بسم الله الرحمن الرحيم

تتقدم **لجنة الطب والجراحة** لكم بهذه الدوسية الخاصة **بمادة الجراحة** / جامعة مؤتة ..

و التي تحتوي على تلاخيص لبعض المواضيع بطريقة تسهل دراستها ومراجعتها قبيل الامتحان ..

قام بإعدادها الطالبة :

مروة مبارك القريناوي

وأشرف على طباعتها وتنسيقها الطالب :

طارق نظمي أبولـبدة

نسأل الله أن يكتب فيها النفع والفائدة ، ونرجو منكم تقديم التغذية الراجعة بملاحظاتكم الرامية لتحسين جودة هذه الدوسية ..

علما أن هذه هي النسخة الأولى ؛ وسيتم التحديث والإضافة عليها عند تجهيز تلاخيص أخرى ..

فقل لمُرَجّي معالي الأمور // بغير اجتهادٍ طلبتَ المحالا

فهرس المواضيع

Appendix

Anatomy:

1. Posterior medial wall of cecum \ 2 cm below iliocecal valve
2. Base → constant at McBurny point
3. Tip → mobile: retro cecal 74%, pelvic 21%, paracecal\subsecal, preilial or postilial
4. Tenia coli can be used as a land mark in the surgery to find appendix.
5. Size → 2-25 cm, average 6-9 cm
6. Blood supply from appendicular artery in mesoappendix "from iliocolic artery"

Histology:

- lined by columnar epithelium
- at childhood it's dominant by lymphoid follicles → atrophy
- crypts → at the base → argentaffin cells → carcinoid tumor.

Appendicitis:

Epidemiology → young age "22 yrs" (2nd, 4th decade), 16 %

Etiology →

1- obstruction of the lumen by CA, bacteria, fecolith, lymphoid enlargement, tumor

2- ↓ fiber content in diet

Pathophysiology → proximal luminal obstruction → ↑ mucus secretion from mucosa with bacterial proliferation → further distention → venous congestion (bacteria may go to the blood) + inflammation (pain; if we give Ab may subside, causes fibrosis) → arterial congestion + go to serosa and peritoneum → inflammation at anti-mesenteric border → may undergo perforation (distal portion of anti-mesenteric border)

Clinical →

History:

1- Pain:
   - firstly around the umbilicus
   - then shifted to RIF in 1-12 hrs
   - colicy at start then dull.
2- Anorexia (always): due to pyloric muscle spasm as a reflex.
3- Vomiting (75%) once\twice
4- Nausea
5- Diarrhea & gastroenteritis
   - Previous similar less severe attacks lead to old, healed appendix

بالترتيب:

Anorexia → pain → vomiting

Physical examination:

- Patient in pain, low grade pyrexia, tachycardia
- Abdominal →
  - inspection: limitation of respiratory movement + pointing sign

- palpation:
1- superficial (McBurny point tenderness, cutaneous hyperesthesia, guarding of perforated)
2- deep: Rovsing sign "press on LIF → pain in right due to bowel pushing the appendix", rebound tenderness → peritoneal irritation elected by deep palpation\coughing\percussion

- Others:
1- *psoas stretch sign* (retrocecal) "extension of the hip on lateral position"
2- *obturator sign* (pelvic) "flexion of hip and knees internal rotation الحركة برا

DDx:

- **Old** → diverticulitis, IO after laparotomy from adhesions, colonic cancer, mesenteric infection
- **Male** → ureterocolic, perforation Pu "paracolic gutter area", testicular torsion to RIF, pancreatitis, rectal sheath hematoma
- **Female** → mittelschmerz, ovarian cyst, ectopic pregnancy, PIP, pyelonephritis.

Investigations:

1- **CBC** → ↑WBC with differential shifting to the left (neutrophilia)
2- **Urinalysis** (hematuria, pyuria if bladder is involved), stool culture to exclude UTI + GE
3- **Imaging** →
- plain abdominal X-ray →
- exclude intestinal obstruction, perforated PU, ureteric colic or pain referred from a right lower lobe pneumonic process
- fecolith may be noticed (rare)

- US الأهم →
- exclude the gynecological causes (ovarian cysts complications)
- graded compression sonography (non-compressible blind loop, 6 mm or more in AP direction)

- Ct → masses and abscesses

4- **Laparotomy**, Dx and Tx.

ALVARADO SCALE:

Symptoms:
- anorexia (1)
- migration of pain (2)
- N\V (1)

Signs:
- tenderness (2)
- rebound (1)
- T (1)

Lab: leukocytosis (2) (shifted to left (1))

9-10 → almost
7-8 → high likelihood
5-6 → less likely

Management:

- Within 12 hrs → emergency surgery by appendectomy + IV fluids + prophylactic Ab.
- Laparoscopic: obese, woman, diagnostic for other differential
- Laparotomy:
  - gridiron incision at McBurny point
  - lanz incision: 2 cm below umbilicus on mid inguinal line, transverse
  - lower midline → IO, complicated
- Ligation of artery then remove appendix.

Complications:

1- **Rupture:**
   - delayed presentation
   - fever > 39 \ ↑WBC > 18
   - majority is contained but if not (elderly, children "short omentum", postoperative adhesions) → may lead to peritonitis and abscess.

2- **Mass or abscess** detected by PEx and CT.
   - phlegmon (bowel and omentum adhere to inflamed appendix) → may lead to IO, resolves alone (we don't do surgery in this case: conservative+ IV Ab)
   - abscess (others intra-peritoneal or pelvic one) → long duration of symptoms (spiking fever, failure to resolve) 5-6 days, Tx by extra peritoneal percutaneous drainage "may lead to fecal fistula",
   if complex: surgical drainage.
   - mucocele → suspect cecal cancer

Interval appendectomy by 6 weeks:
Not used any more, became fibrous tissue

Appendicitis and pregnancy:

- Difficult to diagnose
- Suspect if new onset of vomiting, pain, ↑WBC, US
- Must be treated laparoscopy.

Tumors:

Carcinoid, adenocarcinoma, simple mucocele due to cecal cancer, malignant mucocele

Lower GI bleeding

Introduction:

- Bleeding from a source distal to the ligament of treitz (at the beginning of jejunum to the diaphragm).
- Mainly colon + anorectal region
- 20% lower small intestine

Clinical presentation:

1- Acute (< 3 days duration +\- hemodynamic instability that may need blood transfusion)

2- Chronic (over long duration, small\slow intermediate amount, may present as
- melena → rare (hematin) > 14 hr in the bowel → mainly from UGIB
- hematochazia (maroon stool "bright red" from Lt colon & rectum) → blood with stool (before, after→ (anorectal condition), mixed)
- occult blood → with unexplained iron deficiency anemia.

3- Rectorrhagia → without stool (rare), Lt Colon & rectum or massive upper bleeding.

Causes:
- diverticulosis (M.C one)
- angiodysplasia (2nd M.C)
- colitis (IBD, ischemic, infectious, radiation)
- anorectal disease (fissure, hemorrhoid, rectal prolapse)
- neoplasia
- post polypectomy bleeding
- upper GI bleeding (massive)

How to differentiate from upper?

<u>in upper GI bleeding :</u>

1- hematemesis
2- melena
3- hematochazia in massive bleeding with hemodynamic instability
4- blood NG aspirate
5- hyperactive bowel motion + ↑blood urea nitrogen ← ↑protein absorption (AA)

Approach:

1- resuscitation in acute bleeding (large bore cannula, IV fluid, cross match, CBC, coagulation Foleys)
2- find the cause :

► history:
- C.C → as in previous
- past medical → HTN, DM, vascular disease→ ischemic
- associations → constipation, diarrhea → hemorrhoid\fissure, abdominal pain → diverticulitis, neoplastic IBD)
- past surgical → polypectomy
- weight loss +anorexia + FHx → cancer
- radiation → radiation colitis
- Drug Hx → anti-coagulant

► Examination:
- general → BP + viral + signs of anemia
- LN → supraclavicular
- abdominal ex → masses, tenderness
- anal ex: - inspection→ masses, external hemorrhoid (3rd degree), sentinel pile
  - DRE → masses, diverticulosis

► Investigation + treatment
- CBC → anemia, coagulation profile, ..)
- Lower sigmoidoscopy \ colonoscopy in minor bleeding <40 yr.
- endoscopy to rule out UGI bleeding in hemodynamically unstable after resuscitation .
- NG aspirate
- ^{99}Tc labeled red cell scan → localize the bleeding, inactive bleeding or not, at rate .1 ml\min or more.
- Angiography→ site of bleeding + therapeutic (embolization or infusion of vasopressin), angiodysphagia Dx
- capsule endoscopy → مش عارفين المكان

Occult bleeding:

1- Colonoscopy especially for > 40 yr pts.
2- Upper endoscopy→ 25-40% there is finding.
3- Capsule endoscopy

مخطط صفحة 72

Stomach & duodenum

Anatomy:

- Rugae: mucosal folds
- Located at level T1- - L3
- Fundus (Nissen fundoplication in GERD)
- Antrum (site of biopsy for H-pylori) → Angular notch made by lesser curvature
- 3 muscular layers (internal oblique, middle circular, outer longitudinal)
- Greater omentum attached to greater curvature
- Lesser omentum (hepatogastro ligament, hepatodoudenal ligament)

Blood supply:

1- Rt, Lt gastric artery
2- Splenic → Lt gastroepiploic\short gastric
3- Gastrodoudenal→ Rt gastroepiploic (from proper hepatic)

- Venous as arterial, porto-systemic shunt in lower third of esophagus from (Lt gastric, azygos, hemiazygos)

Innervation:

- **Parasympathetic:**
  1- Lt vagus (ant.): latarjet, hepatic, pyloric
  2- Rt vagus (post.): celiac

- **Sympathetic:** splanchnic (T5-T10)

Vagotomy:

1-**truncal** → from the origin
2- **selective** → celiac
3- **parietal cell vagotomy** → at body, fundus (highly selective)

- Don't cut pyloric branch → accumulation of food in stomach.
- Medical vagotomy = PPI

H-pylori infection:

- 2\3 of them → asymptomatic
- 10-15% symptomatic → +\- PU (100% of DU)
  1- acute gastritis
  2- chronic gastritis → gastric atrophy → metaplasia + ↑duration → CA (malt lymphoma)

- **Pathogenesis**: ↑gastrin, ↓ Somatostatin, ↑pepsinogen, ↓ mucosal resistance, ↑ tissue cytotoxins

- **Tx:**
  1- PPI + 2 Ab or
  2- H2 blocker + 2 Ab
  3- Surgery: complicated case, failure of medical Tx, to reduce pepsin (acid secretion)

- **Dx:**
  1- Rapid urease breath test →follow up
  2- Serology → s, s
  3- Endoscopy + biopsy: rapid urease T, culture *gold standard*, histo

Duodenal vs. gastric PU :

Duodenal: Relieved by eating → no weight loss + good appetite + late Dx (1-2 m) + uncommon vomiting, no malignant transfusion

Gastric: Relieved by vomiting + by eating → weight loss + poor appetite + early Dx (few weeks) + vomiting, little malignant transfusion

When to investigate for CA ?

1- old age > 50 y
2- alarming symptoms: wt loss, anorexia, hemoptysis\melena, dysphagia, vomiting

Surgical Tx:

truncal vagotomy +
1- billroth I: anterectomy + gastrodoudenostomy
2- billroth II: anterectomy + gastrojejunostomy
3- roux en-Y: anterectomy + gastrojujenostomy + jejunojejunostomy

Complications of gastrectomy:

► early dumping syndrome:
- 15 min after meal
- Anxiety, weakness, tachy cardia, diaphoresis, palpitation, borborygmi + diarrhea
- Hypertonic fluid from stomach (uncontrolled released) lead to movement of fluid from IV to IL → hypovolemia
- Tx: fluids, small meals, fluid before meals + 30 min later, Somatostatin analogue + B-blockers, roux en-Y
- MCC: billroth I

► Late dumping syndrome:
- 3 hrs later
- Anxiety, weakness, tachy cardia, diaphoresis, palpitation, NO borborygmi + diarrhea
- Firstly glucose absorption →insulin →hypoglycemia
- Tx: small snacks after meal (2 hrs)
- MCC: billroth I or roux en-Y

- ► Blind loop syndrome (bacterial overgrowth in duodenum)
- ► Afferent loop obstruction
- ► Post vagotomy diarrhea
- ► Alkaline reflux gastritis :
  - recurrent ulcers
  - gastric atony

PU complications:

1- Bleeding: endoscopy + cauterization, adrenalin, clipping, sclerosing (venous only), surgery (open longitudinal) + (close transversely to prevent stricture)
2- Perforation → chemical peritonitis → dilution → purulent peritonitis
PU: graham patch surgical technique (omental patch)
3- Gastric outlet obstruction: edema + fibrosis, recurrent (Tx conservative IVF, surgery B1,2)

Duodenum:

1- **Adenocarcinoma:** most commonly found in duodenum
- periambullary in site (2nd part)
- late DX
- clinical: obstruction, bleeding, jaundice, wt loss, pain
- Dx → endoscopy + biopsy
- CT for staging
- Tx: 1, 2nd portions → doudenopancreatomy, 3,4th portions → resection + doudenojejunostomy
  unresectable → gastroenterostomy, post op radio
- +ve nodes → poor prognosis

2- **Duodenal lymphoma:**
- rare in duodenum
- not specific

Gastric cancer

Types:

- 1°: adenocarcinoma 95%, lymphoma, GIST
- 2°:
  - by blood: melanoma, breast
  - direct: colon, pancreas
  - peritoneal: ovarian
- M.C in Jordan, china

- **R.F:**

1- predisposing: pernicious anemia, atrophic gastritis, smoking, gastric resection (metaplasia)
2- Environmental: H-pylori infection, low socioeconomic, Japan, diet (salted fish, ↑nitrate, smoked meat)
3- Genetic: blood group A, HNPCC
4- Precancerous: atrophic gastritis M.C

Clinical presentation of adenocarcinoma:

1- Asymptomatic
2- Early: epigastric discomfort, ingestion, pain (constant, non-radiating, unrelieved by food)
late: mass, jaundice, ascites
3- Constitutional: wt loss, anorexia, fatigue, emesis
4- Complicated: bleeding, obstruction

PEx:

1- abdominal mass
2- mets:
- Virchow's LN (Lt supraclavicular)
- sister Mary joseph (peri umbilical LN)
- krukenberg's tumor (ovarian masses)
- hepatomegaly

Bormann classification:

- polypoid
- ulcerative
- infiltrative
- diffuse infiltrative

Intestinal	**Diffuse**
- M > F	- F > M
- ↑With age	- Younger
- Gland formation	- Signet ring
- Well differentiated (good prognosis)	- Poor differentiation (poor prognosis)
- More distal\localized	- Transmural\proximal
- Hematogenous	- Lymphatic
- APC mutation (adenomatous, polyposis coli)	- E-cadherin ↓

Investigations:

1- CBC for anemia: bleeding, liver dysfunction, poor nutrition
2- Tumor marker: CEA, CA 19-9, CA 724
3- Endoscopy + biopsy from sides of lesion
4- Double contrast: apple core sign, lenities plastic (leather flask)

Staging:

1- Endoluminal US : tumor penetration, LN, adjacent structures
2- CXR, CT scan (abdomen, pelvis)
3- PET scan (unexpected mets)
4- Staging laparoscopy: curative or not, liver, peritoneal mets.

Tx:

1- Remove the tumor + safe margin (5-6 cm) + LN + resume continuity of the bowel
   → proximal + midbody: total gastrectomy + roux en-Y
   → distal: partial gastrectomy + billroth II

2- Lymphadenectomy:
   - D1 → LN within 3 cm
   - D2 → D1 + splenic, hepatic, celiac
   - D3 → D2 + para aortic
   - no evidence to increase survival rate ☹

3- Chemo\radio (adjuvant, neoadjuvant)

Gastric lymphoma: 5%

1- Stomach is the commonest site for extranodal primary site for non-Hodgkin lymphoma (MALT lymphoma)
2- 2° → may
3- Clinical: anemia, mass
4- 60 y
5- Tx: resection, H-pylori eradication (PPI, 2 Ab) → chemotherapy\surgery
6- Dx: endoscopy, EVS → biopsy

GIST: gastrointestinal stromal tumors

- From intestinal cells of cajal (regulate the peristalsis)
- Larger tumor\greater mitotic activity → more likely malignant
- Stomach is M.C site for GIST
- Clinical: bleeding, (hematemesis, melena), mass
- Investigations: endoscopy, EVS\biopsy
- Tx: excision, no need for lymphadenectomy, chemo, Imitinib عليه دراسات

Colon cancer

Blood supply of colon:

1- superior mesenteric artery → supply the structures of midgut (from 2nd part of duodenum to proximal 2\3 of transverse colon)

- iliocecal → iliocecal region + appendix + cecum
- right colic → ascending + hepatic flexure
- muddle colic → transverse + splenic flexure

2- Inferior mesenteric artery → hindgut (distal 1\3 of transverse to dentate line "upper 2\3 of cecum")

- lift colic artery
- sigmoid artery
- superior rectal artery (Lt, Rt, upper 2\3)

-Fusion of the branches to form → marginal artery of Drummond

Venous drainage: to portal system

Nerve supply:

- **parasympathetic**: up to transverse by vagus, later pelvic splanchnic nerves"S2, 3, 4"
- **sympathetic**: general and lesser splanchnic nerve

Lymphatic: **epicolic** (wall of bowel) → **paracolic** (between wall & marginal artery) → **intermediate** (main vessels) → **principle nodes** (inferior, superior mesenteric vessels)

❖ **Rectum: anorectal** موجود بمحاضرة ال

Function of the colon:

1- **absorption** of water, salt and nutrients (glucose, FA, AA, vitamins)
2- **fermentation** of dietary fibers

After meal:	4 hrs	24 hrs	4 days
	cecum	Rectum	Stool

intestinal polyps:

1- inflammatory → UC (pseudopolyps)
2- metaplastic → hyper plastic, metaplastic
3- hamartomatous → Peutz Jegher's, juvenile
4- adenoma → tubular, tubulovillous, villous
- adenocarcinoma
- carcinoid

Polyps at risk of malignancy:

Adenoma:

1- size → > 5mm should be excised, >2 cm ↑ risk of malignancy
2- type: ↑ in villous
3- shape → ↑ in sessile

So →

1- Pedunculated → colonoscopic polypectomy
2- larger sessile → endoscopic mucosal resection
3- larger → trans-anal endoscopic

Colon cancer:

2nd most common cause of cancer death in Jordan with increased incidence

Risk factors:

- dietary: ↓ fiber diet\↑ fatty meals, alcohol\smoking, ↓folic acid
- ↑BMI - male > female - IBD - FHx - uretrosigmoidostomy
- personal Hx (colorectal, endometrial, breast,..) - cholecystectomy
- neoplastic polyps - adenoma - hereditary conditions (FAP, HNPCC)

Adenoma :

hyperplasia → (tumor suppressor gene APC loss\mutation) → early adenoma → (kras mutation "proto-oncogenic → oncogenic") → intermediate → (DDC loss) → late → (P53 loss) → cancer

familial adenomatous polyposis:

- AD, APC gene mutation
- 1% of colorectal cancers
- 100% risk
- rectosigmoid region (M.C in all)
- congenital hypertrophy of retinal pigment epithelium (for screening)
- associated with duodenal adenoma + mesodermal tumors like (osteomas, desmoids)
- we do colonoscopy from (10-20 yrs) annually مهم

hereditary non-polyposis colorectal cancer (lynch syndrome):

- AD, MLH1 + MSH2 mutations
- 10% colorectal cancer
- 80% risk
- Rt side
- Amsterdam II criteria:
  * 3 or more with HNPCC related cancers and one of them primary degree relative
  * 2 successive generations
  * one at least diagnosed before 50 yrs
  * FAP excluded
  * confirmed by pathological examination
- associated with ovarian, endometrial, breast, small intestine, stomach

Synchronized:
2 tumors at the same time

IBD:

Ulcerative colitis mainly:

- duration → 10 yrs → 1%, 20 yrs → 10%, 30 yrs → 20%
- early age < 15 yrs
- pan colitis
- we take multiple biopsies (rectum, sigmoid, transverse, cecum)

Clinical features:

1- 50 yrs to eight decade of life
2- Lt sided CA (rectosigmoid) → emergent intestinal obstruction \ change in bowel habit \ rectal bleeding \ rectal mass on Ex
3- Rt sided CA → abdominal ass \ iron deficiency anemia (pallor) \ constitutional symptoms
4- Mets → M.C to the liver → jaundice, nodular liver, ascites → then to the lung

Diagnosis:

- Hx, Ex
- CBC, LFT, KFT
- tumor markers (CEA for follow up)
- confirm the diagnosis (gold standard) by: colonoscopy + biopsy
- staging (CXR, CT with contrast* "pelvic & abdominal", MRI, colonoscopy,..
- any pt had distal tumor, we must do colonoscopy for proximal colon (5% → CA)

*: tumor has B.S so we can see it + obstruction

Spread:

1- direct 2- Hematogenous 3- lymphatic (staging) 4- transcoelomic (more in gastric CA)

Screening: at 50 yrs for male + female by colonoscopy

- other recommendations:

1- flexible sigmoidoscopy (FSIG) every 5 yrs (left lateral decubitus position)

2- colonoscopy every 10 yrs (gold standard, if –ve repeat after 10 yrs)

3- double contrast barium enema every 5 yrs

- CT colonography every 5 yrs in pts refuse colonoscopy and enema, if +ve → colonoscopy for biopsy

Staging: TNM

- Tx → can't be assisted
- T0 → no evidence of tumor
- Tis → intraepithelial or lamina propria
- T1 → submucosa
- T2 → muscularis propria
- T3 → submucosa
- T4 →

a: penetrate visceral peritoneum (serosa)

b: other organs

- N1 → 1-3 LN
- N2 → 4 or more LN

Treatment of colon cancer:

<u>surgery</u> (gold standard):

- curative
- palliative → to prevent IO
- Lt\Rt hemicolectomy (with 5 cm safe margin + LN)

<u>In FAP + IBD</u> →

1- total proctolectomy and ileal pouch anal anastomosis (IPAA)

2- colectomy + mucosectomy of rectum + IPAA (rectal)

Prognosis: stages and LN

<u>Chemo\radiotherapy:</u>

stage **I** → surgery **II, III** → surgery + chemo **IV** → palliative + chemo

<u>Adjuvant chemo</u> → control micro mets , ↑ survival

<u>adjuvant radio</u> → control local recurrence

<u>Neoadjuvant chemo</u> → stage, inoperable → operable

<u>Neoadjuvant radio</u> → prevent local invasion

Rectum:

symptoms:

1- bleeding 2- change in bowel habits \ mucus discharge 3- tenesmus 4- prolapse

<u>Rectal polyps:</u>

- adenoma - villous → ↑ risk of malignancy
- all polyps excised by endoscopic or major surgery
- all pts should undergo colonoscopy

Safe margin:

- upper rectum → 5 cm
- lower rectum and anal → 2 cm

Rectal CA Tx:

1- resection of tumor + LNs

2- Pt unfit for surgery → trans-anal excision, laser destruction, intestinal radiation

3- sphincter saving surgery (anterior resection) → 2 cm above anal tumors

- tumors of upper part of rectum → high anterior resection + colorectal anastomosis
- tumors of middle part of rectum → low anterior resection
- tumors of lower part of rectum (or the sphincter in the safe margin) → abdominoperineal resection
  * here we can't preserve the sphincter so we remove it + permanent colostomy

Investigations → for staging of tumors
- anoscope → 12 cm
- Endorectal US (14 cm)
  → for staging: we see layers of colonic wall
  → fistula
- pelvic MRI, CT
  PET scan → distant mets

Lloyd-Davies position → modified lithotomy (lower limb is low)

Anal condition

- 15cm in length (rectum).

Anatomy:

1- anorectal ring: between Rectum and anus made by puborectalis sling (part of levator ani)
(Acute angle)

2- internal sphincter – part of muscularis external / involuntary – autonomic

3- external sphincter – skeletal muscles / voluntary - peudendal nerve

- **Deep part of puborectalis sling.**
- **Superficial**
- **Subcutaneous part**

4- above levator ani → pelvirectal space
below levator ani → ischiorectal space
perianal space
Intersphincteric space - where the glands sets. (Between internal & external sphincter).

5-Mucosal lining:
Rectum / Dentate line (1-2 cm above the verge.) / ATz / Hilton's / anal verge
Columnar / Metaplasia / Stratified squamous

6 - Columns of morgagni :
- surrounded longitudinal mucosal folds in dentate line
- anal glands empty in.

7 - Internal hemorrhoid → and cushions at (3, 7, 11) or It Lateral, RT Ant, RT Post.
(Where venous plexus found)
External hemorrhoid → inferior hemorrhoid plexus

8 - Blood supply:

Vein		Artery
Inferior mesenteric " upper & middle rectum " → portal	Superior	Inferior mesenteric
Internal iliac " lower rectum & upper anal "	Middle " above dentate line "	
Peudendal " lower anal " → Internal iliac	Inferior	Peudendal

9 - lymph: - above dentate line → inferior mesenteric LN → para-aortic
- below dentate line → superficial inguinal LN

10- Nerve: - above dentate line → senseless
- below dentate line → painful

Control of Continence:

- Tonic Contraction by contraction of internal sphincter
- Voluntary contraction of external sphincter.
- Acute angle of puporectalis ring
- Anal cushions
- Levator ani stabilizes the rectum in position.

Hemorrhoid:

Internal	External
above dentate line	below dentate line
Covered by rectal mucosa	anoderm
Painless	painful
Anal cashion	inferior hemorrhoidal plexus
C.C : - bleeding (separate from stool) - incontinence of flatus and mucus - Itching	C.C : - pain - multiple figs like appearance
Ex : Lithotomy position by anoscope	inspection only

Etiology:

1 - increased intra-abdominal pressure: constipation / diarrhea, obesity, heavy weight lifting, pregnancy.

2 - Portal hypertension 3 - colon CA 4 - anal intercourse

Investigation:

1 - CBC for anemia 2 – Anoscope (Proctoscopy) 3 – Sigmoidoscopy (> 40 years → CA)

Management: - only when symptomatic

Grade I → - Local cream (steroid, local anesthesia / laxative in constipation / bulk laxative in diarrhea
- Barrone's Bander (hemorrhoidectomy) or sclerotherapy or photocoagulation

Grade III & IV:

- open hemorrhoidectomy→removedthe pile and skin or mucosa over it and leave the wound open
→secondary intention
- closed hemorrhoidectomy → All of the above + suture the wound

☒ **Complicated by anal stenosis**

Complication of hemorrhoid:

1 - Thrombosis of external hemorrhoids (Bleeding) → acute painful mass. (Edematous, congested)
→ excision immediately, If late (> 48 h) → non-surgical management

2 - Strangulated internal prolapsed one by the sphincter muscles. → Necrotic or ulcerated.

3 - Major hemorrhage

Anal fissure:

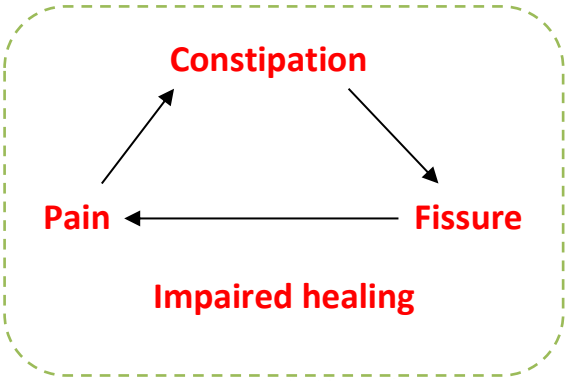
- M > F
- Acute → Sites: 90% posterior midline , 10% anterior midline (in women after child birth)
- Chronic → (> 6 weeks) , Other sites : think of Crohn's disease or immunodeficiency)

+ *chronic* fissures, Impaired healing : sentinel pile

Internal hypertrophied anal papilla

Pathophysiology:

Ischemia due to anal spasm due to increase intra-anal pressure



Clinical features:

- pain on defecation
- rectal bleeding (separated from stool)
- Constipation.

Management

- **Acute fissures: -** resolve spontaneously.
  - sitz paths (15g Na + water) → relaxation of internal sphincter
  - stool softeners
- **Chronic fissures:** - Stool softeners have no curative value.
  - sitz paths
  - medical sphencterotomy is the first-line treatment of choice, By :

    CCB , nitrates , botulinum toxin
  - Surgical sphencterotomy : controlled division of the lower half of the internal sphincter at the lateral position (Lateral sphencterotomy)

Anorectal abscess

1- Intersphincteric space:

- obstructeal and glands
- m>f
- acute anal pain and tenderness during RE + pea sized lumps. EVA
- DDx – fissure

2- Perineal: M.C

- dawn wards
- tender swelling of the anal verge may discharge spontaneously
- 2-3 days pain (throbbing)

- DDx:
1- folliculitis
2- pilonidal abscess
3- hidradenitis suppurativa (- simple: skin flap with removal of sweat glands by knife \ - supportive: removal of all area
(M.C in folds + axilla groin))
4- periprostatic or Bartholin gland abscess
5- perianal hemorrhage

3- ischio-rectal abscess:
- if Intersphincteric one tract from sphincter to reach this space
- wide space may lead to horseshoe abscess → toxic pyric patient.
- DM patient
- pain for several days+ difficulty to sitting, painful fluctuant brawny swelling.

4- high super levator (intermuscular, pelvirectal)
- may encircle the anus → major systemic upset

management: incision + drainage under GA or spinal (S2,3,4,5) → cruciate incision with division of septor with finger
- anal, rectal approach
- complicated by fistula
- sets paths after surgery within 24 hrs (3 D)
- adequate analgesia (pethedine, "morphine → urine retention)

fistula in ano:
communication between 2 epithelial lining. (Perianal skin + anal canal)

causes:
1- after chronic inflammatory process
2- 50% of cases develop after anorectal abscess
3- Crohn's disease, syphilis, lymphogranuloma venereum, actinomycosis, rectal CA, TB (multiple fistulas), malignancy, foreign body

clinical: itching, irritation, discharge, (pain relieved by discharge)
- if the discharge was feaces + flatus → suggests rectal opening

Classification: high, low (according to anorectal ring)

Tracts of fistula: by probing & methylene blue
- anterior → radial tract
- posterior (3, 9 o'clock) → circumferential tract

Investigations:
- examination under anesthesia
- MRI, andoanal ultrasound
- follow through + colonoscopy (if suspected IBD)

High fistula surgeries:
1- Seton:
- threading
- cutting (staged fistulotomy \ fistulectomy)
2- Glue (closing the fistula by special glue)
3- Endorectal advancement flap
4- Ligation of duct near the rectum

Tx:
- low: heal spontaneously, anal fistulotomy
- high: risk of incontinence
*per seton → gradual removing

Thyroid gland

Anatomy:

- 2 lobes + isthmus
- Lies 2, 3 tracheal rings
- Covered by pre-tracheal fascia + (sternohyoid, sternohyoid)

Blood supply:

- Superficial → external carotid, inferior → thyrocervical trunk → subclavian artery
- Venous: superior, middle → internal jugular, inferior + innominate → brachiocephalic trunk

Innervation:

Motor:

- recurrent (all the intrinsic)
- cricothyroid → external branch of superior laryngeal nerve

Sensory:

- recurrent (below vocal cords)
- internal branch of superior laryngeal nerve (above the vocals)

*recurrent laryngeal nerve may lie (between\inferior\posterior) to the branches of inferior thyroid artery

Histology:

- **follicles** (24-40 → lobule) lined by thyrocytes (cuboid epithelium) secretes T3, T4
- **parafollicular C cells** (secrete calcitonin that decrease Ca in blood)

approach:

history:

1- swelling (when, size, skin over)
2- pressure symptoms: dysphagia, dyspnea, hoarseness of voice, engorged neck vein, ear pain
3- hyper: heat intolerance, wt loss, ↑appetite, sweating, tremor, palpitation, diarrhea, amenorrhea, irritability → hyper-reflexia, tachycardia, eyes symptoms, tremors, hot moist palms
- hypo: cold intolerance, wt gain, ↓appetite, myxedema, sluggishness, constipation, menorrhagia,depression → dry skin
4- FHx
5- DHx
6- radiation

Examination:

1- <u>General examination:</u>
- eye → lid lag, lid retraction, exophthalmos “swelling of extraocular muscles.
- hands
- reflexes
- lower limb skin

2- Neck examination:

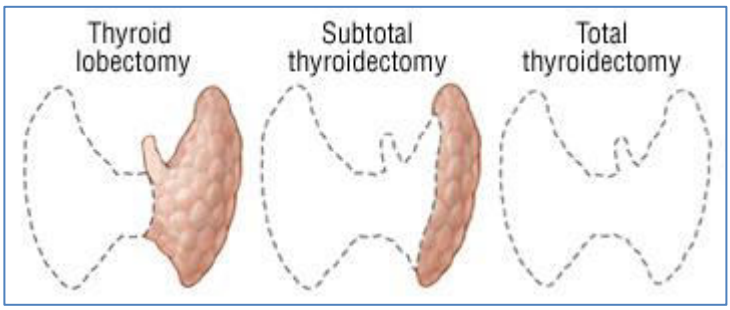
- inspection: swelling, tongue protrusion
- palpation: - Front: tenderness, temperature, retrosternal percussion (for extension)
  - back: swelling (edges, size, consistency, skin, mobility "if fixed could be Reidel's, anaplastic CA, infection, scar, radiotherapy"
  - LN
- auscultation: carotid artery bruit and upper border of thyroid

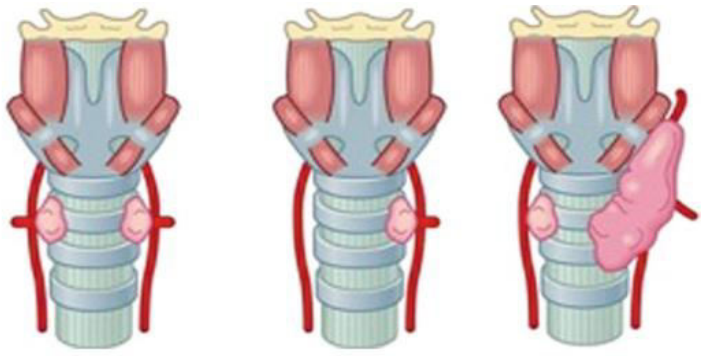
Investigations:

- TFT → TSH, T3, T4
  - in pregnancy become ↑ TBG, we need to use free\bound hormone ratio
- Calcitonin level – medullary Ca
- Antibodies:
  - thyroid stimulating immunoglobulin → graves
  - thyroid peroxidase antibody → hashimoto
- US: lesion (cystic, solid)
- Radioisotope scan → Tc ^{99}: hot, worm (normal), cold
- CT: retrosternal masses, asses malignancy
- MRI: vascular invasion
- PET: mets
- FNAC: not differentiate between adenoma & CA

Types of thyroidectomy:

- **Hemi thyroidectomy** (unilateral lobectomy) - entire isthmus is removed along with 1 lobe- benign diseases of only 1 lobe.
- **Subtotal thyroidectomy** - MNG
- **Near total thyroidectomy** - both lobes are removed except for a small amount of thyroid tissue in the vicinity of the recurrent laryngeal nerve entry point and the superior parathyroid gland.
- **Total thyroidectomy**- entire gland is removed – thyroid carcinoma.
  - collar incision
  - any papillary → must be TOTAL





Near total thyroidectomy

Complications of surgery:

1- Hemorrhage →edema of vocal cords → tracheostomy
2- Damage to the nerves → superficial , recurrent laryngeal (uni: hoarseness of voice "cadaveric position cords" \ bi: aphonia + SOB on exertion)
3- Hypothyroidism (late) after 1 week
4- Hypoparathyoridism (Paresthesia around the mouth)
5- Scar complications (hypertrophic, keloid)
6- Post op pyrexia: early → hematoma, late → hypocalcaemia

In goiter:
- F > M: estrogen receptor on thyroid
- usually euthyroid

☒ Simple goiter:

1. Multinodular:

(diffuse hyperplastic goiter → hemorrhage → necrosis → re-activation → nodular forms)

- **endemic** due to iodine deficiency (.1 - .15 mg daily)
- **sporadic** → enzymes in thyroid synthesis, drugs, food (cabbage)
- **Hx** → diffuse goiter, nodular later on, smooth firm, pressure symptoms, painful if hemorrhage occurs, childhood
- **investigation** → TFT, US
- **Tx** → thyroxin (.15-2 mg daily) for low M.

if it's multinodular → irreversible

- **indications for surgery**: cosmetic, local pressure symptoms, patient anxiety due to thyroxin

-total, subtotal, lobectomy, may be complicated by hypothyroidism after 1 week, 1\2 thyroxin = 7 days

2. Physiological diffuse goiter: in puberty and pregnancy (↑ demand)

3. Solitary

4. Thyroiditis:

1- autoimmune thyroiditis: Hashimoto's

- anti TPO - anti microsomal - anti thyroglobulin

2- sub acute thyroiditis: De Quervian's

- associated with influenza - painful\diffuse goiter
- Tx conservative, surgery in recurrent thyroiditis episodes

3- Riedel's thyroiditis:

- replaced by fibrous tissue - firm painless swelling → tracheal compression (surgery)

☒ Toxic goiter:

1. Gravis disease:

- primary thyrotoxicosis, young age
- thyroid stimulating immunoglobulin : ↑ T3, T4
- hyperthyroid symptoms and signs → opthalmopathy (may lead to opthalmoplagia and chemosis), graves dermopathy (pretibial myxedema "hyaluronic acid")

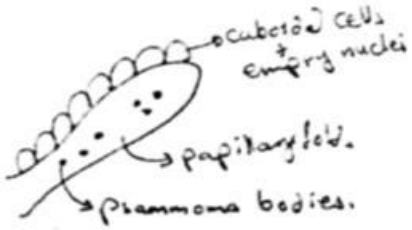
- **Investigations**: TFT, US, radioisotope: diffuse uptake
- **Tx**:
  1. antithyroid drugs:
     * carbimazole → rash + agranulocytosis (serial CBC)
     * propylthiouracil
  2. Radioactive iodine abrasion
  3. Thyroidectomy

2. Toxic multinodular goiter: older patients
- inactive → active
- TFT : ↑T3, T4, ↓TSH
- **Tx**: medical, subtotal thyroidectomy

3. Toxic adenoma = Plummer's disease:
- one toxic nodule → TFT , solitary (hot nodule) with suppression of residual gland
- > 3 cm → hyperthyroidism
- Tx: RAI ablation, surgery (lobectomy + isthmusectomy.

☒ **Malignant goiter:**

1. Papillary: Most common (40 yrs)



- radiation R.F, good prognosis, Lymphatic spread, Psammoma bodies
- Multifocal, multi-centric
- **Clinical** → slow growing swelling, lymphadenopathy (early) ممكن قبل الغدة
- **Investigation**: FNA
- **Tx**: total thyroidectomy + LN + hormone replacement

2. Follicular: 2nd most common (30-50 yrs)

- Vascular + capsular invasion (distinguished from adenoma), FNA **X**
- Hematogenous to lungs, bones, liver
- **Tx**: microinvasion of capsule → lobectomy, gross invasion (mets) → total thyroidectomy + RAI ablation of mets
- **Prognostic Fx**: age, extrathyroid invasion, mets, histology \ grade, size of original lesion

3. Aplastic:

- Highly malignant, rapidly growing
- old age
- Invasion to : recurrent laryngeal, esophagus, trachea, cervical sympathetic ganglion (Horner's), pulmonary mets.
- Death within 6 months

4. Medullary:

- Hard enlargement + LN
- Parafollicular cells → calcitonin for follow up after surgery
- Sporadic 70%, familial with MEN-B2 (Rat oncogene - dominant), if present we must do elective thyroidectomy for all relatives until the 3rd degree.
- Tx: total thyroidectomy + LN dissection

5. Lymphoma: old age

- Hashimoto or normal thyroid
- **Dx**: FNA or true cut biopsy
  staging by CT, bone marrow aspirate
  - thyroid alone → thyroidectomy + chemo\radio therapy
  - lymphoma → chemo alone

Post thyroidectomy complications:

1- reactionary bleeding (at the day of surgery)
   - R.F: ↑blood pressure due to pain, agitation, hypervolemia

2- Respiratory distress, due to:
   - hematoma → evacuation
   - bilateral recurrent laryngeal nerve injury tracheostomy
   - trauma to the larynx (vocal cords injury) in difficult intubation if severe; re-intubate the patient

3- Thyroid crises:
   - pre-op: due to high manipulation in thyrotoxicosis patient most sensitive indicator is sleeping pulse
   - intra-op: in completely controlled thyrotoxicosis
   - post op

Tx: Propranolol, fluids (due to hyperpyrexia + sweating) + glucose

Gallbladder and biliary tract

Anatomy:

- Pear shaped (7.5 – 12 cm long)
- 2 - 30 ml in capacity that increases in fasting for long tomes
- Fundus, body, neck, Hartman's pouch

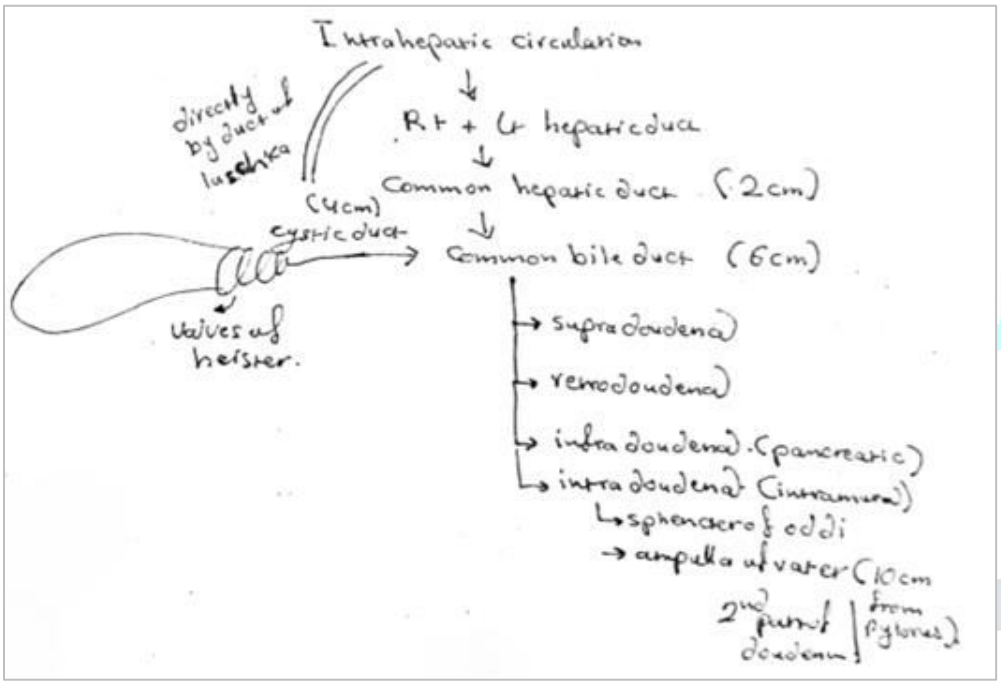
Blood supply:

- Cystic artery → R hepatic artery or occasionally Lt Hepatic, right gastric, superior mesenteric artery.
- veins to portal vein
- Lymphatic: cystic LN → celiac → porta hepatis

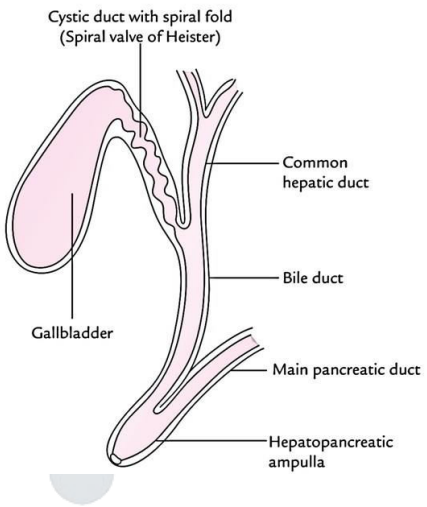
Nerve: celiac plexus (sympathetic), vagus (parasympathetic)

The pattern of blood supply of CBD at 3, 9 o'clock so it has high risk of ischemia in any manipulation

Biliary tree:



- ☒ Bile:
- Cholesterol
- Bilirubin
- Bile salt
- Phospholipid (lecithin)



Histology: no muscularis mucosa or submucosa

Physiology:

Sphincter of oddi:

- phasic contraction: 13 mmHg to 130 mmHg → prevents bile drainage
- ↓contraction → ↓pressure → drainage

1- CCK (cholecystokinin)

2- vagus: contraction of gallbladder + relaxation of sphincter

3- sympathetic →α_1 : relaxation of gallbladder, β→ contraction of gallbladder

-ve: ↓contraction: VAP, Somatostatin, splanchnic sympathetic

Types of gallstones:

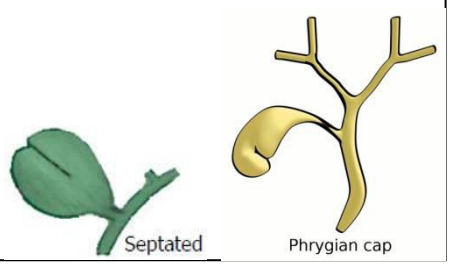
*Unconjugated bilirubin + Ca phosphate + Ca(HCO3)

1. Cholesterol 10 %
2. Pigment stone (bilirubin*) 15% β black (hemolytic "as spherocytosis" + cirrhosis), brown (infection)
3. Mixed 75%

Types of biliary stones:

1. Primary (black, brown)
2. Secondary (from gallbladder)

Congenital anomalies:
- cystic duct: long → confused with CBD
  short→ stenosis of CBD after surgery



Risk factors:

1. Forty, fatty, female, fertile
2. DM → dyskinesia
3. Liver cirrhosis, hemolytic
4. Vagotomy
5. TPN → no CCK
6. Short bowel syndrome, IBD, ileum disorder (↓ absorption)
7. Congenital anomalies (stasis) + hereditary \ ethnic
8. OCP
9. Somatostatin therapy
10. Hyperlipidemia not hyper-cholesterolemia

Clinical picture:

1- Most are asymptomatic (80%)
2- Biliary colic:
   - RUQ or Epigastric pain lasts for hrs, radiates to the back
   - rapid increase in intensity then resolve
   - increase fat content food
   - associated with dyspepsia, flatulence
3- Acute cholecystitis:
   - long standing obstruction
   - begin as chemical reaction (,.C) without bacteria then to bacterial infection (E-coli M.C)
   - as biliary colic but the pain not subside (several days) with radiation to subscapular area (diaphragmatic irritation) → [Boas sign]
   - associated with pyrexia, jaundice, anorexia, N & V
   - murphy's sign (9th subcostal area) → respiratory arrest with deep palpation
4- Complicated by:
   - gangrene\necrosis → perforation
   - fistula
   - empyema & mucocele (long Hx for RUQ pin > 2 w)
   - emphysematous cholecystitis (gas forming bacteria)
   - cholangitis
   - Mirizi stone in infundibulum cause compression to CBD.

Murphy's sign:
- cholangistitis
- hydatid cyst
- liver abscess
- cholangitis

5- Choledocholithiasis:
- primary →infection, stasis due to tumor, striction \ secondary → migration
- clinical: pain, transient jaundice "if moved to duodenum", may be associated with cholangitis or pancreatitis (obstruction of sphincter of oddi → ↑ pressure of biliary tree → bile to pancreas → activation of pro-enzymes)
- investigations: US : dilated biliary tree (if CBD > 8mm) + gallbladder stone, MRCP, ERCP → Dx & Tx by removing the stone by dromia basket or fogarty balloon cath.
- may insert t-tube

Investigation:

- CBC → leukocytosis
- Bilirubin level → mild or marked elevation
- US → gallstones + ↑ size, thickened wall, pericholecystic fluid (halo sign), ↑ caliber of CBD or not, fibrosis
- HIDA scan

Management:

1- IV fluid + antibiotic + analgesia
2- Cholecystectomy → early (3-5 days), elective (4-6 w)
laparoscopy, laparotomy (Kocher incision)
* -ve: colon CA , PU → ↓ bile
3- Lithotripsy
4- Cholecystectomy (anesthetic C.I) or percutaneous aspiration
5- Medical: chenodeoxycholic acid, ursodeoxycholic acid, ↑ risk of recurrence after stopping

How to differentiate between GBS and calcified polyps on US?
- GBS → mobile
- polyps → fixed

☒ **Main cause of pneumobilia nowadays**: ERCP then cholecystoenteric fistula.

☒ **When to remove asymptomatic stone:**
1- > 2 cm 2- Porcelain gallbladder 3- Typhoid carrier 4- Polyp 5- Sickle cell disease 6- child

Complications of cholecystectomy (lap):
1- injury to CBD, hepatic artery
2- cystic duct leak → biloma

DDx of post cholecystectomy jaundice:
1- M.C is slipped GBS
2- iatrogenic stricture

Gallbladder cancers:

Epidemiology: female, old (60-7-(, adenocarcinoma (90%)

Cause:
1- gallstones causes metaplasia → squamous cell carcinoma
2- typhoid carriers
3- porcelian gallbladder

Clinical: pain, jaundice, n & v, wt loss, ascites, anorexia

Investigations: US, CT, laparoscopy for staging, MRI

Spread → direct extension to liver + CBD, Hematogenous, or lymphatic

Staging: we use endoscopy US to stage all GI tumors
I → mucosa, submucosa
II → muscle layer
III → serosa
IV → cystic LN
V → liver + others

I, II, III → cholecystectomy then frozen section, if +ve : 3 cm resection of hepatic parenchyma + LN clearance

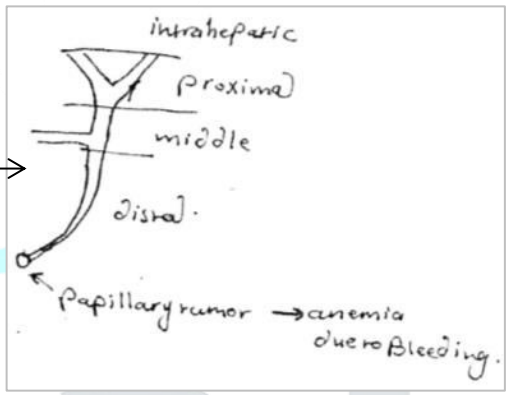
IV, V → inoperable, poor prognosis ☹

Carcinoma of bile duct:

Epidemiology: male, sixty

Cause:
1- parasitic infection → clonorchis sinensis
2- typhoid carriers
3- gallstones ↓

Classification →



Clinical: obstruction jaundice + itching, anorexia + wt loss, anemia, silver stool (steatorrhea + blood), palpable gallbladder

Investigation: MRCP, ERCP

Management: resection, chemo, radio, iridium 192 → brachytherapy \ local irradiation

periambullary tumors:
1- cholengiocarcinoma
2- CA of head of pancreas
3- ampulla of vatoer (transitional jaundice due to edema & necrosis)

- early onset of DM → suspicion of PCA
- **what to do**:
  1- US 2- MRCP ,if filling defect → ERCP 3- CT (pelvic, chest, abdomen) for staging
  4- tumor markers (CA19-9 for follow up)

Cholangitis:

causes:
- M.C is choledocholithiasis
- neoplasms
- ERCP

Clinical:
- Charcot triad → (fever\chills + RUQ pain + jaundice)
- Reynolds's triad → Charcot + altered mental status + shock

Tx:
1- IV antibiotic 2- IV fluid (NPO مهم) 3- give prophylaxis vit K → even if PT\PTT normal
4- analgesia cover
5- go for ERCP (نفس التحضيرات تاعتها)

Enterocutaneous fistula

Definition:

Duodenum, jejunum, ileum (M.C), colon, rectum ↔ communicate with skin

Classification:

Anatomic:

- site of fistula origin
- drainage point
- external \ internal

Physiological: fistula output in 24 hrs

- low output (<200 ml\day)
- moderate output (2000-500 ml\day)
- high output (>500 mg\day)

Etiology:

- **Post-operative (75-90%)**
  - disruption of anastomosis:
    - improper anastomosis with leak → abscess → disruption
    - improper vascular supply
    - under tension
  - Inadvertent enterotomy
  - Inadvertent small bowel injury

☒ **Ex 1:** Gastrodoudenal fistula: DU perforation:
- large\extensive contamination
- late intervention after perforation → lateral duodenal fistula

☒ **Ex 2:** surgery for appendicitis, perforated appendix, after appendicular abscess drainage → colocutaneous fistula

- **Traumatic:**
  - iatrogenic
  - after RTA

- **Spontaneous:**
  - Malignancy
  - Radiation enteritis + perforation → colonic fistula
  - Intra-abdominal sepsis
  - IBD (Crohn's disease)
  - Diverticulitis → colonic fistula (M.C)

History \ PEx:

- Post-operative pain\tenderness
- Abdominal distention
- Enteric content from a drain site
- Generalized\localized peritonitis → tachycardia + pyrexia → toxic, guarding, rigidity, rebound tenderness

Complications:

- **Sepsis**:
  - direct tract: bowel content drain directly to skin (minimal sepsis)
  - indirect tract: bowel content drain to an abscess then into skin (severe sepsis)
- **Dehydration \ electrolyte disturbance** \ malnutrition: due to leakage of protein rich enteric content, sepsis, paralytic ileus → hypokalemic hypochloremic metabolic alkalosis
- **Skin excoriation**: in fluid content that makes it difficult to put collecting bag → more in enteroatmospheric fistula

LAB: CBC → leukocytosis, electrolyte, albumin ↓→ malnutrition, CRP ↑, serum transfusion <200 mg\Dl → indicates poor healing

Favorable factors for spontaneous closure:

- End fistula
- Jejunal fistula
- Colonic fistula
- Continuity maintained fistula
- Small defect fistula
- Long tract fistula (↑ resistance + ↓rate of epithelization "this ↑in short fistula")
- Bowel wall disruption is partial

Unfavorable factors: ***HIS FRIEND***

- **H**igh output
- **I**ntestinal destruction >50% of circumference
- **S**hort segment fistula
- **F**oreign body (drain, ..)
- **R**adiation
- **I**BD\infection
- **E**pithelization of tract
- **N**eoplasm
- **D**istal obstruction
- Lateral duodenal fistula

Treatment: SSNAP

stabilization, **s**epsis**s**kin care, **n**utrition, define underlying **a**natomy (imaging), **p**lan

Stabilization:

1- RL (for acidosis)\NS administration

2- albumin administration

3- UO monitoring

Sepsis: antibiotic cover, abscess drainage

Skin care: containing of effluent by:

A:

1- solid wafers (pectin based "wet, weepy") → good barrier before ulceration

2. Powder → severe skin maceration paste افضل منه

3. Paste \ spray \ ointment and creams → zinc oxide

Laparotomy:

1- extensive cellulitis + necrotizing fasciitis

2- incomplete drainage and collection

3- disruption of anastomosis

B: pharmacological:

- Somatostatin analogue → ↓fistula output
  + TPN (more effective)
- PPI, H2 blocker in proximal fistula (↓fistula output)
- cyclosporine → refractory fistula in Crohn's disease
  infliximab → multiple lesion → closure in 50%
- excessive fistula output → TPN, NG tube

C: vacuum assisted closure:

- -ve pressure application
- help in drainage
- size of wound
- frequency of dressing and protect the skin → healing
- chronic edema → improve blood flow → granulation tissue

Nutritional

A: enteric: at least 20% of whole nutrition to:

- protect and maintain the intestinal mucosal barrier
- stimulating of hepatic protein synthesis
  by gastrostomy \ NG tube, fistulodyalisis beyond the fistula
- at least 1.2 – 1.5 m of functional bowel should be present

B: TPN : BW loss > 20%, gradually initiated to prevent refeeding syndrome

Indications of TPN:

1- gastric, duodenal, small bowel fistula

2- high output fistula

3- ileus, obstructed distal end

4- inability to obtain internal access \ GI intolerance with it

complications of TPN:

1- catheter tip malposition
2- arterial laceration
3- SVC \ subclavian vein thrombus
4- thrombophlebitis
5- catheter embolism
6- hydro, pneumo, hemothorax due to central line.
7- sepsis \ fluid overload

normal requirement:

- Na\K = 80-100 mEq\day
- Ca\Mg = 15-20 Meq\day
- water= 30ml\kg\day → 2.5 L

*- location of fistula and its tract
- bowel continuity or disrupted
- distal obstruction
- abscess

Imaging: (anatomy of fistula*) after 7-10 days

1- fistulography (water-soluble contrast gasteografin) → injected into the fistula
2- CT scan: above + intra-abdominal abscess, foreign body → aspiration under CT guidance
3- endoscopy → delayed till acute inflammation get reduced
4- water soluble contrast enema → to detect different types of fistula tracts
- simple, short, blind ending, <2 cm
- continuous, long, linear single, > 2cm
- continuous, complex, multiple linear

The definite treatment:

- spontaneous closure usually at first month up to 2 months
- After 2 months → no spontaneous closure
- time for surgery (2-5 m later) → at least 6 weeks

remove the fistula and tract + small bowel segment (to reduce rate of recurrence) + re-anastomosis

Indications of surgery:

1- high output
2- lateral duodenal or ligament of treitz fistula
3- ileal fistula
4- ECF + adverse factors
5- disease of bowel, distal obstruction
6- enteroatmospheric fistula

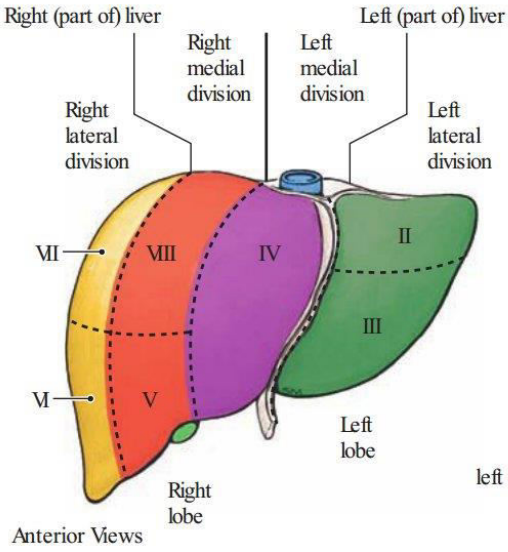
Enteroatmospheric:
- floating stoma
- bowels open to skin directly
- use fibrin glue and plugs

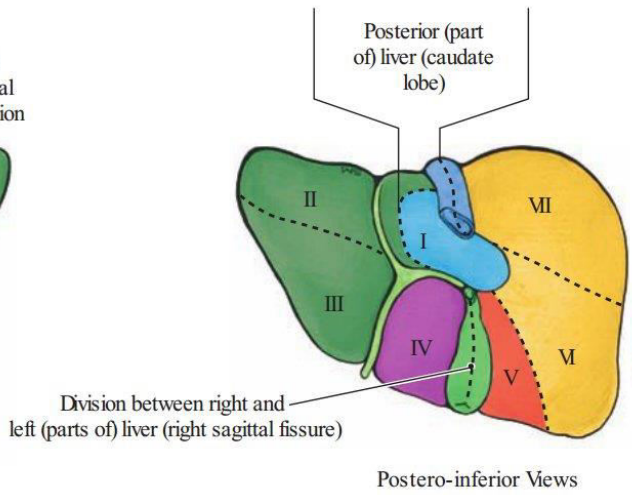
endoclips → acute fistula

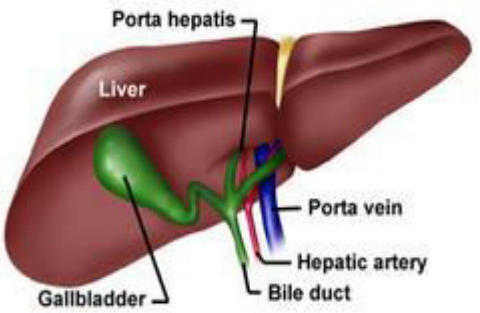
The liver

Anatomy:

1- Bare area (no peritoneum) attached to diaphragm by (suspensory ligaments: triangular + coronary)
2- Falciform ligament, divides the liver into Rt ad Lt lobes
3- IVC impression + gallbladder + porra hepatis → caudate lobe (superior), quadrate lobe (inferior)
4- Segmental anatomy → helpful to surgeon to define the disruption of blood supply → resection







Blood supply: 100 ml\Kg\minute

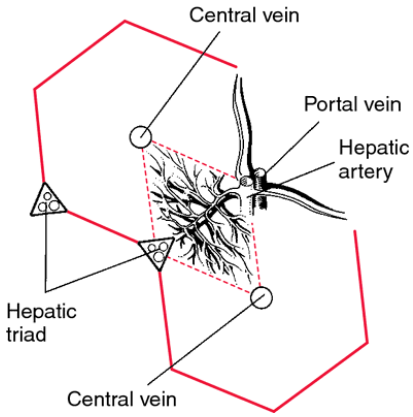
	Hepatic artery	Portal vein
How much	25%	75% ***
O_2	50%	50%
nutrient	75%	25%
Dual blood supply		

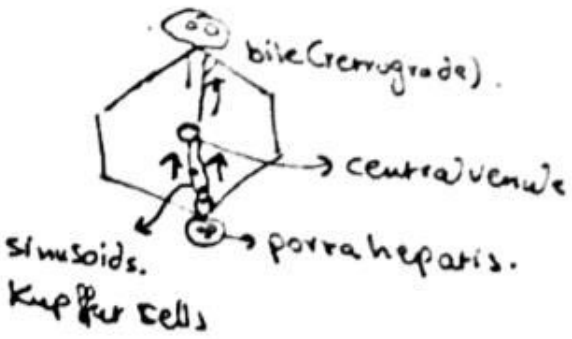
Venous: 3: Rt, Lt, middle hepatic veins

LN: 1- posterior mediastinal 2- hepatic, celiac LN

Nerve: vagus, celiac plexus

Histology: hepatic acinus (functional unit)





Function: 1972 clotting but not factor 8 (anti-hemophilic factor) → endothelial cells

Liver abscess:

bacterial (pyogenic), amebic, parasitic, fungal

► **pyogenic:**

. **Route of infection:**

1- ascending infection (biliary system) → M.C due to radiologic endoscopy
2- portal vein (appendicitis, diverticulitis)
3- hepatic artery (anywhere)
4- adjacent organ (gallbladder)
5- 1\3 → cryptogenic (unknown)
6- lymphatic
7- liver trauma (gunshot wound)

. **M.C bacteria**: E-coli, staph. aureus, anaerobes, Klebsiella, Proteus

. **Clinical feature:** RUQ pain + tenderness, n & v, fever, jaundice (pressure), enlarged tender liver, pleural effusion, atelectasis

. **Investigations:**

- CBC (leukocytosis, anemia) - ↑ LFT - blood culture - ERCP (in biliary obstruction)
- CXR (elevated hemi-diaphragm, pleural effusion, atelectasis) - US (irregular thick-walled mass)

. **Tx:**

- percutaneous aspiration by needle or catheter
- surgery for complex\multiple abscesses \ not respond to percutaneous drainage for 7 days \ viscous content
  associated intra-abdominal disease
- IV antibiotic (2 w IV, 4 w oral)
- antibiotic alone (multiple small)

► **Amebic:** *Entameba Histolytica*

. Started as amebic colitis → trophozoits penetrate the mucosa to portal vein → go to liver → abscess (thin walled, solitary, Rt lobe, large, contains brown sterile pus "anchovy\chocolate sauce)

. **Clinical**: as pyogenic + chronic > 2 w

. **Investigations**: same as pyogenic + stool examination for ameba trophozoits + serology ELIA for amebic protein

. **Tx**:

- metronidazole + chloroquine phosphate → 500 – 700 mg, oral for 7 days
- aspiration if :

1- large one 2- super infection 3- not respond up to 72 hrs

Cavernous hemangioma

- M.C solid benign mass
- Consists of endothelial lined vascular spaces → blood supply from hepatic artery
- ↑ Growth with estrogen (puberty, pregnancy, OCP) and androgens
- Small < 10 cm → asymptomatic \ incidental finding
  large > 10-25 cm → non-specific abdominal symptoms
  both +\- necrosis, thrombosis, infarction, hemorrhage "rare"
- Grossly → flat, red-blue, well defined, soft, easily compressible mass
- **NO** biopsy → life threatening hemorrhage

Kasabach-Merritt syndrome (hemangioma + thrombocytopenia + fibrogenopania)
- consumptive coagulopathy in giant hematoma

Dx:
- US → well demarcated homogenous, hyperechoic masses with hypoechoic lesions (hemorrhage, fibrosis, calcification)
- contrast + CT → centripetal enhancement (gradual enhancement of lesion from periphery to the central)
  → T2 view → hyperintense
- MRI

Tx: mostly observation
if symptomatic, complicated, can't exclude malignancy:
1- enucleation under vascular control (continuous hepatic artery proper occlusion, intermittent inflow occlusion of portal triad) with intermittent Pringle maneuver
2- formal anatomic resection
3- low dose radiation or embolization, in large, unresectable one, hemorrhagic one.

Hepatic adenoma:
- M,C in pre-menopausal women (30 yes), solitary mainly

R.f:
1- current use of estrogen (OCP) الأهم
2- glycogen storage diseases

grossly: well circumscribed (unencapsulated, pseudocapsule), round

clinical: abdominal pain, intraperitoneal hemorrhage (10-25%): >5 cm, pregnancy, men in steroid users

malignant risk: 10% → hepatocellular carcinoma (in large\multiple \ in men)

imaging: Histology
- US → can't be differentiated from adenoma + FNH or malignant
- CT → heterogeneous (fat, necrosis, hemorrhage)
- MRI → the best

Tx: small : stop the OCP → regress
large >5 cm \ bleed \ painful \ rupture → surgical resection without wide margin

Follicular nodular hyperplasia

- 2nd M.C
- neoplastic hyperplasia in response to hyperperfusion from congenital arterial malformation
- in women, childbearing age +\- OCP
- don't have malignant potential

Grossly: well circumscribed unencapsulated, solitary

Clinical: mainly asymptomatic, rarely: pain\mass, hemorrhage

Histo: contain hepatocytes, kupffer cells, bile duct

Imaging: CT, MRI → central scarring and hypervascular lesion

FNH α HCC : large, eccentric central scar, with fibrous bands and calcification

FNH α adenoma: sulfur colloid scan, biopsy

- FNH +ve kupffer cells

Tx: observation

→malignant \ adenoma, large, complicated → surgery

- stop the OCP

Surgical site infection

Definition: infection related to operative procedure occurs within 30 days or 1 year in implants.

- Nosocomial infection
- Surgical ward infection
- Surgical site infection

Classification:

Complications:
1- **wound dehiscence**→ hernia, fistula, sinus
2- **poor healing** → abnormal scar (hypertrophic)
3- **sepsis**

Superficial incisional SSI:
- invade the skin + SC tissue
- ate least one of the following:
1-Purulent drainage (no need for culture)
2- organism isolated from fluid \ tissue
3- signs of inflammation (pain, swelling, erythema, heat)
4- the wound is deliberately opened by surgeon (no dehiscence)

NOT: - abscess formation - epistomy, circumcision burn - extend to muscles \ fascia

Deep incisional SSI:
- involve muscles \ fascia
- at least one of the following:
1- purulent drainage
2- fascial dehiscence or deliberately by surgeon
3- deep abscess, by (Ex, histopathology, radio
4- fever > 38 c, localized pain, tenderness

Organ\space SSI:
- deep to any space involved in the surgery
- at least one of the following:
1- purulent drainage by drain or by stab wound
2- organism is isolated
3- abscess, by Ex, histo, radio, reoperation

Clean:
1- no inflammation
2- not in respiratory, GI, genitourinary system
ex: breast, thyroid
infection rate: 1-2% → prophylactic Ab if it with prosthetics

Clean contaminated:
1- respiratory, ..
2- Without significant spillage
< 3% prophylactic Ab

Contaminated 5-10%:

1- acute inflammation (without pus)
2- visible contamination of the wound (gross spillage)
3- compound\open injuries operated within 4 hrs
ex: appendectomy
- prophylactic Ab

Dirty 30-40%:

1- presence of pus
2- perforated viscous
3- compound\open injuries more than 4 hrs old
- therapeutic Ab

Timing:

- early: within 30 days - intermediate: 1m-3m - late: > 3m

Severity:

- minor: discharge without: cellulitis, deep tissue destruction, systemically ill
- major: pus discharge, need drainage, tissue breakdown (dehiscence), systemic symptoms

Source of infection:

- endogenous (M.C): staphylococcus aureus (G +ve), perforated PU\bowel, mucous membrane
- exogenous: surgical instrument, team, air, ..

- Enteric gram –ve more in GI surgeries. → pre op antibiotic if needed
- Vascular & orthopedic → staph. Epidermidis, staph. Aureus → Flucloxcillin +\- gentamycin, vancomycin or rifampicin \ broad spectrum cephalosporin
- GI → enterobacteriacea, enterococci, anaerobes (bacteroids) → 2nd generation Cephalosporin

Risk factors:

Systemic:

1- age 2- smoking 3- iatrogenic: radio\chemo\steroids
4- disseminated disease (cancer, autoimmune)
5- metabolic (malnutrition, diabetes, uremia, jaundice)
6- hypovolemia \ hypothermia \ hypo-perfusion

Local:

1- classification 3- non-viable tissue\hematoma 3- foreign material (suture, drains)
4- poor skin preparation (local infection, shaving)

Operative:

1- emergency 2- blood transfusion 3- long duration >2hrs
4- intraoperative contamination 5- site of operation
6- poor technique 7- prolonged hospital stay

Prevention:

Why?

- increase mortality twice more \ ICU stay
- increase the length of stay (5-7 days)
- cost effective

pre-operative:

1- short pre op stay
2- identify \ treat all remote infections
3- patient advised to take shower \ dress with the theater wear
4- hair removal: not be removed \ removed only by clipper, why ? :
   - give adequate exposure \ skin markings
   - suturing - good wound dressing

5- prophylactic antibiotics:

-Clean + prosthesis
-clean contaminated
-contaminated

- IV → at introduction & anesthesia
- repeated: long operation, excessive blood loss
- continue: unexpected contamination, prosthesis is implanted in patient with septic source
- prosthesis: give prophylactic Ab before: 1- dental working 2- urethral instrumentation 3- visceral surgery
- not continued > 48 hrs:
  1- masks the symptoms of infection 2- increase resistance 3- serious hypersensitivity
- in case of lower limb amputation give benzyl penicillin to cover C.perfringes (gas-forming bacteria)

6- mechanical bowel preparation:
- reduce the risk in elective colorectal surgery
- we use cathartics: 1- poly ethylene glycol 20 sodium phosphate

7- enhanced nutritional support in malnourished patients:
- combination of arginine \ glutamine \ omega 3 \ nucleotides \ micronutrients

8- IV fluids: improve tissue perfusion & arterial oxygenation → good wound healing
9- perioperative blood glucose control: stress of surgery
10- maintaining normal body temperature.

Intraoperative:

- staff hygiene (hand washing to elbow \ scrubbing, ..)
- application of alcoholic antiseptic to skin
- avoid dead spaces \ hematomas
- abscess → keep open
- oxygenation: 100% for 30s -2 min → before intubation, 80% hypo-pyrexia, 30-35% normoxia
- use close suction → through separate incision
- wound irrigation → hydration \ remove debris, …

Post op:

1- dressing for 24-48 hrs

2- advanced dressing: physical barrier, absorb exudate, keep wound dry.

Management of SSI:

4 lines:

1- empirical antibiotic → switch to specific one according to culture.

- According to what?

1- Gram stains 2- organism most often cultured from similar infections in previous patients.

Examples:

- clean contaminated surgery → metronidazole, co-amoxiclav
- increase risk for candida infection (DM, immunocompromised) → antifungal → fluconazole, amphotericin
- immunity acquired infections → cephalosporin (intra-abdominal \ soft-tissue infections), ampicillin
- appendectomy and it's complications → ciprofloxacin + metronidazole (anaerobes, aerobes)
- cephalosporin + aminoglycoside to cover anaerobes

Specific antibiotics:

- E-coli: penicillin, cephalosporins (all generations), aminoglycoside, ciprofloxacin
- MRSA (methicillin resistant staph. Aureus) → vancomycin, daptomycin, clindamycin
- MSSA (sensitive) → penicillin + B-lactamate inhibitor combination → ampicillin-sulbactam, cephalosporin, ciprofloxacin
- strep. Pyogenes → penicillin, cephalosporin, tetracycline
- staph. Epidermidis → vancomycin, ceftaroline, ciprofloxacin, piperacillin-teizobactam
- enterococcus → vancomycin, gentamycin
- pseudomonas → piperacillin

When to stop antibiotic?

- Clinical improvement
- normal WBC, no bands of PMNs
- no fever (<38 c)

2- Incision and drainage:

- ↓ pressure on some no. of bacteria
- how? 1- Incision + drain 2- deep→ catheter with CT\US guide 3- inaccessible → operative drainage
- abscess+ systemic symptoms → surgical emergency →
- fluctuation → late stage

3- Debridement: removal of dead tissue, its importance:

- help healthy tissue grow
- minimize the scarring
- reduce the complications of infections

Methods of debridement:

1- biological:

- use sterile larvae of the Lucillia Sericata
- large wound – painless
- mechanism of action:
  1. Bactericidal 2. Inhibit bacterial growth – ammonia (↑PH) 3. Ingest the necrotic tissue
- C.I: if the wound reaches the intraperitoneal cavity + immunosuppression therapy \ if the wound approximate a septic arthritis

2- Enzymatic:

- selective (only dead tissue) \ used in combination with other types
- exogenous proteolytic enzyme (collagenase)
- disadvantages:
  1- costly, need prolonged tome (-30 days)
  2- may be inactivated by heavy metals (zinc, silver)
  3- risk of maceration + infection
  4- require frequent dressing (3\day)

3- Autolytic:

- recruit endogenous phagocytic cells and proteolytic enzymes
- by using moisture-retentive dressing (hydro-colloid, hydrogels, hypertonic gels)
- indicated in non-infected wounds
- advantages: selective, effective, low cost, painless \ disadvantage: slow

4- mechanical:

- non-selective (necrotic + viable tissue)
- when? If there is a large amount of necrotic tissue
- C.I: granulation tissue > necrotic, inability to control pain, poor perfusion

5- surgical:

- uses curettes, scalers, ..
- Disadvantages: bleeding, complications of anesthesia
- C.I: intact eschar, no clinical evidence of underlying infection
- how? Start from the base to periphery until red bleeding margins are seen, then irrigation with NS then dressing and leave it for secondary intention.

Intestinal obstruction

Definition: dynamic (partial, complete), adynamic

Dynamic obstruction:

- initially there is increase in peristalsis to overcome the obstruction then it will decrease (muscle wasting and ischemia)

- Small bowel: *high* → acute symptoms due to small lumen to be obstructed, *low*
- adhesion (60%) then hernia then malignancy

Large bowel → chronic because the lumen is large and mostly partial.
- Malignancy then complicated diverticular disease and volvulus.

- Simple (no ischemia) \ strangulated (ischemia)

Causes:

external:

1- adhesions: M.C → peritonitis \ post op, due to decrease in plasminogen activating activity or drying.
2- Hernia 3- malignancy (LN or itself)

Intramural:

1- inflammatory (Crohn's, diverticulitis) → adhesion 2- tumor

Intraluminal:

1- impacted feaces: M.C in elderly
2- swallowed foreign body → children, or hair bezoars in psychiatric (multiple levels)
3- gallstones ileus (cholecystosoudenal fistula) Dx by X-ray
* when the stone go to stomach not to the ileum → Bouveret syndrome

Pathophysiology:

obstruction → dilated proximal loop
1- due to intestinal secretion & air
2- edematous wall due to venous obstruction
3- electrolyte disturbance (impaired absorption, vomiting, anorexia)
4- bacterial overgrowth
- if obstruction not relieved → ischemia → perforation

Intussusception: m.c in 3 months – 1.5 yrs, m.c in ileocecal

Volvulus: rotation of bowel (80 – 360 degree) around itself.
- Causes:
1- adhesions 2- narrow band between bowel & abdominal wall 3- congenital malrotation
- sigmoid → elderly + constipation (sausage mass) - cecal → increased risk of ischemia (mass in the left side)

Closed loop: from two points
- like in ascending colon (in complete iliocecal valve + annular CA in distal segment) which increase pressure that lead to perforation through a clear cut hole (pistol-shot perforation)
- volvulus

Mesenteric ischemia: occlusion of blood supply by thrombo-embolic event lead to ischemia and edema that impairs the bowel motility (elderly patient, vascular disease), pain is post-prandial

Clinical feature:

1- pain:
- colicky (central "small bowel" or suprapubic "colonic")
- decrease in severity later on due to relaxation.
- constant\sudden with pyrexia, peritoneal rigidity & tenderness → infarction

2- Vomiting:
- high obstruction → food then bile stained then feculeus
- low obstruction → late features

3- Abdominal distention: mainly in low obstruction due to gas & fluids

4- Constipation:
- absolute → complete - relative → partial
* after passage of the contents of distal segment

Normal bowel sounds (3-10\min)
< 3 for 3 min after stimulation and changing the position → hypoactive

small → more vomiting & pain
large → distention + constipation

partial:
1- receptive relaxation → passage of fluid, mucus that lead to diarrhea
2- tumor 3- air in rectum on X-ray
4- although there is no increase in pressure significantly but the venous obstruction lead to ischemia and perforation.

Complete: no air on rectum

Management:

general:
1- decompression by NG tube
- used to calculate fluid replacement
- decompression of proximal segment (↓ perfusion, aspiration ↓)

2- electrolyte \ fluid therapy:
- normal saline + 5% dextrose (we neutralize acidic contents by alkaline: Ringer's lactate)

3- Antibiotics (not important)

Definitive: according to the cause:

- Adhesion: conservative mainly or adhesiolysis
- gallstone ileus + impacted feaces + bezoars + bolus obstruction→ remove it
- inflammatory stricture → resection + anastomosis or stricturoplasty
- hernia + tumor → surgery
- volvulus:

Indications of surgery:
- hernia
- conservative failure > 72 hrs
- strangulation

	Cecum	sigmoid
Viable	Un-twisting + cecostomy + fixation (cecopexy)	Untwisting + rigid\flexible sigmoidoscopy or surgery + fixation
Not viable	Hemicolectomy	Resection

Functional obstruction:

paralytic ileus (small bowel)

causes:

1- post op (M.C) within 72 hrs

2- metabolic (↓K^+, ↓Na^+ "dehydration", hypoxia, hypothermia, , DKA, ↑urea)

Signs:

1- dehydration → (↓K^+ ↓Na^+)

2- abdominal Ex → tympanic on percussion, masses, PR → empty rectum (small), feaces, malignancy, diverticular

3- examine groin for hernia

investigation:

- CBC: hemoconcentration, WBC↑, urea↑, Na^++ Cl^- ↓, K^+ ↓ but ↑ in ischemia
- X-ray :

1-

	Small	large
Erect	- multiple air-fluid levels according to the site of obstruction - ladder fashion - centrally located - continuous	- air-fluid at the periphery - decrease number - irregular (not continuous)
Supine	- Diameter of dilation 2.5-5 cm don't exceed it - jejunum → plica circularis - ileum → featureless - duodenum → double-bubble	- haustrations - diameter > 10 cm

2- Gas in biliary tree in gallstone ileus

3- strangulation: loss of mucosal pattern, gas in portal veins, pneumatosis intestinalis

4- volvulus:

- cecal → distended cecum, gas in ileum
- sigmoid → omega sign (2 air-fluid levels in 2 loops)

Barium enema:

- cecal volvulus: bird beak feature
- follow though is C.I → perforation

Clinical:

- no pain, no bowel sound, distention
- X-ray: air-fluid levels, recto-sigmoid gas

Tx: conservative

Pseudo-obstruction (colon) → ***Ogilvie's syndrome***

- mainly in elderly

Causes: neurological, hypnotic\sedation, lead toxicity, hypothyroidism

Clinical: abdominal distention that may lead to perforation + peritonitis

X-ray: distention, no air-fluid level

Tx: conservative

Trauma

Causes:

1- motor vehicle accidents 2- violence (9-15%) 3- falls (9%)

4- burn: thermal, electrical, chemical, corrosive (alkaline, acidic solution), drowning, blast

☒ The accidents (un-intentional) are the 5th leading cause of death worldwide in young adults and 30% of ICU admissions.

Death from trauma:

1- **immediate** → 50% at the time of accident hemorrhage from great vessels → CNS trauma (brain stem), respiratory arrest

2- **early death** (golden hour) 30% → hemorrhage, hypoxia

3- **late death** (1- days) 20% → sepsis, PE, multiple organ failure

Risk factor according to cause:

RTA:

- cars speed -rolled over car - dead passenger - car indentation >30 cm - extraction time > 20 min

Falling down:

- height - ground - way of fall

Burn:

- temperature - time of contact - flame with close space → inhalational injury
- associated trauma (falling, ..)

Trauma system:

1- injury prevention 2- access to car 3- pre-hospital 4- hospital 5- rehabilitation

Approach:

- primary survey → Tx life threatening events
- secondary survey → head to toe exam to define other non-lethal injuries
- definitive management

Primary survey:

- detect and treat immiedetly life threatening problems
- should take few min
- don't proceed to secondary until the ABC-stable
- repeat it when: changes in mental status, changes in vital signs.
- Airway: + C-spine stabilization (ask the pt what's your name→ phonate, mentate)

*relieve any obstruction (tongue "in case of bilateral Fx of mandible", foreign body, aspirated material, blood, vomiting, tissue, edema, teeth, denture)

*tracheal intubation for any hemodynamically unstable pt and injury to the face (with depresses Fx) and neck

* but we must do CXR to rule out tension pneumothorax that develop from minor\small pneumothoracies

Ex: inspection of chest\ oropharynx:
- palpate the trachea and anterior neck for any laceration, hemorrhage, swelling
- any noisy breathing sound → obstruction

What to do?
1- Remove any tight clothes at neck
2- suction for any secretion, blood, foreign body
3- O2 → bag valve mask
4- cricothyroid kit
5- endotracheal tubes

Adjuncts to primary surveys:
1- pulse oxymeter, BP, cardiac monitor
2- ECG
3- X-ray → cervical, chest, pelvis
4- blood work
5- ABG

Cervical spine protection:
1- highly suspicious history
2- avoid rough manipulation of head and neck:
   - holding the head in neutral position facing forward
   - secure it by hard cervical collar
3- then radiological evaluation after pt stabilization

Breathing and ventilation:

Start with examination:
1- palpate tracheal deviation
2- crepitus in fractures, air → surgical emphysema
3- inspect asymmetrical chest movement
4- auscultate breath sound bilaterally

Life threatening conditions:

Tension pneumothorax →
1- needle insertion at mid Clavicular line in 2nd or 3rd intercostal space
2- chest tube

Massive hemothorax → chest tube

Flail chest: paradoxical chest movement:
- intubate in elderly pt and multi-traumatic one- if there is hypoxia or respiratory distress do ABG + pulse oxymeter

Open pneumothorax: there is a sucking wound in the chest wall that flow the air into the pleural space, as the trachea to the lung (during inspiration)

Circulation: BP, HR, evidence of bleeding
- control the bleeding
- 2 large bore cannulas, Foleys catheter, cross match, IV fluid + blood, ..

Disability:

1- Glasgow coma scale or APVU (alter, response to painful stimulation, verbal stimulus, unconscious)

2- pupil size and reactivity

3- gross motor and sensation (spinal cord injury)

Exposure:

1- the pt is completely undressed to reveal any hidden injury.

- missed\neglected regions: posterior scalp, abdominal folds (obese), axillary \ groin \ perineum

2- examine the back

Quick history:

AMPLE: allergy, **m**edication, **p**ast medical, **l**ast meal, \drink, **e**vent

Secondary survey:

- head to toe examination
- special diagnostic test
- including (limb radio, US, CT)

Head:

- skull palpation and inspection
- check for face deformity
- check for eyes → discoloration, pupils, contact lenses
- check for nose → bleeding, CSF leak
- check ears

Neck:

- check for any swelling, wounds
  (JVD, accessory respiratory muscles, tracheal shift)

back\cervical spine: wound, tenderness, swelling, bruising

Chest, abdomen

Pelvis: deformity → scrotal or perineal \ bleeding per urethra

Arms and legs + pulse sensation + movement

Abdominal trauma

Special characteristics:

1- large amount of blood may reach 4 L → we have a space

2- liver, spleen bleed profusely as major abdominal vessels

3- increased infection (bowel injury)

4- 3rf cause of traumatic death after head\chest → (hemorrhage, sepsis)

Causes: RTA (M.C)

Classification: 1- intra-peritoneal 2- extra-peritoneal

	Blunt	Penetrating
Cause	1-motor vehicle: مكانه, في وفيات؟, حزام الامان, مدى الدمار → auto to auto \ auto to pedestrian 2-direct blow to the abdomen 3-fall from height → height, ground	1-low → depend on the mass move high velocity missiles (>100 m\s) cavitation → shattering KE = 1\2 M (V1-V2) 2-stabs → no. of stabs, distance, size
mechanism	<u>Deceleration:</u> - fixed points as ligament of treitz, iliocecal valve, phrenocloic ligament <u>compression with crushing</u> of abdominal content to the abdominal wall and posteriorly (vertebral column posterior thoracic cage) <u>compression with rupture:</u> - 2nd part of duodenum - iliocecal valve recto with intraperitoneum نقطة وصل	- Width, size of knife - velocity \ mass <u>other factors:</u> - colon is less tolerable to the high velocity missile than small bowel (fecal content) Velocity \ mass \solidity of the organ α liberation of energy → ↑damage
Ex	<u>Fully exposed patient:</u> 1- ecchymotic skin, abrasions 2- steering wheel \ seat belt sign (1\3 abdominal injury) 3- abdominal distention	→ Where the injury according to the abdominal boundaries. (5th intercostal) space: - inferior gluteal fold post - inguinal ligament ant. anything with these boundaries indicate abdominal injury

Examination:

Palpation:

- peritoneal irritation \ guarding \ rigidity → maybe evisceration
- abdominal distention
- per-digital exam
- pelvic instability
- crepitus at lower thoracic cage

Follow up + investigation:

1- serial vital \ serial physical examination

2- US → to check if there is abdominal fluid or not (normally up to 50 ml "5-20 ml")

3- CT → in hemodynamically stable pt → retroperitoneal organ injury in blunt trauma

4- diagnostic peritoneal lavage:

- why ? To know if there is blood in peritoneum, injury to intestine

- when?

1. CT\US unavailable (difficulty in assessing the pt)
2. Equivocal clinical exam
3. Multiple injuries
4. Persistent hypotension despite adequate resuscitation

- how? Sub-umbilical longitudinal small incision → aspiration

+ve → 1. > 5 ml of blood 2. Bloody irrigated fluid 3. Presence of bile, enteric content

4. Fluid analysis: RBC >100,00 \cmm, WBC > 500\cmm, amylase > 175 U

Spleen injury:

signs & symptoms:

1- asymptomatic <=> non-specific ex

2- RUQ or diffuse pain and tenderness

3- referred pain to the Lt shoulder (Kehr's sign)

4- syncope \ hypotension \ tachycardia \ tachypnea

5- dullness in LtUQ (Baltance's sign)

when to suspect with plain X-ray:

- chest:

1- lower left rib Fx

2- Lt pleural effusion

3- Lt lower lobe atelectasis

- abdomen:

1- elevated left hemi-diaphragm

2- shifted to: gastric bubbles medially, splenic flexure gas inferiorly

Scaling:

I → subscapular hematoma <10% of surface, laceration <1 cm deep

II → subscapular hematoma 10-50% of surface, laceration 1-3 cm deep

III → subscapular hematoma >50% of surface, laceration >3 cm deep

IV → laceration >25% of parenchyma or involving hilum

V → shattered spleen, hilar vessel injury + de-vascularization

Treatment:

I, II, III → conservative or selective splenic artery immobilization:

- acute dilation of stomach die to small gastric artery ligation, risk of infection, risk of ischemia

IV, V → surgery \ newly maybe treated conservatively → risk of developing abscess (blood in peritoneum)

- splenic preservation → rraphy, partial spleenectomy

- spleenectomy

- Complications of spleenectomy:

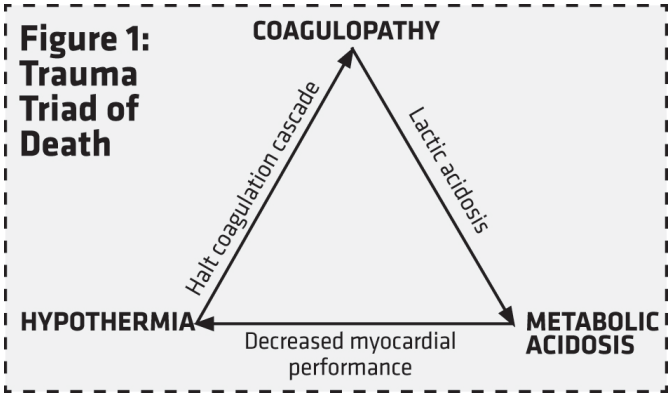
1- encapsulated infection → fulminant sepsis

→ pneumovax vaccine: - 2 w before surgery - in emergency ASAP post. Op

→ or polyvalent vaccine or penicillin daily (E.coli, meningeococcus, pneumococcus, hemophilus)

2- gastric fistula, gastric dilatation

3- thrombosis (thrombocytopenia)



Liver injury:

Signs & symptoms:

1- RUQ pain (↑ with deep breathing) <=> tenderness

2- BP, abnormalities

3- N, V

Scaling:

I → subscapular hematoma <10% (non-expanding) laceration < 1 cm depth

II → subscapular hematoma 10-50% (non-expanding) laceration 1-3 cm depth

III → subscapular hematoma >50% (non-expanding) laceration >3 cm depth

IV → parenchymal damage, > 25-50 of hepatic lobe \ ruptured hematoma + active bleeding

V → parenchymal damage, >50%, vascular injury

Treatment:

non-operative:

- hemodynamically stable patient
- risk for missing other injuries

Operative:

- suture - mesh wrapping, peri-hepatic packing - fibrin glue application
- resectional debridement - anatomic resection - hepatic artery ligation

Retroperitoneal injury:

when to suspect: high injury blow to epigastrium (like steering wheel)

how to find: CT, operation

Zones:

I → duodenum, pancreas, major vessels → always explore

II → laterally (kidney, colon) **III** → pelvis

- both II + III → blunt – observe, penetrating – explore

Abbreviated laparotomy: damage control procedure

- control hemorrhage - prevent further damage - prevent contamination → no abscess later on.

Upper GI bleeding

Definition : any bleeding above ligament of treitz

Etiology :

- peptic ulcer disease
- gastroesophageal erosions
- Mallory weiss tear
- esophageal varices
- Tumors
- vascular lesions (angiodysplasia)
- small intestine bleeding (Meckel's diverticulum , aortoenteric fistula)

Clinical :

- Hematemesis
- Melena (IUH in Bowel)
- hematochezia (in large amount)
- coffee ground vomiting
- occult blood in stool

Physical examination :

1 - we start from vitals (blood pressure and heart rate) ➔ then postural hypotension decrease > 20 points
→ indicate 10 to 20% blood loss
➔postural tachycardia increase > 10 points
2 - digital rectal examination ==> if there is blood --> indicate brisk bleeding
3 - signs of liver disease + portal hypertension ==> varicose veins

Treatment :

1 - resuscitation : 2 large bore canula + cross matching + coagulation profile
folly's catheter --> central venous catheter --> NG tube : to confirm Dx & prevent aspiration
16% --> non the bloody aspiration

other according to the cause (80% resolve spontaneously)

2 - CBC → hematocrit should kept > 30% in elderly (coronary artery disease)
3 - increase PT → give FFP
4 - decrease platelet → give platelets
5 - Endoscopy → in hemodynamically unstable to control the bleeding

Peptic Ulcer :

gastric ulcer ➔ bleeding from the artery and the base of ulcer
duodenal ulcer ➔ bleeding from gastroduodenal artery posteriorly located ulcer
- May the 1st presentation 25%
- Mortality rate 40%

Management :

A - Endoscopy :

- electrocoagulation
- laser therapy
- sclerotherapy
- cauterization
- arterial banding
- vasopressin injection

a - Active bleeding
b - Non bleeding visible vessels

- increase risk to rebleed :
→ uncleare ulcer { visible vessel , blood , clots }
→ should stay 3 days in hospital

B - Surgery :

1 - unable to control the bleeding
2 - patient is elderly and unfit
3 - 6 unite blood transfusion

Doudenal ulcer ➔ { under run with sutures to through doudentorotomy }
Gastric ulcer ➔ a - young patient --> excision of the ulcer
b - elderly patient --> under run with sutures + biopsy --> if Malignant --> treatment as CA

C - PPI { omeprazole , 80 mg bolus , 8 mg infusions } :

➔ increase pH → 1 - increase stability of clot
2 - decrease further bleeding

Eradicate H-pylori
Avoid NSAIDs

GE erosions :

- NSAIDs use
- erosive esophagitis
- gastritis

not cause significant bleeding

Stress Related :

- curing ulcer { trauma , burn , major surgery }
- Cushing ulcer { intracranial disease }
- severe medical illness { ventilator-dependent , coagulopathy }

not cause significant bleeding

treatments : H2 Blocker + sacralfate

Mallory wiess treat :

- history of vomiting , itching
- alcoholic
- under GEJ
- resolve spontaneously (80 to 90%) , not endoscopic treatments , not :
  1 - angiographic treatment (vasopressin)
  2 - surgery treatment

Esophageal varices :

most common bleeding from varicose veins
treatment :

- vasopressor { decrease portal inflow by splanchnic artery constriction } } acute bleeding
- Octerotide/ somatostatin / terliprisson
- life-threatening conditions before endoscopy { sengstaken - Blakemore tube }
- Endoscopy : 1 – ligation
  2 – Sclerotherapy ↓ → { may cause stricture }
- Long term prophylaxis by non-selective beta blocker
- Persistent or recurrent bleeding

" بندخل منه " **Transjugular intrahepatic portosystemic shunts { TIPS }** expandable metal shunt from Portal system to hepatic vein

contraindication in severe liver disease , transplant is anticipated
milder cases → splenorenal shunt

Dieulafoy lesion :

= angiodysplasia = arteriovenous malformation

- Large tortous submucosal artery
- can cause severe bleeding
- missed in endoscopy unless if the bleeding { under normal mucosa }
- **treatment** : - endoscopy { sclerotherapy }
  - angiographic embolization
  - surgery { suture or reception }

Obscure GIB :

- usually from small intestine
- push endoscopy or video capsule enteroscopy
- technetium-99 labeled
- aortoenteric fistula ➔ - history of aortic graft replacement
  - untreated aortic aneurysm

Prognosis of UGIB :

according to :

- Underlying illness
- Age
- Comorbidity
- Hemodynamic compromise

Diabetic foot

Pathogenesis:

1- **Diabetic neuropathy**
   - sensory: distal symmetrical polyneuropathy, caused by untreated minor injuries (mechanical, thermal, pressure)
   - autonomic: ↓ sweating →dryness, crackled skin
   - motor: clawing of toes, high arch*, prominent metatarsal head* (1st, 5th), tip of fingers
   * pressure points → ulcers + callus

2- **Diabetic osteoarthropathy**:
   - Charcot joint (mid planter area) → ulceration in the medial aspect of foot
   - stretching of ligament → loss of arch
   - minor trauma → healing v trauma → deformity

3- **Vascular insufficiency** (microangiopathy) → delay of healing

4- **↓Immunity:** affects the chemotactic activity of T-cell

Wager classification of diabetic foot:

- **Grade 1** → no ulcer, but high risk foot
- **Grade 2** → superficial ulcer (skin not underlying tissue)
- **Grade 3** → deep ulcer (cellulitis, abscess, bone involvement by osteoarthritis)
- **Grade 4** → localized gangrene (toe, heel)
- **Grade 5** → extensive gangrene involving the whole foot

Why foot not others (hand, others) ?

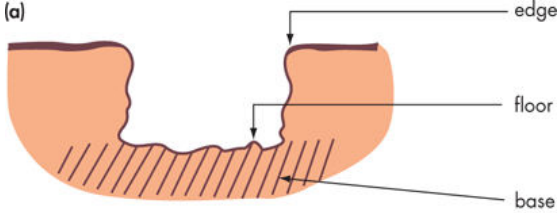
- Compartments of foot separated by dense fibrous tissue → any ulcer + infection → edema → ↑pressure → ↓blood → ischemia

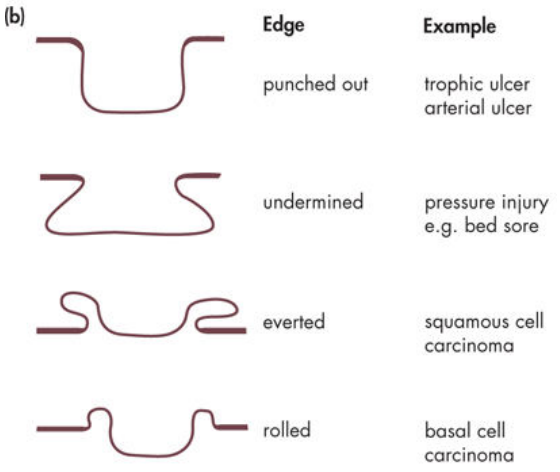
When pt come to ER (C.C):

1- Cellulitis, abscess
2- Osteomyelitis
3- Ulcer
4- Impeding gangrene
5- Deformity (Charcot joint)

History:

1- **DM and its control:** duration, complication (eye, heart, renal, peripheral "numbness, claudication", medication or insulin.
2- **Social Hx**: smoking***, alcohol, diet, occupation
3- **Medical Hx**: HTN, surgical Hx
4- **Cultural habits**: wear socks or not, wet foot on work, foot care and hygiene, daily activity
5- **Chief complain of foot complain**: duration, pain, numbness, when and where he noted the ulcer, deformity, previous surgery





Examination:

-Inspection:

1- general look – edema

2- ischemia of skin: cold, scalding, loss of hair, pallor, callus formation, nail changes → shape & color, shiny foot (fungal, bridging, brittle)

3- ischemia of muscles and tendons, deformity of toes (overriding, clawing "hammer toe")

4- bones

5- veins: guttered, cavitry, empty vein) داخل لجوا→ vascular insufficiency

6- ulcer:

- surrounding skin → hyperemia, hotness, tenderness, black discoloration (infection)
- edge (as in the picture)
- site, size
- shape (irregular indicates long duration), floor "what you see"
- floor "what you see" → granulation (pink, bright, glazy, easy to bleed "if healthy", if not :pale pink, covered with pus or discharge or white material, don't bleed easily) , bone, muscle, discharge
- base "what you feel" → indurated –chronic
- depth →very shallow (venous)

7- LN (superficial inguinal – longitudinal) → painless: cancer, painful: infection

-Palpation:

- <u>Temperature</u>
- <u>Pulse:</u>
  - posterior *tibial:*
    1. Medial third of the distance between medial mallus (inferior border) and the tip of calcaneus
    2. Posterior border medial malleolus and Achill's tendon
  - *dorsalis pedis:* against navicular, at the end of first metatarsal space, lateral to extensor hallucis longus after active dorsi flexion.
  - *popliteal*: flexion 30 degree or prone position
  - *femoral*: midway between anterior SIS and symphysis pubis

-neurological examination

lines of management:

> We use scaling system to give insulin??
> → We use short acting insulin to get better control.

1. **metabolic care:** blood sugar, HbA1C, CBC, KFT, ESR+CRP, fundoscopy
2. **microbial care:**
   - mixed infection
   - best method for microbiological study is tissue culture after taking a sample of healthy tissue
   - broad spectrum (empirical) → Flagil, 3rd cephalo
   - x-ray: foreign body, gas, osteomyelitis
3. **dressing:** 1- simple washing 2- better drainage 3- debridement 4- amputation
4. **vascular care**: Doppler US + surgery if macrovascular
5. **Foot care** (shoes..)

1- claudication:
severity:
1. Distant 2- surface of stress 3- cold environment 4- drugs as B-blockers 5- smoking 7- walking against wind

2- Rest pain: in the foot in distal metatarsophalangeal → hanging the leg on bed.

3- Rest pain + ulcer → pre-gangrene

4- gangrene

Compartment syndrome

Definition: excessive pressure inside enclosed muscle space → leads to tissue ischemia → necrosis

- Excessive pressure → content: bleeding, edema due to trauma
- pressure from outside that size: bandage\cast, lying on limb

Epidemiology\causes:

- M.C.C (fracture)
- leg M.C → due to tibial fracture (anterior compartment)
- Forearm- 2nd M.C due to supracondylar fracture (flexor, ant-compartment)
- M>F

Pathophysiology: muscle perfusion pressure = diastolic pressure – intramuscular pressure (0-4 mmHg, >30 indicates compartment)

Types:

- **Chronic**:
  - excertional compartment
  - especially when it involve repetitive motion
  - recurrent pain + disability (↑with ↑ intensing and ↓ within 30 minutes after stopping: burning, aching, pressure like)
- **Acute:** due to major injury → crush injury, cast\bandage, from heavy drinking or drugs use.

Symptoms: 6Ps

. **Pain**: out of proportion (doesn't improve after Tx)
  - deep ache\ burning +\- bulge of affected muscle
  - first symptom
. **Pressure**: >30-40 mmHg "diagnostic"
. **Paresthesia**: numbness → early to one compartment, late to entire limb
. **Pallor** (rare - late stage) → sign of vascular injury + ischemia
. **Pulseless**: late stage, if present not exclude compartment
. **Paralysis**: very late, indicate nerve damage

-Volkmann's contracture (fibrosis after ischemia)

Complications:

. **Muscle scarring, contracture** → Volkmann's contracture (at wrist, hand & fingers), claw toes + weak dorsiflexors
. **Infection**
. **Permanent nerve damage** → sensory loss
. **Rhabdomyolysis** → ↑myoglobin + ↑K+ → kidney damage "may need dialysis"
. **Chronic pain**
. **Amputation**

Compartments of the upper limb:

► Arm:

- **Anterior** : musculocutaneous nerve\biceps, bronchials
- **Posterior**: radial nerve\triceps

► Forearm:

- **Superficial volar**: median and ulnar nerve → pain with passive extension + weakness of flexion + sensory loss at median index and ulnar nerve (little finger)
- **Deep volar**: anterior interosseous nerve→ weakness\pain , no sensory defect (motor only)
- **Dorsal compartment**: posterior interosseous nerve
- **Henrey's mobile wad**: superficial radial nerve

► Hand: 10 compartments

- **4 dorsal interossei**
- **3 volar**
- **One adductor pollicis**
- **One hypothenor**
- **One thenor**

Compartment of lower limb:

► Thigh:

- **Anterior**: M.C in thigh due to femoral fracture\blunt trauma
  - weakness in knee extension, pain in passive flexion
  - femoral nerve\saphenous nerve: numbness at medial knee
- **Medial**: obturator nerve\adductor muscles, gracills.
- **Posterior**: sciatic\biceps, semi membranous, semi tendinous

► Leg:

- **Anterior**: anterior tibial artery\deep peroneal nerve → numbness in first web space.
- **Lateral**: superficial peroneal nerve→ numbness in dorsum of foot
- **Superficial dorsal**: sural nerve → numbness at lateral border of foot
- **Deep dorsal**: tibial nerve → numbness at planter surface of foot

► Foot: 9 compartments:

- 4 interossei
- One adductor halluces
- One lateral
- One medial
- Two central

} Swelling, tenderness at the dorsum of the foot

Etiology:

- **Trauma related:**
  1. Burn eschar
  2. Re-perfusion syndrome
  3. Hemorrhage\fracture hematoma
  4. Repetitive muscle use
  5. Crush injury
  6. Penetrating injury
  7. Burn edema
- **Non-traumatic:**
  1. Coagulopathy
  2. Incorrect positioning of the limb
  3. Increased capillary permeability

Abdominal compartment syndrome:

- IAP: 5-7 mmHg
- IAH > 12mmHg
- ACS sustained IAH >20 mmHg

Grades: 12-15, 15-20, 21-25, >25

Primary: (from pelvi-abdominal organs)

1. Trauma → bleeding. \ retroperitoneal hematoma
2. Ruptured AAA
3. Pancreatitis
4. Visceral edema
5. Obstruction\ileus
6. Pneumoperitoneum
7. Abscesses

Secondary:

1. ARDS
2. Major trauma\burns
3. Massive fluid resuscitation \blood transfusion >100
4. Hypothermia /,33c
5. Hypotension
6. Acidosis\sepsis
7. Coagulopathy

Recurrent:

1. Obesity
2. Liver failure + ascites
3. Malignancy

Dx of compartment:

1- M.I point is the time (before 8hrs)
2- It's clinical Dx
3- Intracompartment pressure by stryker manometer:
   - >30
   - >20 in hypotensive patient
4- Lab – CKP "reatinine phosphokinase)

Tx:

- chronic → conservative
- Acute → surgery:
  - any pressure should be removed
  - fasciotomy: 4-6 weeks by 2° attention, skin graft
  - may be complicated by:
    - altered sensation at margin (77%)
    - ulceration
    - muscle herniation
    - pain

Complications:

- Renal: ↓ perfusion, renal congestion and edema, ↓GFR → ↓ urine output
- Cardiac:
  - ↓preload
  - Heart failure
- Pulmonary
- GI: hypoperfusion

Colostomy

Definition: surgical procedure at which the one end of large intestine brings out through the abdominal wall, with incision to create a stoma.

Normal appearance:

- At first it's swollen → 8 weeks it shrinks
- Red, moist, painless on touch

Indications:

- **Congenital malformations:**
  - anal atresia
  - hirschsprung disease

- **Neoplastic:**
  - rectal
  - anal

- **Injury to colon\rectum**
- **Inflammatory process: IBD, diverticulitis**
- **Bowel obstruction**
- **Wound\fistula in perineum**

Choosing a stoma site:

avoid:

1- bony prominences, umbilicus, skin folds or creases

2- hernia, old wounds or scars

► Should be assessed preoperatively, in sitting, lying, standing positions.

Classification:

Time:

Permanent:

- disease affects the end part of colon\rectum
- end colostomy\ileostomy

Temporary:

- to give a chance for the bowel to heal\rest
- hartman's procedure (end-colostomy + rectal stump)
- loop transverse colostomy (defunctioning stoma "in obstruction" , bowel rest – pericolic abscess or anorectal fistula

Morphology + function:

► <u>End colostomy:</u> single opening, same level of skin (flush), left iliac fossa

- *permanent*: low rectal cancer → abdomino-perineal resection, low anterior resection
  the distal part is removed → **X** PR ex

- *temporary*:
  -Hartman's procedure → rectal stump → ✔PR ex
  nonfunctional for mucous decompression
  - chronic fistula
  - trauma

► <u>double barrel colostomy:</u>

- 2 openings:
  - end colostomy (proximal)
  - mucous fistula (distal)
- Indication as above

► <u>Loop colostomy:</u>

- The loop is brought up to the abdominal wall and a plastic rod is placed underneath the loop then opened and sutured to the skin
- Both the stool + mucous will pass through it but some may leave through anus.
- Temporary
- *Indications:*
  1. To protect distal anastomosis
  2. Defunctioning a near obstructing rectal CA prior to long course chemotherapy.
  3. To prevent fecal peritonitis developing following traumatic injury to the rectum

	Colostomy	**Ileostomy**
Site	- End → ELF - loop\temporary → transverse\RIF	RIF مو شرط
Shape	No sprout (at level of skin)	Sprout\ + circular folds on the rectum
Output	Solid, hard stools (↓amount) → more higher in location→ more liquid and in amount → less skin irritation → odor is more → ↓ frequency so less likely to develop electrolyte + fluid problems	Liquid\watery → large amount → more skin excoriation → odor is less → ↑freq so more likely to develop electrolyte + fluid problems

Examination:

Inspection:

Site:

- RIF → ileostomy\urostomy
- LIF → colostomy
- transverse → loop

# of lumens:

- one → end
- two → loop\double barrel

Color:

- pink → viable
- dusky pale→ ischemic
- blackish → gangrenous

Output: soft\hard stool, urine, mucous, blood, foreign body, pus

Skin: inflamed

Any complications: later

Palpation: tenderness, cough → hernia

Auscultation: bowel sound, if ↑ : obstruction, if ↓ or absent : ileus

Digital examination for stoma:

- May be needed to relieve the obstruction by adhesions\fibrosis
- Inspect the finger (stool, blood, mucous)

  Complications:
  - Early: ischemia, retraction, infection\abscess\fistula, skin excoriation
  - Late: parastomal hernia\prolapse, stenosis\bowel obstruction

Ischemia →

- devascularization: ligation of the primary blood vessels, inadequate collaterals
- excessive removal of peristomal mesentery (cleaning off)
- too much edema\tension

Retraction →

** Mechanical**:

- inadequate bowel mobilization
- the abdominal opening is large
- short mesentery
- poor fixation (mucocutaneous separation)*
- scar, adhesions*
- premature removal of the supporting device (loop)*
- loop located in skin folds

* Tension to stoma

** Non-mechanical**:

- ischemia: necrotic stoma
- mal-nourishment (protein)
- steroid, immunosuppression

Parastomal hernia: incisional hernia

- **Intrastomal**: the intraperitoneal structure protruded into the space between serosal surface of a spout ileostomy.
- **Peristomal**: bulging under peristomal skin (pas through a dissected area of the fascia and muscles)

- **R.F:**
  - patient related: obesity, chronic cough, sepsis, malnutrition, steroid, old age
  - technical:
    - size of surgical opening
    - elective\emergency
    - location outside the rectus muscle.
- **Tx:**
  - Simple local repair → ↑ recurrence
  - subperitoneal mesh
  - relocation (last option)

Prolapse:

Full thickness protrusion of intestine through the stoma

- **Sliding** → intermittently with IAP
  fixed → present constantly

- More in loop colostomies
- Associated with parastomal hernia (50%)
- **Appearance**: edematous, prone to bleeding, ulceration
- May be without pain or obstruction

Stenosis:

- Stenosis at skin or facial level → results from ischemia\retraction
- Act as mechanical obstruction
- **R.F:**
  - Excessive scar formation\keloid
  - Inadequate excision of the skin during construction of stoma
  - Mucocutaneous separation
  - Peristomal sepsis
  - Recurrent disease (CA, Crohn's)
  - Irritation → poor site
  - Ischemia\retraction

Types of bags:

One piece:

- Bag + adhesive base (one)
- Zero chance for bag and flange coming apart*
- less expensive*
- recurrent change of flange**
- Causes skin tenderness, stomal irritation**

Two pieces

- Two
- More skin friendly*
- Better accommodation for special needs*
- Bag and flange can come apart and leak **
- More expensive**

*=advantage
**=disadvantage

Classification:

Type 1:

- 90-95 %
- Dilatation of CBD
  A → entire CBD
  b → segment CBD
  d → fusiform dilatation of CBD

Type 2: Diverticulum of CBD with NO dilatation of CBD + intra\extrahepatic ducts

Type 3: choledococele (cystic dilatation of distal BD)

- Intra duodenal,intrapancreatic
- Usually stenotic in its opening due to chronic inflammation

Type 4: multiple cysts (intra + extra hepatic)

Type 5: single or multiple intrahepatic (not extra hepatic) + hepatic fibrosis (caroli disease)

Complications: Choledocholithiasis, Rupture, Cirrhosis\portal HTN, Biliary cancer → long term monitoring, Stricture

Dx:

Lab:
- CBC (anemia, prior surgery)
- AST, ALT, GT, ALP
- coagulation profile
- bilirubin

Imaging: ***
- US: gold standard
- CT: anatomy
- ERCP: the best diagnostic
- MRCP: superior to ERCP, non-invasive, no post ERCP pancreatitis

Tx: radical excision of cyst (risk of CA) + reconstruction of biliary tract by Roux en-Y loop of jejunum "hepato-jejunostomy" (incidence of stricture + cholangitis)

Type 5:
- conservative
- percutaneous drainage + medical management

The breast

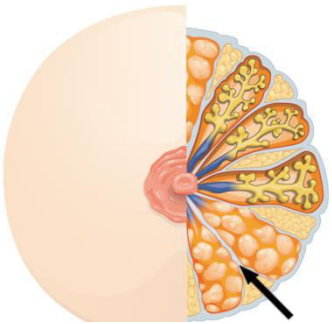
Anatomy:

1- controlled by hormonal system by (hypothalamus & pituitary + reproductive organs + placenta)

2- composed of 15-20 lobes → lobules → ducts → lactiferous ducts → sinus (ampulla) → duct open to nipple

3- areola → concentric radial muscle + sebaceous glands (enlarged in pregnancy, lubrication, called Montgomery's tubercle) + sweat glands

4- nipple → contains lactiferous ducts openings + concentric & longitudinal muscle (erectile)



Suspensory ligament of cooper (perpendicular)

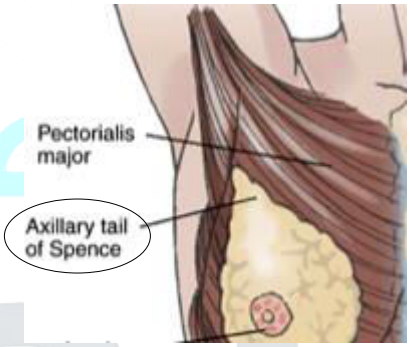
5- the breast lie from 2-6th ribs and from sternum to anterior axillary line, between the skin and pectoral fascia.

6- Blood supply:

- lateral: axillary artery, thoracocromial, lateral thoracic
- medial: internal thoracic, 2-4th intercostal arteries

7- lymph :

- 85% → axillary: lateral\medial, ant\post., central, apical → supraclavicular LN → subclavian lymphatic trunk \ thoracic dust
- 15% → internal mammary \ parasternal nodes



8- Axillary tail of Spence which extend to axilla between latissimus dorsi & pectoral muscles.

Histology:

1- inactive or resting mammary gland → duct system + ↑ adipose tissue in non-pregnant

2- active mammary glands → pregnant → tubuloalveolar glands + secretory alveoli

Mastitis:

- diffuse cellulitis (wedge shape)
- mainly in lactating or puerperal period due to obstruction and strangulation
- staph aureus from baby nostrils through a fissure
- treated mainly by antibiotic
- may convert to single or multiple abscess → need incision and drainage under GA
- it's characterized by multi locularity that may recur.
- Other causes: TB, syphilis, actinomycosis

. Mastitis neonatorum → due to maternal prolactin effect
. Puberty mastitis → due to endocrine dysfunction \ local trauma
. Mastitis adolescentium

- **Fibroadinoma:** aberration of normal development and involution ANDI
  - breast mouse (M.C\ reproductive years)
  - characterized by → develop from a whole lobule + normal epithelium under hormonal effect
  - giant fibroadenoma> 5 cm (α phyloid tumor: recurrence, need surgical removal, metastasize according to the # of mitosis)
  - investigation → triple assessment
  - management: small → **X**, giant → excised

- **Ductectasia:**
  - major sub-areolar duct dilatation and shortening
  - symptoms:
    1- discharge (cheesy +\- bloody
    2- retraction: slit like \ partial retraction *(CA → circumferential retraction)
  - don't need treatment unless the retraction is terrible to the pt → surgical Tx

- **Cystosarcoma phylloides:**
  - serocysts disease of brodie
  - benign ANDI
- symptoms:
  - large \ massive mass +\- ulceration of skin (pressure necrosis)
  - mobile on underlying chest wall
- histology: (low – high malignant potential)
- Tx: surgery (wide local excision\mastectomy): if 1- large mass 2- recurrent tumors 3- worrying histology

- **fibrocystic disease:**
  - fibroadenomatosis. ANDI
  - under hormonal changes throughout menstrual cycle.
  - signs & symptoms: lumpness (rice gray feeling), tenderness (cyclical mastalgia), discharge (green)

  *non-cyclical mastalgia → periductal mastitis

- **Breast cyst:** 15%
  - s & s: smooth discrete lump +\- pain
  - US to reveal the content (fluid or mixed...)
  - what to do →

    1- aspiration → not blood stained
    → blood stained, mixed tissue on US, recurrence after aspiration , residual lump after aspiration
    2- mixed tissue on US
    3- recurrence after aspiration (now)
    4- residual lump after aspiration

DDx of cyst:
1- galactorrhea
2- lymphatic cyst
3- hydatid
4- ANDI + phylloides
5- intracystic papilliferous CA, colloid degeneration of cancer, papillary cystadenoma

- **Breast discharge**

non-bloody → ductectasia, fibrocystic

bloody →

- ductectasia
- duct papilloma (M.C), ductal CA 5% → both from multiple ducts + unilateral
- - US → triple assessment to rule out CA
- Tx: microdochectomy by periareolar incision

- **Breast cancer:**

- **R.F:**

1- age: 35→ very rare then every 5 yrs increase (double), 50→ 1\50, 80→ 1\10

2- race + geographic distribution (increase in north America)

3- hereditary causes 5-10%

a. BRCA1, BRCA2 → (to develop breast cancer at 65) + ↑ risk of ovarian CA

b. P53 mutation

c. ataxia telangiectasia

d. hereditary non-polyposis coli genes

??:
1- four affected relatives
2- young age < 40
3- bilateral breast CA
4- +ve ovarian CA
5- male breast

4- estrogen exposure:

- early menarche + late menopause
- nulliparous
- contraceptive pills → in COCP
- HRT after 5 yrs

5- radiation: ionizing

- depending on: dose, time of exposure, age

6- lifestyle: fat intake, alcohol, decreased physical activity

↓ risk in:
- early age in first delivery
- breast feeding

- **Non-invasive:**

- **Ductal carcinoma in-sito:**

1- premalignant
2- non-palpable
3- mammogram Microcalcifications
4- risk of developing CA according to the grade
5- Tx: lumpectomy with 1 cm rim +\- radiotherapy

Lobular carcinoma in-situ:

1- less likely to develop to CA than ductal
2- no palpable masses or mammographic findings
3- incidental on biopsy
4- Tx close monitoring

- **Invasive cancer:**

- **Ductal: 85%**

1- hard mass + unilateral well defined vein
2- desmoplasic response on mammogram (sun rays appearance)
3- grade 1-3 according to:
1- mitotic index 2- hyperchromatosis + polymorphism 3- tubule formation
4- 2\3 express estrogen & progesterone receptors

- **Lobular: 10%**

  1- less likely to be detected in mammogram → no microcalcificatoin

  2- could ne bilateral + multifocal 20%

  3- all express estrogen receptors
- **Colloid, medullary, tubular** → most are well differentiated + good prognosis
-

  → may adhere to:

  - underlying pectoral muscle
  - overlying skin: dimpling (dors), tethering (كل المساحة نازلة)
- → involvement of lymph may cause peau de orange appearance
- **Clinical picture:**

  1- breast lump: 70%, may have axillary swelling

  - usually painless, hard, .. – (M.C) in upper outer Q (60%)

  2- nipple changes: discharge (bloody, ..), retraction (circumferential), erosions, itching, enlargement

  3- skin changes: dimpling, tethering, peau de orange, scaliness

  4- breast pain (rare)
-

  Paget's disease:

  - dry scaling and weeping appearance of nipple
  - due to spread of tumors (mainly ductal) to the nipple
  - well demarcated (α eczema), X steroid
-

  Inflammatory breast cancer: = anaplastic ductal CA

  - erythematous, swollen (enlarged) breast, without fever or leukocytosis or palpable mass(X US OR MAMO)
  - underlying poorly differentiated carcinoma
  - Dx by biopsy (core-cut)
  - no true inflammation

  α Mastitis:
  - young age
  - constitutional symptoms
- **Assessment:**

  1- clinical: Hx + PEx:

  - age, menarche, FH, gynecological and obstetric Mx
  - drug Hx
- 2- radiological: US

  - < 35 Yrs, solid\cystic

  Mammogram:
  - > 35 yrs → increased risk of CA after one exposure (1%)
  - benign → well differentiated mass with surrounding halo.
  - malignant → speculation + architectural distortion, microcalcification
- 3- pathological:

  a. *FNA*:

  - diagnosis of benign, if it's cyst → drainage
  - 5% false –ve due to sampling error
  - if we find atypical cells → biopsy & follow up

  b. *true-cut biopsy**: to find out → grade, invasive, estrogen receptor
-

  *- atypical and fluoride hyperplasia → CA
  - metaplasia and mild hyperplasia → no

Others:

-MRI :

advantages:

- pick up carcinoma in situ
- differentiates local recurrence from fibrosis
- staging
- young women
- multi-focal lesions

disadvantages:

- not detect calcifications
- C.I in coronary cath.

-PET → multifocal lesions

Spread and staging:

1- blood extension: bone (lumbar, femoral), liver, lung, brain, kidney, suprarenal

2- prognostic factors:

- M.I one is # of axillary LN involved: (0→ 80%"5 yrs survival", 3→ 50%, >3→ 25%)
- stage, grade, histological type
- HER2 (epidermal growth factor)
- hormonal receptors

Investigations:

- liver enzymes + alkaline phosphatase.
- CXR, US, bone scan

Stage I, II → early \ **III, IIII** → advanced

Management:

1- breast conserving treatment: lumpectomy or wide excision (1 cm margin) + axillary LN sampling (sentinel LN biopsy) or axillary clearance + radiotherapy

2- mastectomy : + radiotherapy to high risk)

- *simple*: removal of all breast tissue with nipples but leave chest wall muscles intact →
  1- multiple foci 2- large CA 3- cancer involving nipple → ↑ recurrence

- *radical*: remove breast + axillary clearance + pectoralis major & minor

-*modified radical*: remove breast + axillary clearance + intercostal branches are divided → post-op Paresthesia \ preservation of axillary vein, long thoracic nerve & latissmous dorsi

☒ Both lumpectomy and mastectomy has the same survival rate but the recurrence is more in lumpectomy so we add radiotherapy

3- chemotherapy + radiotherapy

4- hormonal treatment:

- oophorectomy, tamoxifen → more effective in pt who have estrogen receptors
- anastrozole (aromatase inhibitor)

5- biological agent:

in HER2 +ve pt: trastuzumab, heparin

others: bevacizumab → VGFR inhibitor, lantimab → GFR inhibitor

Cancer en-cuirasse

- recurrence of CA locally after mastectomy
- may associated with swollen arm
- poor prognosis
- Tx: palliative

Lymphangisarcoma:

- complicated lymphedema
- as subcutaneous nodules in upper limb
- poor prognosis , x: chemo & radio

Male breast:

Gynecomastia:

- mostly benign
- causes : alcohol intake, liver cirrhosis, hypogonadism, testicular tumor, drugs: finasteride, spirinolactone, cannabis
- rapid progressive indicates hormonal investigation
- persistent indicated surgery

Cancer:

- very rare 5%
- age: 5–10 yrs later than women
- presented as: eccentric mass, retraction of the skin
- investigation: mammo, FNA, core-cut biopsy
- Tx: mastectomy+ radiotherapy + chemo → ↓recurrence

Breast surgeries:

1- Lumpectomy \ quadrantectomy
2- Simple mastectomy
3- Modified radical mastectomy (cutting the tendon of pectoralis minor to remove the LN)
4- Radical mastectomy
5- Bilateral:
   - lobular carcinoma (multifocal lesions)
   - BRCA1, 2 → prophylactic

How to deal with the LN in axilla? Complicated lymphedema ↓

1- sentinel LN (we inject a dye then remove the involving LN only)
2- sampling
3- axillary clearance (remove level 3)

Thoracic trauma

Anatomy:

1- first 6 ribs attached to the sternum
2- later 4 form lower costal margin
3- last 2 floating ribs
4- Rt lung → 3 lobes, Lt lung → 2 lobes

Epidemiology:

1- 1\3 of RTA have chest trauma → 20-25% mortality rate
2- M.C.C is blunt trauma + mostly associated with other injuries
3- M.C blunt thoracic injury → rib fracture 30-35%

Rib fractures:

Clinical:

- pain, difficulty on breathing
- tenderness, crepitus, bruises → may be subcutaneous emphysema

. most common ribs fracture 4-10
. 8-12 raised suspension for hepatic, splenic injury
. 1,2nd → raised suspension for vascular injury + ↑ thoracic trauma

Indications of admission:

1- unable to cough → ↑ pneumonia
2- underlying pulmonary disease → COPD
3- age > or = 65 (↑ hypoventilation → hypercapnia \ atelectasis → pneumonia)

Associations:

- hemothorax, pneumothorax → >3 ribs unilateral
- pulmonary contusions

Tx:

1- pain relief + adequate ventilation: pain killer, intercostal nerve block, epidural analgesia (multiple ribs)
2- early mobilization
3- pulmonary toilet

prognosis depends on:

1- age 2- underlying pulmonary status 3- # of ribs

Flail chest

multiple consecutive rib fractures from 2 levels or disruption of costocondral junction.

Clinical: chest pain, SOB, paradoxical motion (late sign, -ve → doesn't exclude flail)

Causes:
- M.C cause: RTA
- falling in elderly (weak bones + more impacted by falls)

Association: pneumothorax, pulmonary contusion →RF

Tx:
- admit to ICU + ABG
- oxygen + painkiller (to promote cough and clear the secretion)
- aggressive pulmonary physiotherapy
- deep coughing
- bronchoscopy → to remove the secretion
- intubation if: RR > 30\MINUTE, PaO2 < 60, PaCO1 > 45

- In hypoventilation + hypercapnia (impeding RF) →
Intubation + PEEP, IV antibiotic, adhesive material (**X** paradoxical)

Clavicular fractures:
Broken collar bone

Clinical: pain with movement and may extend to surrounding muscles, swelling

M.C site: middle one third 80% > lateral 15% > medial 5%

Causes: falling on shoulder, FOSH, direct trauma

Associations: pneumothorax (apical lung), vascular + neural injury

Tx:
- spontaneous healing
→ immobilization by (figure of eight bandage)
- surgery :
1- neurovascular injury 2- open Fx 3- multiple pieces, shortening 4- ununion↑ 3-6 m \ malunion
5- distal third Fx (risk of ununion)

☒ **Healing process depend on**: age, complexity, location of fracture, displacement

Scapular Fx:
1- indicate energy trauma → high speed vehicle accident
2- associated with severe injuries → chest + others, that indicate admission
3- **Tx** → spontaneous

Sternal Fx: 4%

- **M.C location** → upper, middle third \ transverse
- **Dx**: lateral CXR, CT
- **Clinical**: pain, swelling
- **Associations** (55-70%) → rib Fx, long bone Fx, closed head injury, blunt cardiac injury (<20%)
- **Tx:** pain killer, spontaneous within 6-8%

Tracheobronchial trauma:

Mechanism:
1- rupture of membranous portion of trachea
2- disruption of trachea at point of fixation (carina & cricoid) due to sheeting or rapid deceleration force.
3- Laceration and transection

clinical: subcutaneous emphysema, dyspnea, dysphonia, and hemoptysis
CXR: fallen sign
Complication: empyema, clotted hemothorax, bronchoplural fistula, bronchial stenos, chylothorax.

Diaphragmatic injury: **1-7 %**
Associated injury in 80-100% of cases

When to suspect:
1- severe chest trauma, lower rib Fx
2- penetrating injury of chest & upper abdomen
3- rapid deceleration, direct crush to upper abdomen.

Clinical: SOB: late diagnosis with chest symptoms that increase on lying, bowel sound on auscultation of chest.

Dx:
1- CXR → hemi-diaphragmatic elevation \ stomach, colon, small bowel gases on chest
2- CT → may lost in absence of herniation
3- laparotomy or laparoscopy or thoracoscopy → GOLD standard

Complication: strangulation, sepsis

penetrating injury:
1- contusion → bruise
2- laceration: more serious, Tx: O2, ventilation, drainage
3- hemo\pneumothorax

Pneumothorax:
Classification:
1- open sucking wound
2- closed laceration of trachea or bronchi
3- tension

Clinical:
- severe respiratory distress (SOB)
- distended neck veins
- deviated trachea and apex pulse
- hyper-resonance on percussion + absent breath sound
- hemodynamic instability (hypotension- cause of death)

Dx:- CXR → collapsed lung, mediastinal shift, and absence of lung marking

Tx: chest tube → 5th intercostal space at upper margin of 6th rib (prevent NV bundle) at anterior axillary line

Hemothorax:

From where the bleed:
- internal mammary artery
- intercostal artery
- pulmonary parenchyma
- may: pulmonary vessels
- may: great vessels and heart

Tx: chest tube

Indications for thoracotomy:
1- initial chest tube output > 1500
2- hourly > 200 cm for 2-4 hrs
3- progressive opacification on CXR

CXR:
- homogenous opacity
- obliteration of costophrenic angle
- concave upper border

Hydatid lung

Definition: parasitic infection of both humans and other mammals such as sheep, cattle & pigs with hydatid cyst (larval stage of different echinococcus "mainly granulosus", cystic, unilocular)

D.H → dogs, foxes and other canines

I.H → sheep, cattle, pigs and occasionally human

Infective stage → eggs **diagnostic stage** → larva (hydatid cyst)

Contents of hydatid cyst: fibrous layer- laminated and germinal layer, scolices
daughter cyst – fluid

life cycle: D.H small intestine (worm adult) → eggs with stool → graze contaminated by this eggs ingested by sheep\human → eggs are hatching and go to portal system → primary echinococcus (liver MC, lung 10-30%, kidney + spleen + brain 10%) → hydatid cyst → secondary to other organs (by metscoles)

Clinical picture on lung: **20-40 yrs**

1- M.C asymptomatic = incidental finding on X-ray
2- large cyst (>20 cm) → pressure symptoms, mediastinal one (compression on airway, bone pain "sternum")
3- ruptured cyst (thin wall): Spontaneous, 2ndry infection, trauma:
- cough (productive + scolices), fever
- acute hypersensitivity (urticaria → anaphylaxis)
- glomerulonephritis; 2ndry amyloidosis → nephrotic syndrome (immune complex mediated disease)

Investigations:

- lab: peripheral blood eosinophilia + leukocytosis, ↑ erythrocyte sedimentation rate (ESR)
- serology: Ab by ELIZA, -ve in lung hydatosis
- casoni's test: intradermal injection of sterilized fluid from cyst → wheal within 20 minute, +ve
- imaging: CXR, CT:

*Uncomplicated: homogenous round masses with smooth borders (1-20 cm)

* Complicated:
1. crescent sing (erosion of bronchus + air into cyst) →
2. Double arch combo sign (more air → shrink of endocyst + air between endo and pericyte) →
3. Water lily camalote (more air + irregular air fluid level) →
4. Rising sun sign (when daughter cyst appears) →
5. Dry cyst sign (emptying)

- 2 + 3 are pathognomic for rupture.

☒ Pulmonary hydatid cyst do not undergoe calcification, daughter cyst is rare.

Management:

1- **Aspiration** → risk of rupture and anaphylaxis + recurrence
2- **Pharmacological** → mebendazole, albendazole (3-6 m):
   - multiple cysts\recurrence
   - small cysts
   - poor surgical risk\refused
   - after intra operative spillage of fluids
- C.I : large cysts, inactive or calcified, bone marrow suppression, pregnancy (primary term)

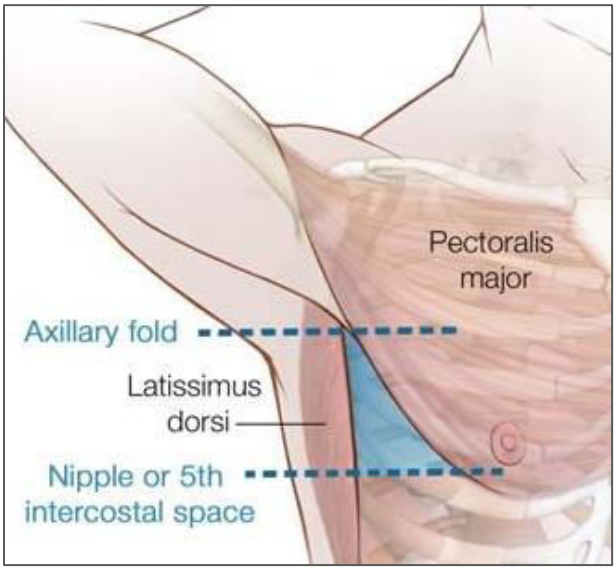
3- **Surgical**: the best curative method.
   - albendazole + posteriolateral thoracotomy:
     remove the cyst, lobectomy >50% occupying + post op albendazole

☒ **CASE**: 2 hydatid cysts on Rt & Lt lungs, one ruptured and the other didn't, from which one I start?
From the ruptured one to avoid complications like abscess, after 6 w I can do the other one.

☒ **CASE**: 3 cysts (brain, lung, liver) from which one I start?
The one in brain due to pre-symptoms in skull (bony), then lung (high risk of rupture), then liver.

Chest tube

The triangle for insertion:



Needle → midclavicular line \ 2nd intercostal space

Tube → anterior axillary line \ 5th intercostal space

☒ Always at the upper border of the rib below

Position:

- 45 degree semisetting
- the arm of the affected site is abduced \ externaly rotated \ hands behind head

The tip of the tube:

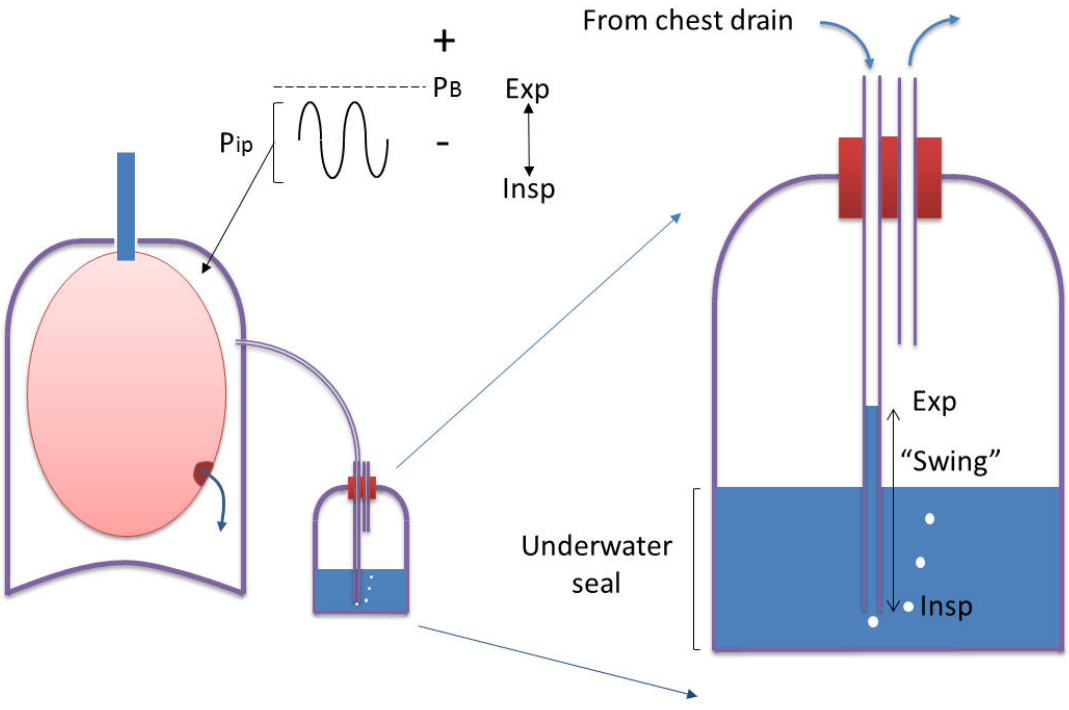
- posteriorly basally (dependent effusion)
- superiorly (pneumothorax)

☒ **CXR is performed**

Complications:

1- improper placement
2- dislodgment, blocked drain
3- bleeding
4- infection, empyema

The design:



Varicose veins examination:

Inspection:

1- diameter and tortuosity → indications for the severity

2- skin color:

- red: thrombophlebitis
- brown: Lipodermatosclerosis

3- ulcers

Palpation:

1- edema (non-pitting)

2- tenderness (thrombophlebitis)

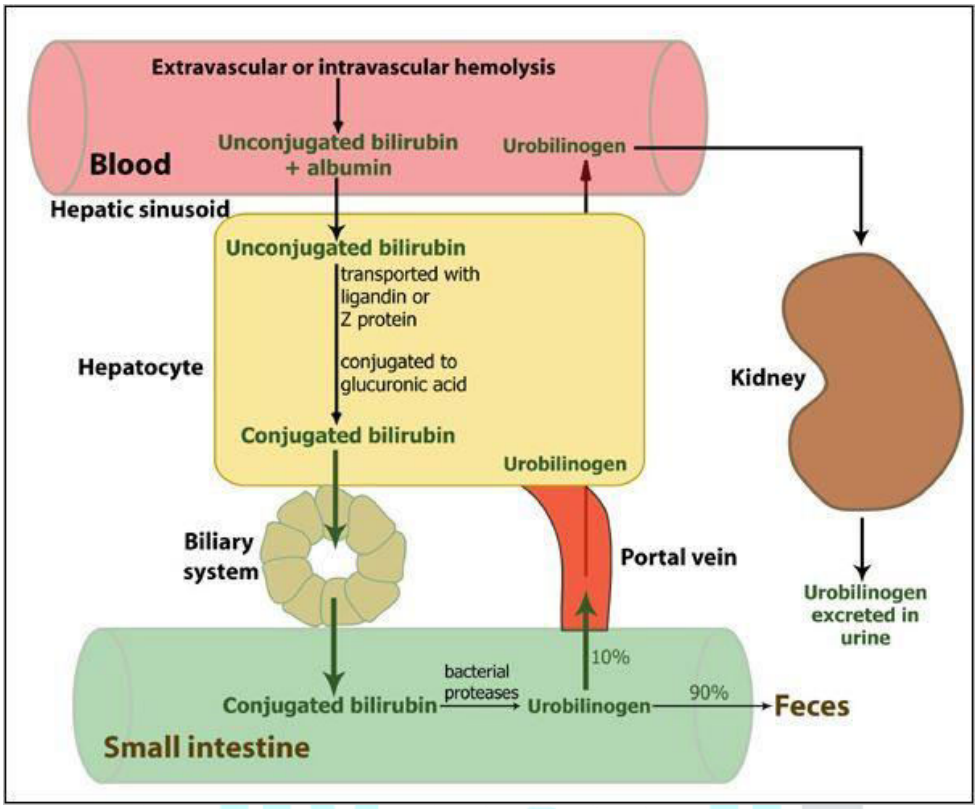
- **To detect the level of incompetent valve** → *(3 tunicate test) \ Trendelenburg test*
  - raising the leg and putting 3 tunicates (above & below knee, below inguinal ligament) and gradual release of these turnicates

- **To examine deep vein patency** → *(Parthes test)*
  - raising the leg and putting the turnicate as high as possible then walking → if the symptoms of DVT appear → +ve

- **To examine the perforator vein at fixed sites** → 5 – 10 – 15 – 20 cm above the medial malleolus (from the ankle)

Surgical jaundice

Physiology:



- Aged \ abnormal shaped RBC → Sequestrated in spleen sinusoids → Taken up by macrophages
- In the endosome, Hb >> globulin + heme
- Heme → "by oxidase" → biliverdin + CO + iron
- Biliverdin → "by reductase"- cytosolic → UC bilirubin → albumin → UC bilirubin → by glucoronic acid "UDP glucosyltransferase" → conjugated bilirubin → passed unchanged to GB and small bowel→ B-glucuronidase (distal ileum + colon) → unconjugated (sterco + uro bilinogen) "colorless" →:
  - 80% excreted in stool as stercobilin
  - 20% portal system (entero-hepatic circulation)
  - systemic circulation to the urine, combined to urochromes to give the color

Serum bilirubin:

Van den Bergh method
- bilirubin + diazotized sulfanilic acid → Direct (conjugated), total (after alcohol addition) } Give direct

- Normal value: total < 1 mg\dL (17 µmol\L) → conjugated .3 mg\dl + unconjugated .7 mg\dL

- In ↑ total bilirubin: if the direct > 50% → absorption, < 50% → indirect or mixed

Etiology of surgical jaundice:

► **prehepatic** → hemolysis: spherocytosis for spleenectomy + others (blood transfusion + hematoma) مش مهم

► **hepatic** → medical (exaggerated by surgery due to hepatocellular injury)

► **post-hepatic** (cholestatic):
- intrahepatic (obstruction of canaliculi due to acute, chronic liver disease) + drugs (chlorpromazine + phenothiazine + estrogen)
- extrahepatic = obstructive jaundice:

Extraluminal	Intramural	intraluminal
- CA of head of pancreas - periambullary tumor - enlarged LN - Mirizi syndrome - hepatoma	- sclerosing cholangitis - biliary atresia - iatrogenic stricture → (surgical\radiotherapy) - inflammatory stricture → dormant stone - traumatic stricture - idiopathic stricture	- stone - parasitic infection: ascaris, hydatid (perihepatic scolices) - CA: cholaniocarcinoma, papillomatosis

Clinical features:

1- **Dark urine** (conjugated ↑)

2- **Pale stool** (urobilin + stercobilin ↓)

3- **itching** (bile salts that activate mast cells to relieve histamine) + according to the DDx 65 جدول ص

- **Biliary stones**: abdominal pain, AF, fatty dyspepsia, +\- cholangitis\pancreatitis, recurrent jaundice
- **Biliary tumors**: obstructive jaundice, abdominal discomfort, old age
- **PCA:** progressive painless jaundice +\- palpable GB + weight loss & anorexia
- **Periambullary tumor**: transient jaundice + weight loss & anorexia
- **Iatrogenic**: constant jaundice + Hx of gastrectomy, cholecystectomy, ..
- **Inflammatory**: constant jaundice + disability episode

Physical examination:

- **vitals** : ↑ fever (cholangitis)
- **tenderness + guarding in RU + hepatomegaly**
- **palpable GB** - **ascites** - **lymphadenopathy** (Virchow's LN) - **wt loss**

Investigations:

- CBC, serum bilirubin

- liver function test: PT\PTT (vit K deficiency due to malabsorption of fat soluble vitamins, corrected through 36 hrs with a parenteral vit K)

- liver enzymes: differentiate between hepatocellular (AST, ALT↑) and cholestatic (alkaline phosphate + AST higher than ALT, GGT "gamma glutamyle transferase")

- US: gallstones + biliary tree stones (↓ due to bowel gases), biliary tree dilatation (8 mm in normal)

- CT: choledocholithiasis in the distal tree + head of pancreas

- ERCP (gold standard) : biliary tree stones detection & treatment after sphencterotomy, biopsy from periambullary tumor, stew insertion.

ERCP Complication: pancreatitis (M.C); depends on the pressure used to pump the contrast, cholangitis, hemorrhage, perforation.

- MRCP: non-invasive, differentiates between malignant + calculus obstruction. Could be used instead of ERCP.

Treatment:

1- fluids
2- vit K
3- antibiotic
4- surgery to treat the cause
5- post-op mannitol to prevent hepatorenal shut-down due to bilirubin → RTN

- The initial investigation of RUQ pain is always US , even if there is suspension of cholangitis.
- When The LF is impaired: always the PT prolongs before PTT → factor 7 has the shortest half-life.
- Dilated CBD starts from 6mm or equal to portal vein diameter.

Polycystic liver disease "PCLD"

- Genetic disease, AD, 3rd decade of life, mutation in PRD1, 2 gene
- 50% associated with polycystic kidney disease
- Development of multiple hepatic cysts (↑ in # and severity in females, advanced age, ↑with renal dysfunction)

Clinical:

- **small cysts** < 2 cm →asymptomatic
- **large cyst** → pain, distention, SOB, enlarged liver

☒ Liver function is usually preserved unless in massive disease → ascites, variceal hemorrhage, encephalopathy.

Complications:

1- intra-cystic hemorrhage, infection, ruptures
2- RF → hemodialysis

Associations:

1- cerebral aneurysm
2- diverticulosis
3- mitral valve prolapse
4- inguinal hernia

Investigations:

- ↑ γ-glutamytransferase level, MRI, CT

Tx: the aim is to reduce liver volume:

1- **medical** – on study (Somatostatin analogue: Octreotide, lanreotide, ..)
2- **sclerotherapy**, laparoscopic fenestration
3- **surgical**:
- liver resection → if the cysts found in ta particular area (majority of them)
- liver transplantation → definitive Tx

Hepatic cystadenoma:

- rare 5%, mainly in Rt lobe
- presented as abdominal pain\mass
- **imaging**: thick with soft tissue nodules and septation
- **Tx**: liver resection → risk of malignancy

Hydatid disease: *Echinococcus granulosus*

clinical:

1- asymptomatic
2- RUQ pain due to stretching with enlargement of liver
3- ruptured cyst:
  - anaphylaxis → foreign hydatid protein
  - secondary infection
  - biliary obstruction: daughter cyst, scolices, pressure from outside
4- pulmonary symptoms: hydatid lung

Investigations:

1- eosinophilia 2- serology: ELIZA 3- casoni (not used anymore)
4- imaging:
- plain film of calcified cysts → inactive one
- US, CT: thick wall cyst +\- multiple daughter cysts (multiloculated cysts), floating membrane within cyst on CT.

Management:

1- Albendazole, Mebendazole (15 mg\Kg\day) for at last 4 m.
2- PAIR (puncture, aspiration, installation of hypertonic saline\alcohol, re-aspiration)
3- surgical excision (the best):
- >10 cm \ complicated - daughter vesicles - superficial cyst → rupture

☒ if ruptured: 1- post operative\pre\ through: Hydrocortisone therapy 2- post op Albendazole

Simple cystic disease

- M.C benign lesion in liver, F > M, solitary
- Biliary malformation (not communicate with biliary tree)
- Asymptomatic mainly → large mass, RUQ pain, Epigastric fullness

Dx:

- US, CT → well defines, no solid component, filled with homogenous fluid.
- Laparoscopy → blue hue appearance

Tx:

- asymptomatic
- symptomatic: sclerotherapy → after aspiration \ rule put biliary, peritoneal communication.
  Surgical excision then for pathology to exclude CA

Malignant lesions in liver

- M.C is secondary

Hepatocellular carcinoma:

M.C primary
without cirrhosis (poor prognosis)

R.F: any cause of liver cirrhosis (US every 6 months):
- HBV, HCV
- alcoholism, steatohepatitis (non-alcoholic)
- congenital biliary atresia, IEOM (Wilson, ..), tyrosinemia.
- aflatoxin

Signs & symptoms:
- enlarged abdomen (hepatomegaly \ ascites)
- pain in RUQ
- obstructive jaundice (pruritus, clay colored stool or melena)
- upper GI bleeding, hepatic encephalopathy
- wt loss
- Leser-Trelat sign: multiple seborrhoeic keratosis
- dermatomyocytis
- acute symptoms in peritonitis \ hypovolemic shock (ruptured)

Investigations:
- CBC (anemia from melena & GI bleeding, thrombocytopenia)
- KFT (prereanl failure, hepatorenal syndrome)
- LFT
- AFP → inversely correlate with survival rate
- electrolyte (Na → ascites)
- bilirubin

- imaging: US, spiral CT, MRI, angiogram

Staging: TNM →
1→ solitary without vascular invasion
2 → solitary with vascular invasion
3 →multiple > 5 cm or invade major branch portal\hepatic vein
4 → to adjacent organ

Tx:
1- treat the symptoms of failure (ascites, HEP, GI bleeding)
2- resection: partial with 1-2 cm safe margin or total + transplantation
3- radio\chemo therapy
4- Sorafenib (tyrosine kinase inhibitor)

☒ **Milan criteria for liver transplant:**
single < 5 cm or 2-3 small ones < 3 cm AND no vascular extra-hepatic invasion

Fibromellar carcinoma:

- Arising in non-cirrhotic liver
- **Dx**: biopsy, tumor marker CD68, Hep Par-1, cytokeratin 7.
- Don't response to chemotherapy ☹

Chlangiocarcinoma:

- 2nd most common primary \ old aged women (obstructive jaundice + wt loss)
- Arise from epithelium of biliary tree from any site (typically from Rt, Lt hepatic duct "Klatskin tumors")

R.F:

- primary sclerosing cholangitis
- hepatolithiasis
- parasitic → *Clonorchis sinesis*
- congenital abnormalities in biliary tree
- biliary papillomatosis
- HCV
- lynch syndrome
- thorotrast exposure

Tx:

- surgical excision: proximal: partial hepatectomy + reconstruction of biliary tree, distal: pancreaticodoudectomy "whipple" (better prognosis)
- chemo \ radio

Secondary \ metastatic: M.C

- From a primary colorectal (50%), stomach, breast, pancreas, lung, ..

Investigations:

- LFT, CEA, AFP, CA 19-9
- CT, MRI, US → multiple lesions involving both lobes.

Tx:

- surgical resection: local, segmental, hemi hepatectomy
- if diffuse → incurable ☹

Burns and inhalational injury

Etiology:

- All age groups are involved
- M.C burn at home
- 50% of mortality due to inhalational injury
- <3 yrs → scalding (hot liquids)
- 3 yrs → scalding + clothes catching fire + contact + electrocution + chemicals
- Teenagers + 17-65 yrs → domestic flames + electrocutions + industrial accidents
- Elderly → scalding

Mortality:

- incidence of burn-mortality accurately known and ↓ with burn centers
- Depends on: site, extent, age, depth, general condition
- M.C direct cause → uncontrolled shock + uncontrolled septicemia

Pathophysiology:

Local effect of burns: zones

1- 3 zones:
   - coagulation zone = dead tissue
   - zone of stasis = in between, if /(infection, prolonged hypotension) → dead
   - zone of hyperemia = recovers for sure

2- Fluid loss:
   - least severe forms → capillary dilatation + erythema
   - deep zone → capillary permeability ↑ + damage → plasma to outside or encircled by blisters.

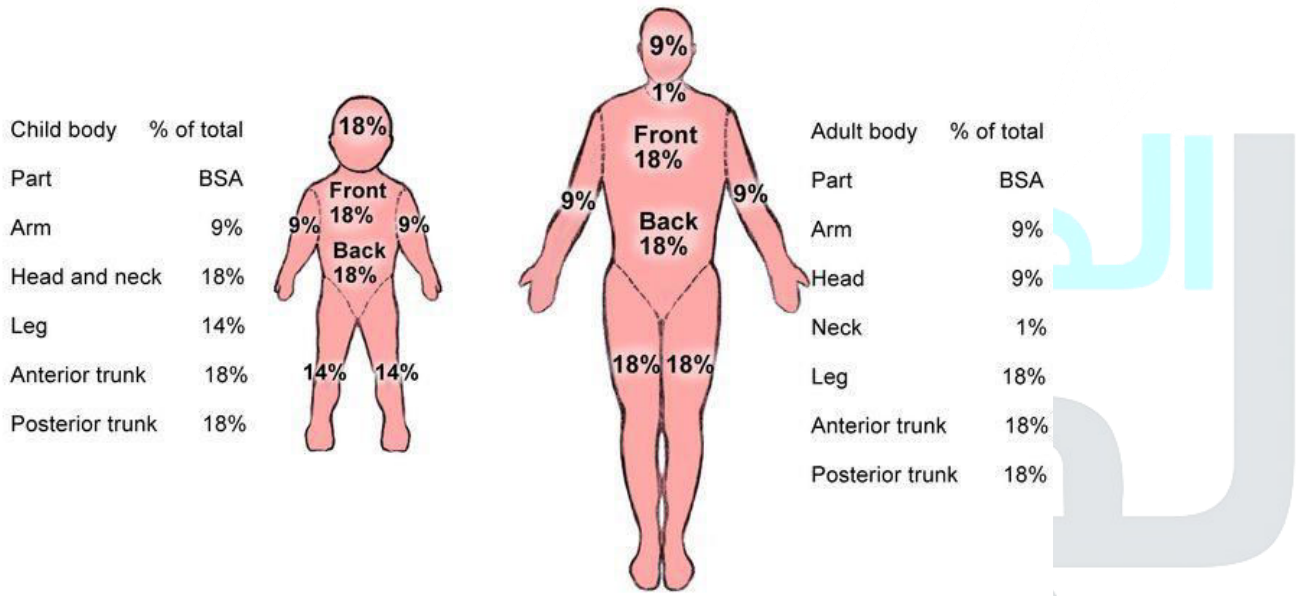
Systemic effect:

1- Hypotension, hypothermia
2- Sepsis
3- ↓Na^+ (loss by plasma) → "later" ↑ Na
   ↑K^+ (cell damage) → ↓K
4- Hemolysis
5- Renal failure (hypotension → RTN, hemoglubinemia + myoglubenemia)
6- Curling's (stress) ulcer, erosive gastritis
7- Venous thrombosis
8- Respiratory failure (inhalation injury)

	Superficial partial	Deep partial	Full thickness
Extent	Epidermis + sub dermis	Epidermis + deep dermis	All epithelial element
Healing	epithelial cells survive to restore epidermis	Depends on appendage	**X**
Appearance	Erythema wet (small blisters) pink	Erythema wet (Large blisters) pink-brown	Dry brown, white, yellow, black visible thrombosed veins + subcutaneous fat
Test to differentiate	Blanching: ✔"quick" pin-brick: ✔	✔ "slower" ✔	**X** **X**
Mechanism	Scalding sun burns	Scalding chemical fire	Scalding chemical electrocution

Extent of burn: prognostic value, management

1- **Rule of nine:**



2- **Palm method** (each palm = 1%)
3- **Lund Browder** (more accurate) → according to age

Inhalation injury:

1- **Co-poisoning** → COHb → oxygen utilization, cardiac damage, CNS → demyelination
2- **Thermal injury** → URT mainly, lower (rare with flames), caused by heat carrying capacity
3- **Smoke inhalation** → product of combustion, epithelial damage for all RS.

Key point to inhalational injury:

- Closed place
- Full thickness or deep burns on neck, ace, upper torso
- Signed nasal hair + presence of sores in nose
- Carboneous sputum

Management of burns:

Prehospital:

- Stopping the burn process Key point to inhalational injury → Rolling, water, ..
- Electrical: x source + remove the patient by a stick
- Chemical: irrigation
- Cool water: if cold → hypothermia
- O2 in ambulance

Hospital:

► Airway: inhalation will result in burns above vocal cords → edema later

When to intubate?

1- erythema of oropharynx in inspection
2- change of voice
3- stridors 4- dysphagia

Tracheostomy: usually not done →↑ risk of infection around stoma but possible in some cases

► **Breathing:** close space, S & S of CNS → 100% O2 by mask → measure COHb, if +ve intubation is needed
Lower injury is suspected : CXR, ABGs, call the specialist

► **Encircling eschar on chest** → escharotomy

Traumatic one: late & slowly

► **Shock** → pain, resolves spontaneously
→ plasma loss, ↑ in first hrs → ↓1-2 days, 3 days → (severe)

- If Mild: oral
- 20% adult + 15% children → IV fluids
- >25 % catheter + NG tube
  depends on size not the depth
- **Formula 1:** volume (ml of colloid) = burn area (%) x body weight \ 2
- **Parkland:** volume = burn area (%) x body weight x 4
  → blood: if > 10% BSA (each 1% → 1% of patient blood)

Fluids:
- ringer lactate
- dextrose later
- colloid

Surgical management:

- Full thickness or non-healing partial
- Skin flap (split, full thickness)
- Early (1st week), late (after 3rd week)

Others: antibiotic prophylaxis, tetanus toxoid

Effect of infection:

- delayed healing
- ↑ depth (1°→2° , 2° → 3°)

Local Tx:

1- **Exposure method:**
- cleaning by antiseptics continuously in dry, coolness, light exposure conditions
- dryness + crusts formation → bacterial invasion
- when to use: uncovered areas (perineum, face, one side) + hyperpyrexia patient.

2- **Dressing:**
- provide mechanical barrier to prevent bacteria
- to absorb the exudate + applying antibacterial agents
- how? Apply initial cleansing, antiseptics, non-adherent dressing
- reviewed every day and left in place 8-10 days
- <u>when to remove?</u>

1- ↑ amount of exudate
2- bad smelling
3- hotness + painful

Antiseptics:
- NCP (neomycin, chlorhexidine, polymyxin)
- sulfamylon
- flamazine (silver sulphadiazine)
- silver nitrate 5%
- soframycin

3- **Circumferential:** encircling eschar → trunk (respiration) or limbs (circulation)
1. Monitoring the circulation by Doppler in the neck → escharotomy under anesthesia
** analgesia only in 3rd degree

4- **Bacteriological studies + infection**
- collection of samples at admission, 3rd, 4th, pre-grafting, septicemia
- the count of bacteria ∝ with infection
- s & s of infection: purulent smelly discharge, pain, red margin
  - Angry and un-healing looking burn → hemolytic strep
  - Bluish green pus → pseudomonas (the most dangerous)
  - Foul smelling discharge → proteus

Skin cancer

Basal cell carcinoma:

- Most common one
- 40-8- yrs
- Head & neck
- Most common in eyelid

Risk factors:

1- Sun exposure
2- Advanced age
3- Immunosuppression: AIDS, organotransplant, medications
4- Carcinogen exposure: UV + ionizing radiation, arsenic, hydrocarbons
5- Albinism
6- Defective production of melanin (vetiligo, ..)
7- Fitz Patrick skin type: I, II, III
   - I – white: always burns never tan
   - II – white: usually burns, tan difficulty
   - III – white: sometimes burns, tan average
   - IV – moderate: brown rarely burn, tan with ease
   - V – dark brown: very rarely burn, tan very easily
   - VI – black: don't burn, tan very easily
8- Genetic mutations: PTCH, P53, Ras
9- Gorlin's syndrome: AD, multiple basal cells + odontogenic keratocysts mainly in mandible
10- Xeroderma pimentosum: (R.F for all skin cancers)

Originate: pluripoential epithelia cells of epidermis and hair follicles.

Types:

1- Nodular: head & neck, M.C type → exophytic, well defined borders, flesh colored. + **{telangiectasia}** مهمة
2- Superficial spreading: endophytic "flat", pink, scaly patches on trunk
3- Micronodular: infiltrative, pigmented (زي العضة)

Diagnosis:

1- history (R.F) – examination
3- biopsy: excisional (small one), incisional (large & in sensitive area), taken from 4 regions.
- in both biopsies we should take a part of normal margins

Treatment:

- Medical: imiquimod, 5- fluorouracil
- Radiotherapy: rare to be used

- Destructive: curettage and electrodesiccation, cryosurgery, later phototherapy, photodynamic therapy.
  - Primary surgical excision with safe margin →
    (4mm) if low risk, (10 mm) if high "recurrent, biopsy with poor features"
  - after excision we send the tissue to pathology → margin involvement: if +ve we re-excision
  - No need for LN removal
  - Follow up 3 months later, then 6 months, by examination, LN ex.

Mohs surgery:
used in sensitive areas.
not available in Jordan ☹

Risk of recurrence:

	Low risk	**High risk**
Location, size	< 20mm, trunk <10 mm, check\scalp, forehead, neck <6mm, central face, genitalia, hands, feet	>20 >10 >6
Defined borders	Well defined	Poorly defined
Primary\recurrent	Primary	Recurrent
Immunosuppression	-	+
Radiotherapy	-	+
Pathology	Nodular	Morpheaform, sclerosing (worse prog.
Perineural involvement "diagnosed by pathology"	-	+
Rapidly growing	-	+
Depth	<2mm	>2 mm
Lymphovascular invasion	-	+
Degree of differentiation	Well differentiated	Poorly

Squamous cell carcinoma:

R.F as BCC
+ viral infection (HPV 16, 18 →mouth), HSV
+ marjolin's ulcer
+ premalignant lesions: actinic keratosis, Bowen's disease
(10 % risk of malignancy)

***marjolin's ulcer** → arise from chronic non-healed wound (burn scar, fistula, chronic inflammation..), latent period 1 yr-30 yrs.

Types: verrucous, ulcerative, *marjolin's* ulcer*, subungual

Diagnosis:

- History (R.F)
- Examination + LN: CT scan for staging (> 2cm = T2, risk of regional mets)
- Biopsy subungual pathology

*Surgical excision + LN with safe margin in (4-6 mm up to 1 cm) grossly (macroscopy)
-microscopy: +ve (10%) we remove more from margins

LN dissection:
- if there is no evidence for LN involvement we do sentinel LN biopsy, if +ve → dissection & radiotherapy.
- if there is evidence → dissection

Treatment: - Surgical excision* - Frozen section (70% accuracy) -Follow up

Malignant melanoma

Congenital naevus cell naevi:

Giant hairy neavi:

- 20 cm, 5% of body surface area, 40% risk of malignancy so we need biopsy (incisional) + follow up
- **Tx**: follow up (difficult to remove)

Special types of naevi:

► **Dysplastic naevi:**
- >5 mm in diameter
- Irregular outline

► **Malignant melanoma:**
- Skin mainly → the least common in eye
- Female predominance (35-54 yrs)
- **R.F:**
  1- history of changing mole \ multiple or atypical nevi
  2- Large navus > 15 cm
  3- White
  4- Melanoma before age of 40 yrs
  5- Regular tanning before the age of 30 yrs
  6- History of non-melanotic skin cancer
  **we should do them biopsy or dermatoscopy

- **ABCDE of melanoma:**
  A: asymmetry **B:** border (irregular, not well defined) **C:** color (in the same nevi is mixed)
  D: diameter > 6mm **E:** evolving (changes in size, color, shape)

- **Types:**
  1- Superficial spreading melanoma: rapid spreading, M.C one
  2- Nodular: vertical growth (depth), worst prognosis, risk of LN mets.
  3- Lentigo malignant melanoma: sun damaged kin, irregular margin, slow development, dark in color
  4- Acral lentinigos melanoma: poor prognosis, mainly in palms and soles
  5- Amelanotic melanoma

- **Diagnosis:**
  1- History (R,F)
  2- Ex (ABCDE) + LN
  3- Staging
  4- Biopsy: excisional, punch (like a pencil, take biopsy from the depth), shave is not used

Breslow depth:

≤ 1.0 mm, > 1.0 -2.0 mm, >2-4 mm, > 4 mm

(I) **(II)** **(III)** **(IIII)**

- ☒ Distance between glandular layer to the deepest point of melanoma
- ☒ Directly related to survival

- Melanoma can cause small bowel obstruction by mets.

- Trunk, perineum, mucosa, scalp → have worse prognosis

TNM staging:

1- AT as breslow (1-4)
   T1a → without ulceration, mitosis < 1\mm2
   T1b → with ulceration, mitosis > 1\mm2
   - mitosis مش ال ulceration باقي بس بال
2- Stage 3 → LN involvement

- **Treatment:**
  - Surgical excision with safe margin according to the depth:
    - .5 – 1 cm ←1 mm or less
    - 1-2 cm ←1-2 mm
    - 2 cm ←> 2mm

  + LN dissection if there is evidence of mets by ex, CT, US
  .75 mm in depth without evidence of LN involvement by Ex, US, CT → sentinel LN biopsy → if +ve → dissection

Abdominal wall hernias

Definition: protrusion of viscous or part of viscous through abdominal opening.

- Consists of sac (fundus, neck, body, mouth) , covering, content .
- Epigastric hernia contains fat mainly.

Contents:

- Intestine (enterocele)
- Omentum (omentocele)
- Ovary +\- fallopian\bladder → urinary symptoms
- When the intestine involved in only portion of circumference → Richter
- Mickle's diverticulum → Litter's
- More than one loop → maydl's
- Sliding hernia → if the wall is part of content (like visceral peritoneum that contact with

By Ex:

- tympanic → intestine
- dull → feaces, omentum, fat.

According to reducibility:

1. **Reducible**: by surgeon, patient, itself
2. **Irreducible**: due to adhesion ns to the wall .
   - Incarceration → when the lumen of colon occupying hernia blocked with feaces.
3. **Obstructed**: obstructed bowel without ischemia.
4. **Strangulation**: ischemia (-ve cough impulse, redness, hotness, pain)

According to the site:

- **Epigastric** → fat
- **paraumbilical\ umbilical**.

Anatomy of abdominal wall:

1- Layers:

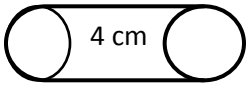
- skin, subcutaneous fascia (superficial "fatty" → camper's \ deep "membranous" → scarpa's → colle's in the perineal region)
- muscles:
  - external oblique → aponurosis → inguinal ligament
  - internal oblique → cremastric muscle
  - transversus abdominis
  - rectus muscle
  - pyramidal
- fascia transversalis \ peritoneal lining (parietal)

Arcuate line: where he rectus sheath in posterior wall of rectus muscle is absent so it will be in direct contact with fascia transversalis.

Nerve supply: T7-T12 + L1 (iliohypogastric + ilioinguinal)

Inguinal hernia :

- M.C one
- Direct, indirect
- **Anatomy** of inguinal canal:

Deep inguinal ring  Superficial inguinal ring

  - Anteriorly : external oblique, laterally by internal oblique
  - Posteriorly: fascia transversalis, conjoint tendon (medial 1\3)
  - Roof: arching fibers of internal oblique + transversalis abdominis.
  - Floor: inguinal ligament.

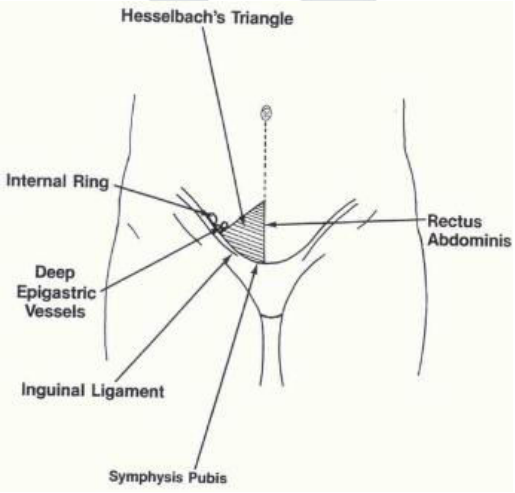
- **Contents**:
  1- genital branch of genitofemoral nerve
  2- spermatic cord and round ligament
  3- ilioinguinal nerve
  - Inferior Epigastric vessels lie medially to internal ring.

- **Types:**

Indirect:

- M.C, children, Rt side mainly (55%) , bilateral 12%
- Caused by patent processus vaginalis + intra-abdominal pressure (may help)
- **Types:**
  - bubocele → Not reach the external ring
  - funicular sac → reaches beyond external ring but not reach tunica vaginalis.
  - Complete → reach the tunica vaginalis

- **Clinical :**
  1- asymptomatic (painless bilge +\- heavy feeling)
  2- swelling (medial and above pubic tubercle)
  3- Expansile cough impulse \ palpable cough impulse.
  4- Reduce spontaneously or by pt
  5- Bowel sound on auscultation
  6- Deep ring occlusive test (put your fingers on deep ring " 2 cm above mid inguinal point" + cough)
  - +ve direct \ -ve indirect سكرت عليها



Management:
- if reducible we do taxis (to reduce it under sedation) + herniotomy → (excision of sac)
- herniorrhaphy → (adult, tightening the ring and strengthening the posterior wall "hassle-Bach triangle"

Epigastric hernia:

- Hernia through the linea alba above the umbilicus due to sudden strain tearing
- May be :
  1- fatty hernia of linea alba (extra-peritoneal fat)
  2- true Epigastric hernia (omentum)
- Clinical: asymptomatic \ some Epigastric discomfort.

Umbilical hernia:

- More likely in infants and children
- Symptomless, increase with crying, conical shape
- Tx usually it disappear at 3 yrs, if above → surgery

Paraumbilical :

- F>M, multiparous, obese
- Defect of the linea alba just above the umbilicus
- Symptomatic → dragging pain, transient attacks of colic due to (adhesion between wall and loop), skin may become reddened, excoriated, ulcerated, may have fistula. (thin skin and we may see the loop)
- Tx: it may become irreducible thus surgery advised in all cases.
  1- Small→ herniorrhaphy
  2- large → hernioplasty
  3- additional lipectomy in case of large abdominal wall fatty.

Incisional hernia: 10%

- **R.F:**
  1- cough, constipation, early retaining to strenuous exercise, difficult micturition
  2- Infection, irradiation, malignancy, chemotherapy, steroid
  3- Hematoma, seroma
  4- Malnutrition, chronic systemic illness
  5- Early post-op pregnancy

- **Tx:**
  1- Wear abdominal support
  2- Surgery → repair the defect \ mesh

Spigelian hernia:

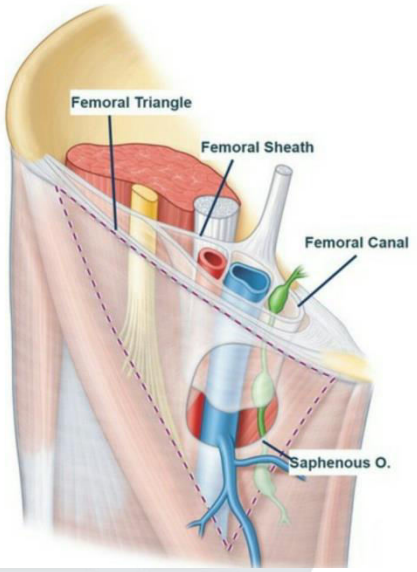
- Occur in linea alba semi-lunaris (outer border of rectus muscle)
- Liable to strangulation → surgery
- May press the inferior Epigastric vessels.

Direct: 35%

- M>FF
- **Acquired**:
  1- straining, heavy lifting
  2- smoking
  - ilioinguinal nerve injury (appendectomy)
- **Anatomy** : (descend through external inguinal ring \ triangle of hesslebach's)
  wide neck , reducible, no strangulation
- **Clinical**:
  - bulging above groin crease
  - deep ring occlusive test → +ve
- **Management**: herniotomy + reconstruction of fascia transversalis.

Femoral hernia: 3%

- f>m
- more liable to strangulation bcs of rigid femoral ring (presence of lacunar\pectineal\ inguinal ligaments) + narrow neck (40% of presentation)
- **Causes**:
  Acquired: f>m ??
  1- Wide femoral canal due to small ilioposas and pectineus.
  2- Pregnancy (↑ in multiparous)surgical anatomy :
  - the hernia may reach saphenous opening .



- **Clinical features:**
  . Inguinal mass (below, lateral to the pubic tubercle)
  . Rt side more than Lt + 20% bilateral
  . Asymptomatic → may become strangulated
  . Difficult to reduce due to J shape course and tight neck.

- **Management**: remove the inguinal sac + suture the inguinal ligament to the pectineal.

- **Different approaches:**
  1- Below inguinal ligament (lock wood)
  2- Through inguinal canal (lothessen)
  3- Through rectus sheath (McEvedy)

Neonatal jaundice

Epidemiology: 60% of term, 80% of preterm

- Mostly due to unconjugated bilirubin → medical condition
- R.F : as mentioned in pediatric lectures
- Physiological jaundice → 2-3rd day → "relieved" 5-7 days
- Pathological jaundice → 1st day, beyond 2 weeks, direct

Causes:

1- **Obstructive:**
   - biliary atresia (M.I), surgical cause
   - choledochal cyst
   - inspissated bile syndrome (cystic fibrosis, hemolysis, parenteral nutrition)

2- **Hemolytic** (ABO, rhinocompitaility, spherocytosis)
3- **Metabolic disorders** (α1 antitrypsin, galactosemia)
4- **Congenital infection** (syphilis, TORCH)

Biliary atresia:

- Rare
- Characterized by fibroproleferation of biliary tree, may be : (hepatofibrosis, cirrhosis, ESLF)
- Involve any part of biliary tree

- **Causes**: multifactorial:
  - arrest in development
  - fc gene (BA + splenic malformation)
  - perinatal exposure to REO\ROTAVIRUS

- **Association**:
  1- Intestinal malrotation
  2- Predoudenal portal vein (posteriorly to duodenum → may lead to rare duodenal obstruction)
  3- Polysplenia (multiple small accessory spleen)
  4- Interrupted IVC (below hepatic vein which directly drain to Rt atrium) with azygos continuation (drain the lower limb).

- **Classification**: according to JAP:
  - ✓ I → CBD
  - ✓ IIA → common hepatic duct (CHD)
  - ✓ IIB → CBD, CHD, cystic duct
  - ✓ III → (>90% M.C) ALL at level of parahepatics.

- **Signs & symptoms:**
  - Pale stool
  - Dark urine
  - Progressive jaundice
  - Hepatomegaly
  - when advanced → (hepatospleenomegaly, ascites, varices)

- **histology**: inflammatory changes + fibrous tissue of parenchyma + duodenal proliferation

- **DDx:** biliary atresia, choledochal cyst, inspissated bile syndrome, neonatal hepatitis.

- **Dx:**

1- Lab tests:
- bilirubin (total, direct) → direct + indirect ↑
- ALP → obstruction
- GGTP → more specific ↑
- LFT → albumin\clotting → normal
- infection work up → TORCH
- α1 antitrypsin screening

2- Imaging:
- *US*:
a) absent gallbladder (highly suggestive)
b) intrahepatic biliary tree (not dilated) **مهم**

- *nuclear medicine scan* \ HIDA scan (99-Te) "hepatobiliary iminodiacetic acid" : normal hepatic reuptake but no excretion even after 24 hrs + bladder (isotope go to circulation)

- *cholangiogram*: hypoplasia of extrahepatic biliary system.

3- Surgical exploration (END Diagnostic)

- **Tx:**
  - Type I → patent proximal hepatic bile duct → direct Roux en-Y- hepato jejunostomy (hepatic duct to jejunum)

  - Types II \ III → X → kasai procedure (before age of 8 weeks)
    - radical excision of all bile tree up to liver capsule
    - Roux en-Y
    - portoenterostomy
    - liver biopsy
    + antibiotics, drugs to promote the flow, 10 days hospital stay.
    - Complications post op: bacterial cholangitis, attacks of hepatic fibrosis, portal HTN.

  - Liver transplant: if all above not successful

Choledochal cyst:

- Congenital cystic dilatation of intra +\- enterohepatic biliary system.
- F>M
- More common in Asia
- Majority diagnosed at first decade of life and others later. 20 % prenataly.
- Cause: pancreatobiliary maljunction
- Clinical:
  - Adult form: jaundice, pain, palpable mass.
  - Prenatal: cystic mass in abdomen
  - infant: jaundice\hepatomegaly
  - adulthood\childhood: ascending cholangitis, OJ.

Corrosive esophageal injury

Anatomy of esophagus :

- 25 cm in length
- Striated at the beginning 

smooth
- Squamous epithelium
- Sphincters : upper & lower
- Three strictures (foreign body may stuck on it) :

  1 – cricopharyngeus 2 – aortic arch 3 – lower esophagus

- **Nerve supply :**

  vagus that has synaptic connections to myenteric (Auerbach's) plexus

  xx Meissner's submucosal plexus

- **Blood supply :**

  1 – Inferior thyroid artery ➔➔ cervical esophagus

  2 – Bronchial arteries ➔➔ Proximal descending thoracic aorta

  3 – Branches from aorta ➔➔ distal descending thoracic aorta

  4 – Inferior phrenic artery + left gastric artery ➔ ➔ abdominal aorta

Epidemiology of injury (corrosive) :

- Most common in children < 3 yr. , ↑Boys .
- May in > 5 yr. & adolescent girls (intentional)

Cause :

according to the physical form of the substance ➔ site / type of the esophagus injury

Alkali	Acidic
Ph > 7 (> 12 ➔ sever)	Ph < 7 (< 2 ➔ sever)
Hydrates , Carbonates (Na , K+)	organic / inorganic
Mainly injures upper esophagus ➔ alkali will neutralized in stomach , so this limit the injury	More lower esophagus + gastric injury
Tasteless , odorless ➔ larger amounts	Pungent odor and Nexus taste
Liquefecation necrosis ➔ direct extention + saponification of fats + dehydration &thrombosis of blood vessel , deeper injuries	Coagulative necrosis ➔ coagulum that limit the depth of injury
no eschar formation or afriable eschar	Hard eschar that limited injury

Severity :

amount , concentration , form (solid , liquid) , duration of contact with mucosa .

Clinical features :

Common ➔ retrosternal or epigastric pain
oropharyngeal injury
dysphagia , odynophagia
Hypersalivation
burn to epiglottis + Larynx ➔ Hoarseness , Stridor , Aphonia , Respiratory distress
Perforation / Peritonitis ➔ Tenderness rigidity

Phases :

1 ➔ (Acute necrosis) 1 – 4 Ds
2 ➔ (Ulceration + granulation) 4 – 12 Ds
3 ➔ (Cicatrization + scarring) 3W – 6 M

Investigation (Imaging) : + (CBC , electrolyte , BUN , ABG , KFT , LFT)

1 – CXR : ملاحظة : شوفوا الصور من السلايد

- Pneumomediastinum
- pleural effusion , aspiration pneumonitis
- foreign body (button battery ….)
- signs of mediastinum

2 - Abdominal radiograph : pneumoperitoneum , foreign body

3 – Esophagram fluoroscope (water soluble contrast) :

- Acute mild ➔ Atonic dilated Aperistaltic + multiple shallow ulcers
- Acute severe ➔ extensive ulceration + narrowing
- Chronic ➔ Large or short segments strictures + proximal part of stomach pulled to chest

4 - CT scan :

- circumferential esophagus wall thickening > 5 mm
- pnemomediastinum / plural effusion
- stricture in chronic phase

Grades :

- **1** ➔ no swelling
- **2** ➔ edematous wall without periesophageal soft tissue involvement
- **3** ➔ edematous wall with periesophageal soft tissue involvement but well demarcated tissue interface
- **4** ➔ edematous wall with periesophageal soft tissue involvement but blurred interface Or collection of fluid around descending aorta + esophagus

5 – Endoscopy :

- must in first 24 hours after digestion
- extent of damage , progress , guide the therapy
- risk of perforation
- **Contraindication** : 1 - hemodynamic instability
  2 - evidence of perforation
  3 - severe respiratory distress
  4 - oropharyngeal or edema ➔ intubation
- **Staging** : 0 ➔ normal
  I ➔ mucosal edema + hyperemia
  II ➔ A - superficial ulcers , bleeding , exudate
  B - deep ulcers (circumferential / Local)
  III ➔ multiple deep ulcers + necrosis
  Perforation ➔ mortality rate 65% ➔ surgery

Good prognosis / not need treatment

Need Tx , developed strictures : 70 to 100%

6 – Endoscopic US : no evidence to use it but :

- if the muscle layer is interact ➔ no strictures will forms
- if involved ➔ strictures so we do balloon dilatation

* PH testing of saliva product ➔ to know if it alkaline or acidic + how much PH
(but neutral pH not rule out ingestion)

Management :

For all :

- ABC
- NPO + IV fluids + PPI (in acidic) + painkillers
- CXR , abdominal radiograph
- Endoscope in first 24-hour
- observation

* Steroid / antibiotic are contraindicated .
* Asymptomatic / low concentration and amount / tolerating a normal diet ➔ Follow up in OPD

Avoid :

- emetic (re exposes)
- neutralization agent :thermal injury
- gastric lavage : esophageal perforation , aspiration
- activated charcoal : poor absorption + endoscopy interference

Complications and its treatment :

Early :

- airway edema and obstruction ➔ intubation
- upper GI bleeding
- Perforation ➔ mediastinitis , pericarditis , pleuritis , TE fistula , E Aortic fistula , peritonitis

Late : strictures , CA

Strictures :

- Balloon / Bougies dilators in tight and fibroticon
  Gradual deterioration until reach effective safe dilation (3 - 4 W interval)
- Esophageal stent : - SEMS → metal
  - plastic
  - biodegradable
- Surgery : in non-responsive cases / harmful dilatation
  → parietal , total esophagoectomy + gastric pull up or colonic interposition

Cancer :

- at 1 – 3 decades
- Adeno / squamous cell carcinoma
- need endoscopy screening

Esophageal foreign bodies :

Symptoms : dysphagia , poor feeding , drooling , irritability , Stridor , choking , cough

Worke up : - CXR + cervical spine + soft tissue (AP , lateral View)
- Abdominal x-ray
- Contrast esophageogram in non-opaque objects .

Treatment : - removal by forceps basket + intubation or over tube placed in esophagus
→ to prevent aspiration
- button batteries / sharp objects → endoscopy