood (**peptic ulcer, esophageal varices, and Mallory-Weiss tear**)
 - ✓ Small bowel obstruction → **thick material**.
- **Defecation:** Ask them can they pass gases or not, if not it's called **Obstipation** "**complete bowel obstruction**".
- **Enlarged Virchow's lymph** node is strongly indicate gastric carcinoma
- **Rectal examination:** accumulation of pus in the Douglas pouch in **perforated appendicitis**.
- **Vaginal examination:** to rule out ectopic pregnancy, pelvic inflammatory disease and salpingitis.
- **Electrolyte, BUN, and CREATININE:** BUN & Creatinine if elevated in acute abdomen, it indicates hypovolemic prerenal azotemia, insufficient perfusion to the kidney that will lead to renal failure.
- **Abdominal CT:** To diagnose difficult echo **vocal appendicitis**, rule out pancreatitis, tumors and bowel ischemia.
- **Angiography:** Ruptured aortic aneurysm.
- **Diagnosis:**
 - ✓ Acute abdomen+shock → Ruptured aortic aneurysm/acute pancreatitis. (Category **A** "means immediate surgery")
 - ✓ Generalized Peritonitis → Ruptured Viscus. (Category **B** "means surgery within 3-6 hours")
 - ✓ Localized Peritonitis → acute appendicitis. (Category **C** "means surgery within 24 hours")
 - ✓ Bowel obstruction (Category **D** "means surgery within 48 hours")
- **Management:**
 - ✓ Immediate operation → **Ruptured AAA**
 - ✓ Preoperative preparation and urgent operation within 6 hours → Ruptured viscus.
 - ✓ Urgent operation within 24 hours → Acute appendicitis.
 - ✓ Conservative treatment → Acute pancreatitis.

L16: Esophageal diseases

I. **Achalasia:**

- **Clinical features:** Dysphagia to solids and liquids + Regurgitations.
- **Diagnosis:** **Barium swallow** (bird's beak) the initial test and manometry is the most accurate.
- **Management:**
 - Medical therapy: Nitrates & Ca channel blockers.
 - Botulinum toxin.
 - Pneumatic dilation.
 - Surgical therapy (**Myotomy**).
- **Complications:** Primary (malnutrition & aspiration). Secondary (cancer "SCC" & epiphrenic diverticula).

II. **Esophageal diverticula:**

- **Symptoms:** staking in throat, halitosis, and dysphagia.
- **Diagnosis:** Barium esophagram.
- **Treatment:** Surgical or endoscopic repair.
- True diverticula: all layers.
- False diverticula: mucosa & submucosa (Zenker's & Epiphrenic diverticulum).

III. **Diffused esophageal spasm:**

- **Symptoms:** non-cardial chest pain (mimic MI) and dysphagia.
- **Diagnosis:** Esophagram and manometry.
- **Treatment:** pharmacological > if fail > surgery.

IV. **Barrett's Esophagus:**

- Caused by GERD and it may progress to **Adenocarcinoma**.
- **Diagnosis:** Endoscopy and pathology

V. **Esophageal perforation:**

- Caused by endoscopy, Boerhaave syndrome, forceful vomiting or trauma.
- **Symptoms:** pain, vomiting, hematemesis.
- **Diagnosis:** x-ray > Barium > endoscope.
- **Treatment:** Recitation > endoscopy.

VI. **GERD:**

- **Diagnosis:** Barium swallow (to confirm) > pH monitoring (gold standard).
- **Treatment:** Lifestyle, then Acid suppression drugs, then surgery.

L17: Approach Abdominal Surgical Problems in Children

History (the impact of age)

Less than 3-4 year can't express verbally, difficult to communicate, fear of strangers

History sources: **Mother is the best source, while father is not very reliable.**

- Nurses are reliable if ICU kid, but not always available. Other doctors may help.

Symptoms of Surgical Abdomen

Feeding: Feeding well means healthy baby

Poor feeding means sick baby from any GI or systemic cause (ear infection), GI obstructed, Pain.

Vomiting: Regurgitation is frequent in babies

Considered Pathological if associated with failure to gain weight, respiratory infection

Projectile means proximal obstruction, while Small amount after each feeds is normal

Bowel movement (BM) Normal is variable for infants from 4 per day to once in 2-3 days.

Failure to pass meconium in the first 24-48 hrs newborns, Meconium is 80% passed in the first 24 hours, 95% in the 48hr. Meconium is greenish, sticky, and dark.

Upper & Lower GI Bleed is very rare in children. On the other hand anal fissures are common.

Crying: Babies communicate their needs by crying (e.g. if they are hungry or wet "Urinated")

Baby who continue to cry, refuse feeding and dry is an "irritable baby" (on pain) (e.g. abdominal pain, other causes Earache). While non-crying baby with reasons can be worrisome (very sick).

Physical Examination

- Usually have higher HR, RR. Lower BP than normal. The younger the child, higher the values.
- Crying baby > not very sick (not critical). Unusually calm baby who doesn't respond normally > sick
- Focus on inhalation if baby cries and you can't hear his lung sounds.
- Examine abdomen while taking breath and keep your hand on the abdomen.
- Never do a rectal examination on babies. It's not helpful, it causes anal fissures and it's very painful.
- Otherwise physical examination is similar to adults

Due to the relative difficulties in taking a reliable history and performing an accurate physical exam, we tend to depend more on investigations in diagnosing the underlying problems in infants.

L18: Benign gastric and duodenal diseases

- Most common cause of **abdominal pain** originating from stomach and duodenum is pain due to **peptic ulcer**. **Peptic ulcer** literally means loss of the full thickness of the **mucosal membrane** by the effect of hyperacidity, however hyperacidity is not always the cause.
- Patient usually present with **epigastric pain**, **vomiting** and maybe symptoms of **perforation** in severe cases. **NOTE: Always think of MI and Aortic aneurysm in patients with epigastric pain.**
- Peptic ulcer is 3 times more common in men and can be either:
 - 1- **Duodenal ulcer**: occurs mostly in the **duodenal bulb**, common before the age of 40, usually acute and caused by H.Pylori in 95% of cases. Pain is **relieved by food** (Landmark to differentiate it with gastric ulcer).
 - 2- **Gastric ulcer**: 95% in the **distal half** of the lesser curvature, usually chronic, more common in **older people** (40-60 years old), may lead to **gastric adenocarcinoma**. Pain is **aggravated by food**.
- Both diagnosed by endoscopy (**Never use if perforation is suspected**) and contrast meal. Other investigations are gastrin blood level (to rule out **Gastrinoma** in severe cases of ulcer).
- Both treated by **PPIs**, **H₂ antagonists** and **Amoxicillin to eradicate H.Pylori**. Surgical interventions are second options when the medical treatment fails (e.g. Vagotomy, Antrectomy and Gastrectomy).
- **Complications** of peptic ulcer include **Pyloric obstruction** (Presented as projectile vomiting) and **Perforation**.
- There are also many serious late post-surgical complications like recurrent ulcers, Fistulae, Anemia, Alkaline gastritis and **Dumping syndrome**.
- **Dumping syndrome** is a condition where the ingested food bypasses the stomach too rapidly and enters the small intestine largely undigested leading to symptoms of **hypovolemia** early after food (tachycardia and hypotension) and symptoms of **hypoglycemia** (mainly syncope) later due to hyperinsulinemia.
 - ❖ Other common gastric and duodenal conditions: (only important ones)
- ✓ **Zollinger-Ellison Syndrome (Gastrinoma)** which in role leads to high amounts of gastrin hormone and thus **malignant** peptic ulcer can be one of **MEN1 syndrome** manifestations. Patient also present with **steatorrhea** due to inactive lipase. Diagnosed mainly by gastrin serum levels and CT-scan and treated by massive PPI doses or surgically by gastrectomy.
- ✓ **Upper GI bleeding**: patient present with **hematemesis**, **melena** and rarely hematochezia. Commonest cause is **peptic ulcer** followed by esophageal varices. Diagnosed and treated by endoscopy or surgical intervention, should be preceded by **fluid resuscitation**.
- ✓ **Mallory-Weiss Syndrome**: one of the common causes of GI bleeding (10%), when sever vomiting or coughing creates a streak of blood in the GEJ mucosa. Common in young patients. Endoscopy used to confirm the diagnosis. Treated by **cold gastric wash** or endoscopy. However it usually **heals spontaneously**.
- ✓ **Gastric polyps**: **Asymptomatic** abnormal growth from the mucosal surface of stomach. Anemia can be the only manifestation. Endoscopy is used to rule out malignancy, if the polyp is adenomatous, resection is preferred.
- ✓ **Gastric leiomyomas**: bulging of **benign** smooth muscle growth behind normal mucosa (**in submucosa**), usually **incidentally** found, **asymptomatic** but can **massively bleeds**, diagnosed by endoscopy and CT-scan. Surgically removed with no biopsy taken before (to avoid metastasis).
- ✓ **Menetrier's Disease**: Giant **hypertrophy of the gastric rugae** resulting in hypersecretion of acids and mucus that are manifested by **Hypoproteinemia**, edema, diarrhea and weight loss. Treated usually by atropine and PPIs.
- ✓ **Gastric volvulus**: when the stomach **turns around itself**, either **organoaxially** or **mesentrioxially** (first is more common and sever). Present with sever epigastric pain + **Brochardt's triad** (Episodes of vomiting followed by retching, gastric distension and inability to insert a NG tube). Dx is by X-ray. (**Ground-glass appearance**).
- ✓ **Bezoar**: a retained indigested **foreign body** within the stomach. Can be **hair** (Trichobezoar) or Indigestible **plant** (Phytobezoars), presented with signs of **obstruction**, diagnosed by endoscopy and X-ray, Treated surgically.
- ✓ **Superior mesenteric artery syndrome**: a disease of the **3rd part** of duodenum in patients who **lose weight** within a short period. Characterized by duodenal obstruction by the effect of the surrounding vessels (Superior mesenteric anteriorly and abdominal aorta posteriorly) when the **fat** between the duodenum and those vessels become diminished. Common in severely ill patients. Diagnosed by CT-scan, treated by **naso-duodenal feeding**.
- **Gastric volvulus and Superior mesenteric artery syndrome are emergent conditions, should be managed immediately**

L19: Differential diagnosis of abdominal masses & abdominal hernias

I. Abdominal Masses

- Visceral abdominal pain is mediated by the sympathetic nervous system and is typically deep-seated and ill localized to the area originally occupied by the viscus during intrauterine life.
- Irritation of foregut structures (the lower esophagus to the second part of the duodenum) is usually felt in the epigastric area. Pain from midgut structures (the second part of the duodenum to the splenic flexure) is felt around the umbilicus. Pain from hindgut structures (the splenic flexure to the rectum) is felt in the hypogastrium.
- Colic is a form of visceral pain that arises from hollow viscus with muscle in its wall (e.g. gut, gall bladder, ureter), and results from excessive muscle contraction, often against an obstructing agent.
- Patients experiencing colic are usually unable to remain still during the bout of pain but are pain-free between attacks. 'Biliary colic' is an exception (and the term colic may be a misnomer), in that pain often waxes and wanes on a plateau and there are no pain-free intervals.
- Parietal pain, such as that caused by parietal peritonitis, is mediated by somatic nerves and localized to the area of inflammation.
- Reflex guarding and rigidity of the overlying muscles is usually present, and the patient is reluctant to move for fear of exacerbating the pain.
- Some area of the peritoneum (e.g. the pelvis, posterior abdominal wall) are 'non-demonstrative' in that parietal peritonitis may be present without tenderness or guarding of overlying muscles.

II. Hernias

- A hernia is an abnormal protrusion of a cavity's contents through a weakness in the wall of the cavity, but takes with it all the linings of the cavity.
- Hernias in the abdominal wall are common and may exploit natural openings or weak areas caused by stretching or surgical incisions and association with a defect in collagen metabolism.
- Hernia may be classified as reducible or irreducible, and the contents (e.g. bowel) may become obstructed or strangulated.
- Strangulation denotes compromise of the blood supply of the contents and its development significantly increases morbidity and mortality. The low pressure venous drainage is occluded first and then the arterial supply becomes occluded, with the development of gangrene.
- Indirect inguinal hernias 60% groin hernias and commence at the deep inguinal ring, lateral to the inferior epigastric vessels. Direct inguinal hernias 25% of groin bulge through a weakness in the back wall of the inguinal canal, medial to inferior epigastric vessels.
- Inguinal hernias are more common in males, while in females the most common is paraumbilical (due to obesity, multiparity).
- Femoral hernias 15% of groin hernias and the most common prone to complications.

L20: Portal HTN and surgical diseases

I. Variceal bleeding:

- Prevention of variceal bleed: (AASLD recommendation).

- ✓ Patient with compensated cirrhosis and small varices that haven't bled → nonselective beta blockers.
- ✓ Patient with medium-large varices that haven't bled → nonselective beta blockers or esophageal variceal ligation.
- ✓ In patient who received nonselective beta blockers, a follow up with EGD (esophagogastroduodenoscopy) is not necessary, but in patient treated with EVL (Endoscopic Variceal Ligation), EGD should be performed.

- Treatment of active bleeding:

- ✓ Initial hemodynamic resuscitation.
- ✓ Prophylactic antibiotics (IV ceftriaxone).
- ✓ UGD should be performed for diagnosis.
- ✓ Suggest octreotide.
- ✓ If patient still bleed TIPS (Transjugular intrahepatic portosystemic shunt) is usually performed (salvage treatment).
- ✓ Balloon tamponade used as temporizing measure (maximum 24 h) if TIPS not available at the moment.

*splenectomy is curative for cases of splenic vein thrombosis and gastric varices formation.

II. Liver resection:

- Large adenomas more than 5 cm is indication of surgical resection (benign).
- The most common liver metastasis which indicate a liver resection is colorectal cancer.
- Limits resection up to 70-80 % of liver can be taken out with maintained liver function.

L21: Pancreatic problems

- I. **Acute pancreatitis:**
 - **Etiology:** Gall stone, alcohol, familial & drugs.
 - **Clinical features:** Epigastric pain, shock, Grey Turner's & Cullen's signs.
 - **Diagnosis:** ↑ Lipase and amylase.
 - **Management:** Analgesia, NPO, NG & IV. → Cholecystectomy & ERCP.
 - **Complications:** Necrosis, infection & pseudocyst.
- II. **Pseudocyst:**
 - **Diagnosis:** ↑ Lipase or WBC, CT scan & jaundice.
 - **Management:** Observe → drainage.
 - **Complications:** infection, rupture & bleeding.
- III. **Chronic pancreatitis:**
 - **Etiology:** alcohol.
 - **Clinical features:** Epigastric pain, Malabsorption & diabetes.
 - **Diagnosis:** Normal Lipase and amylase. X-ray and CT show calcification.
 - **Complications:** Biliary obstruction, pseudocyst, carcinoma & splenic vein thrombosis.
- IV. **Pancreatic adenocarcinoma:**
 - **Etiology:** Smoking, fatty food, gastrectomy, and chronic pancreatitis.
 - **Clinical features:** Weight loss, jaundice.
 - **Management:** Whipple's resection.
 - **Complications:** Necrosis, infection & pseudocyst.

L22: Cholelithiasis

- Three types of stones, **cholesterol** (most common), pigment (15%) or mixed. Pigment stones (15%) are from calcium bilirubinate. Diseases that increase RBC destruction will cause these. Also in cirrhotic patients, parasitic infections.
- **Risk factors: 5 F's:** Fat (overweight), Forty (age near or above 40), female, fertile (premenopausal-increased estrogen is thought to increase cholesterol levels in bile and decrease gallbladder contractions), and fair (gallstones more common in Caucasians).
- **Prevalence:** every year 1-3% of patients develop symptoms (associated with morbidity and mortality). Asymptomatic GS are not associated with fatalities.
- **Clinical stages:** 1- asymptomatic (60-80%), 2- symptomatic, 3- with complications (cholecystitis, cholangitis, common bile duct "CBD" stones). A history of epigastric pain with radiation to shoulder may suggest it.
- **Definition:** Best definition of colic is pain that is severe in epigastrium or RUQ that last 1-5 hrs, often waking patient at night.
In classic cases pain is in the RUQ, however visceral pain and GB wall distension may be only in the epigastric area. Once peritoneum irritated, localizes to RUQ.
- Vital signs and physical findings and lab in asymptomatic cholelithiasis are completely **normal**. Fever, tachycardia, hypotension, alert you to more serious infections, including cholangitis, cholecystitis. (Murphy's sign).
- **Lab:** Elevated WBC is expected but not reliable. ALT, AST, AP more suggestive of CBD stones **Amylase elevation** may be GS pancreatitis (but normal values do not rule it out).
- **Imaging: US and HIDA are the best.** Plain x-rays, CT scans and ERCP are adjuncts. ERCP is diagnostic and therapeutic, done when CBD dilated and elevated LFTs.
- **Treatment:** Anticholinergics (dicyclomine hydrochloride), Demerol (Meperidine), Antiemetics (phenergan, compazine) and antibiotics.
- **Surgery:** Cholecystectomy can be performed after the first 24-48h or after the inflammation has subsided. Unstable patients may need more urgent interventions with ERCP, percutaneous drainage, or cholecystectomy.
- Laparoscopic Cholecystectomy very effective with few complications (4%). 5% convert to open. In acute setting up to 50% open.
- **Complications:** Cholangitis, Sepsis, Pancreatitis, Perforation (10%), GS ileus (**mortality 20%** as diagnosis difficult), Hepatitis, Choledocholithiasis (presence of a gallstone in the common bile duct).
- **Prognosis:** Uncomplicated cholecystitis as a low mortality, Emphysematous GB mortality is 15%, Perforation of GB occurs in 3-15% with up to 60% mortality, Gangrenous GB 25% mortality.

L23: Inflammatory bowel disease (IBD):

- IBD is a chronic inflammation of GI tract (Either CD, UC, or indeterminate colitis “between them”).
- **20%** of IBD patient have indeterminate colitis
- In indeterminate colitis we see how it behaves, if like Crohn’s we treat it as Crohn’s disease, or treat it as ulcerative colitis if it behaves like it.

	Ulcerative colitis (UC)	Crohn’s disease (CD)
Definition	Disease of colon only, start from rectum (50% of patients limit to rectum) and extend proximally in a continue fashion.	May involve any part of GI, particularly iliocecal region, in a skip fashion.
Prevalence	It increasing in Saudi Arabia (UC more common than CD)	
Sex	Male = female	
Appendectomy	Reduce symptoms	Worse symptoms
Smoking	Reduce symptoms	Worse symptoms
Symptoms	Bloody mucosy diarrhea , rectal bleeding, crampy abdominal pain, and tenesmus.	Diarrhea , Crampy abdominal pain, vomiting, weight loss, fever, perianal disease.
Extra-intestinal manifestations	Uveitis /Episcleritis, Erythema Nodosum, Pyoderma Gangrenosum, Arthritis, Ankylosing Spondylitis, Sclerosing cholangitis	
Gross feature	Erythematous mucosa.	Thickening of bowel wall with creeping fat, cobblestones appearance.
Microscopic feature	Inflammation only in mucosa , crypt abscesses, atrophies of glands.	Transmural inflammation (all layer), focal ulceration, Noncaseating granuloma (If caseating thinks of TB).
Polyps	No (Pseudopolyps)	Yes
Complication	Toxic megacolon, Perforation (they need surgery), Hemorrhage, Stricture.	Stricture (leading to obstruction), fistulas , toxic megacolon, perforation, perianal disease, malabsorption, gallstone, renal stone, amyloidosis.
Risk of colorectal cancer	May occur in long duration (usually > 10 years of begin of the disease)	Very low
Treatment	<ul style="list-style-type: none"> - First line is Medical treatment - Surgery if: <ol style="list-style-type: none"> 1- Medical treatment is failed 2- Complications appear (e.g. toxic megacolon, perforation). 3- Patient desire to cure Name of surgery; total proctocolectomy ileal pouch anal anastomosis .	<ul style="list-style-type: none"> - First line is Medical treatment - Surgery if: <ol style="list-style-type: none"> 1- Medical treatment is failed 2- Complications appear (e.g. toxic megacolon, perforation).
Notes	<ul style="list-style-type: none"> - Backwash ileitis: when UC involve last segment of terminal ilium (20% of UC patients) - If UC develop stricture is cancer until prove other. - If UC develop sclerosing cholangitis, it’s incurable and ↑ risk of cholangiocarcinoma. - Sclerosing cholangitis is associated with increased risk of colorectal cancer in UC patients. - Toxic megacolon is dilation of colon (> 9 cm), associated with Constitutional symptoms (e.g. fever, abdominal pain, tachycardia, ↓ BP, ↑ WBC, or shock) 	

*ONLY to understand:

Episcleritis; is inflammation of episclera which is a thin membrane that covers the sclera (the white of the eye).

Erythema nodosum is inflammation of the fat cells under the skin, resulting in tender red nodules.

Pyoderma Gangrenosum is deep ulcerative cutaneous condition, usually occur on the legs.

Ankylosing Spondylitis is an inflammation of axial vertebra, can cause vertebral fusing and cause pain and stiffness

Sclerosing cholangitis is autoimmune disease cause inflammation and fibrosis of the intrahepatic and extrahepatic bile ducts. Cause liver failure and cancer of liver and bile duct. Best treatment is liver transplant.

L24: Metabolic response to surgery

- Metabolism is altered by trauma (e.g. Surgery)

Metabolic response to trauma		
Phase	Ebb phase	Flow phase
Notes	Characterized by hypovolemic shock (All system decrease their functions to maintain body life e.g. bradycardia, hypotension, hypoperfusion). Usually associated with hemorrhage.	Characterized by catabolism (to provide energy). ↑ Catecholamines, ACTH, GH, and Glucagon. ↓ Insulin (because it anabolic hormone). Calories source came from fatty acid (lipid reserve), and glucose (from hepatic glycogen and provide amino acid to gluconeogenesis). This process lead to muscle wasting

- After these two phases, the body will recover and start to building energy (**Anabolism**).
- Nitrogen excretion can indicate the severity of injury (as it raise means increase in muscle breakdown). **Elective surgery** is least traumatic loss of nitrogen, while **severe burn** is maximum one.
- Harris-Benedict Equation (**HBE**) is formula that calculate **basal energy requirement** for **healthy** person, we use it to calculate basal energy for sick patient by following formula: HBE x stress factor x activity factor.
- **Macronutrients requirements during Stress:**
 - Carbohydrate:** at least 100g/day to prevent ketosis, they need 30%-40% of their total calories.
 - Fat:** Maximum for IV infusion (1 – 1.5g/kg/day). Should provide 20%-35% of total calories.
 - Protein:** Required (1.2-2.0 g/kg/day) during stress. Should provide 20%-30% of total calories.
- Glutamine and Arginine are **conditionally essential** (meaning their synthesis can be limited under special pathological conditions, so we must provide it to patient).

Thank you

"Feeling gratitude and not expressing it is like wrapping a present and not giving it."

William Arthur Ward

When the time became more valuable than gold and more difficult to find, the members of our team and other teams volunteered their own time and effort to help their colleagues in this great batch.

So all gratitude, acknowledgment, and thanks to every member have worked, improved or even just encouraged our team during this term.

I hope we can keep that great, brotherly and solidary team working till the end of our years in this collage.

May god bless us all and bless our time and effort

Good luck, and wish you all the best

Faisal S. AlGhamdi

