

Gall bladder

Dr. Elias - lecture 1 - Q&A

* Anatomy of GB

- GB stores and concentrates bile.
- Capacity **50-80 cc.** of bile.
- Acidification of bile → $\text{bicarb} + \text{H}^+ \rightarrow \text{H}_2\text{O} + \text{CO}_2$ (acidification)
stones & precipitation ← acidification
(stones) ← bicarb (alkaline)
- Parts → Fundus - body - neck - **Darkestman pouch** - cystic duct.
dilatation in between neck of GB and cystic duct.

Darkestman's ligament usually absent where stones usually lodge.
pouch.

* Fundus → below inferior border of liver.

anterior → in touch with abdominal wall
irritation → Murphy's sign
sudden catchment of breath → of peritoneum
when fundus of GB hits peritoneum.

Surface anatomy of fundus of GB

Transpyloric plane → halfway between xiphoid process and umbilicus, at 9th CC.

* Rr + Lr hepatic duct → common hepatic duct.

* Common hepatic duct + cystic duct → common bile duct.
Spiral in shape.

body of GB
 ① GB in front / anterior to transverse colon and junction between D1 and D2.

2nd part of duodenum ulceration GB store 1st ①

gall store ileus terminal ileum

causes small bowel obstruction

ileocecal valve

small bowel 10cm before ileocecal valve

transverse colon GB store 1st ①

Bouveret syndrome

pyloric obstruction

repeated early vomiting

leading to alkalosis

cholecystoenteric fistula duodenum interline GB fistula 1st ①

air in biliary system or cholecystocolic fistula

① So, air in GB cholecystoenteric / cholecystocolic fistula or cholecystoduodenal

emphysematus cholecystitis

gas forming acute abdomen tachycardia - dehydration
 ASAP GB bacteria antibiotic

PFA left side X-ray ultrasound

Rt hypochondrium tender abdomen [plain film abdomen]

urgent cholecystectomy cholecystitis emphysematus cholecystitis

rupture

Cystic duct wavy - spiral shaped, length 4cm, 1.5 inch, mucous membrane, folded.

mucous membrane of splenic a. folded

valve of Isthmus

① incidence of gallstone in cystic duct 1.5 inch, obstructive jaundice

②

straight. cystic duct. ampulla. في صلب زحالي

* cystic duct + common hepatic duct → (CBD)
below the neck - postmedial aspect of D2 (في الحجاب)

Blood supply of GB

① From cystic artery.

↳ arises from R hepatic artery.

↳ arises from common hepatic a. from

celiac trunk.

② but it takes additional blood supply from liver bed.

side of GB cystic a. -

end artery appendix - appendicular a.

case - 70% blood supply hepatic a. - liver bed

hepatic a. - portal vein. - 70% blood supply

cystic a. - inflammation

* appendicular a. from posterior cecal a. → from ileocolic a. → from SMA.

* GB length → maximum 7-10 cm.

* GB width → maximum 4 cm. inflammation -

* wall thickness of GB → 2-3 mm. edema swelling

↳ > 3-4 → acute cholecystitis.

How to differentiate between cholecystitis and biliary colic?

- By US → ① wall > 3 mm

most likely acute cholecystitis

biliary colic < 2 mm

② pericholecystic collection / edema of GB fluid

acute cholecystitis.

- ④

1st part of duodenum bile duct 2nd inch of 1st part of duodenum.

Duodenum → 1st part - 2nd part - 3rd part - 4th part
10 inch 2 inch 3 inch 4 inch 1 inch

duodenal cap → 1st inch of D1 intraperitoneal duodenum
D1 smooth muscle

valvular 2nd inch of duodenum 3rd part of duodenum 4th part of duodenum
gastrojejunum gastrojejunum

① Blood supply of CBD → runs vertical at 3-9 o'clock.

artery

investing layer of → superficial fascia → skin of thyroid
→ deep cervical fascia → pretracheal fascia → thyroid
→ infrahyoid muscle

blood supply → segmental → blood supply → bile duct

Rt hepatic a. + cystic a. → liver

gastroduodenal a. → Duodenum

superior pancreaticoduodenal

- 7 parts supplying bile duct → most important are cystic and
Rt hepatic a. above, gastroduodenal a. below.
termination of

common hepatic artery

D1 hepatic a. and gastroduodenal a.

* Gallbladder disease

- Multiple causes, genetic and environmental factors contribute to GBD.
- Female : Male $\rightarrow$ 9:1 $\rightarrow$ it's the disease of female & thyroid.
- Pregnancy, (+) family hx. are risk factors.
- 80% are asymptomatic, 20% have symptoms or will develop in 15-20 years.
- 1-2% per year. $\leftarrow$ نسبة الإصابة سنوية

we don't need to remove it $\leftarrow$ لا نحتاج إزالته

asymptomatic $\leftarrow$ غير متماثل very young female $\leftarrow$ أنثى شابة

% 30-40 $\leftarrow$ 30-40% asymptomatic $\leftarrow$ غير متماثل 20% $\leftarrow$ 20% symptoms $\leftarrow$ أعراض

* Adenoid $\rightarrow$ nasopharyngeal tonsil - single at root of nasopharynx.
double $\leftarrow$ palatine tonsils $\leftarrow$ اللوزتين

* Double Adenoid tonsils

* single lingual tonsil.

- Complications are more in late 40s.

* acute cholecystitis $\leftarrow$ التهاب المرارة $\leftarrow$ female $\leftarrow$ أنثى $\leftarrow$ male $\leftarrow$ ذكر

(biliary dz $\leftarrow$ أمراض المرارة $\leftarrow$ M $\leftarrow$ ذكر $\leftarrow$ F $\leftarrow$ أنثى)

60% : 40% (F:M)

* acute cholecystitis $\leftarrow$ التهاب المرارة $\leftarrow$ male $\leftarrow$ ذكر $\leftarrow$ female $\leftarrow$ أنثى

severity $\leftarrow$ شدة $\leftarrow$ male $\leftarrow$ ذكر $\leftarrow$ female $\leftarrow$ أنثى

* GB stone $\leftarrow$ حصى المرارة $\leftarrow$ female $\leftarrow$ أنثى $\leftarrow$ male $\leftarrow$ ذكر

supersaturation of $\leftarrow$ زيادة التشبع $\leftarrow$ estrogen $\leftarrow$ هرمون الإستروجين $\leftarrow$ progesterone $\leftarrow$ هرمون البروجسترون

mobility $\leftarrow$ حركة $\leftarrow$ GB $\leftarrow$ المرارة $\leftarrow$ bile $\leftarrow$ الصفراء $\leftarrow$ cholesterol $\leftarrow$ الكوليسترول

GB stone $\leftarrow$ حصى المرارة

- Increase lipids and carbohydrate in diet.

- high cholesterol, TGA [triglycerides], and DM [especially type II]

Types of GB stones

85% are cholesterol stones - 15% are pigmented stones
 85% of GB stones - 15% of GB stones
 cholesterol stones - 85% of GB stones
 pigmented stones - 15% of GB stones

PFA - 85%

2 types

① Pure cholesterol (90-100%)

→ > 2.5cm

بشكل قشري أو حبيبي

choking - 10%

② Mixed cholesterol

(50-90%)

small, multiple,

variable in shape and size.

2 types

① Black stones

elderly

cirrhosis - hemolysis

- malignancy.

② Brown stones

infection

- normal & Ca^{2+} bilirubinate

Ca^{2+} - 85%

bilirubinate.

- 17% of population has GB stones, 50% remain asymptomatic over 10 year periods.

Stages of GB stones

① Lithogenic stage

lithogenic - bile salts - cholesterol - (triangle).

problem in control ileum - DM - chronic - bile salts - stage.

cholesterol - bile salts - disturbed enterohepatic circulation.

cholesterol stones - supersaturation of cholesterol - stage - 85%.

85%.

② Asymptomatic stage.

في حالة عدم وجود أعراض

③ Symptomatic stage.

biliary colic

complications.

biliary colic

- أي شيء زيادة عن ذلك

④ Stage & complications

Complications of GB stones

① A) Acute cholecystitis.

② B)

or cholangitis or bile duct

obstructive jaundice.

③ C) Gallstone ileus.

④ D) Pancreatitis.

E) Fistula or cancer in GB

[Mirizzi syndrome] bile duct.

F) Carcinoma of GB.

Rome criteria for biliary pain

well localized.

appendix or parietal pain

partly localized - normal abd. exam. visceral pain

periumbalic ← visceral

RTF ← parietal

acute

cholecystitis

stone or

chole duct

permanent / continuously

pain > 6h

to biliary colic as a result of distention of GB.

biliary colic

chole stone

temporarily

pain < 4h.

⑤ في المصطلح asymptomatic يعني لا توجد أعراض

biliary colic يعني ألم في البطن

⑥ BIDA scan يعني bile duct is blocked

↳ hepatic iminodiacetic acid scan / hepatobiliary

يعتبر الـ BIDA scan من أفضل الطرق لتصوير GB

blocked

So biliary colic is intermittent obstruction of chole duct.

distention

انقباض

بطني

biliary

pain

continuous

visceral constant

⑦

- visceral pain of appendix $\rightarrow$ T10.
- visceral pain of distention of GB $\rightarrow$ T8 or T9.

- Pain of biliary colic is in epigastrium (more) and or RUQ

must exclude inferior MI - epigastrium also onset & severe pain

- Severe enough, needs IV-TM analgesia.

بھمبر بلوف وچری سے الوجہ رائے اور Colic اور اس سے بھکار Peniternite بھمبر سے

- Severe enough to interrupt daily activity and leads to emergency department visit.

Fatty dyspepsia. - after fatty meal (bile CS) to non-bile w/o CS

usually 30-90 mins. بعد الوجع في العدي
لنحسك بعد الفية 3-4 hrs
[last at least 30 mins]. acute cholecystitis 4 hrs

- Builds up to steady level.

بہد احقوف سقوة دیبا ایزر بہد ہلبتیک

- لإصلاح العالم أو استنقاذ ما يروج إليه ولا *prohibitional change* ولا حاجة.

تیسری طرف طائفہ typical biliary colic بھی انہ اکلے دم دیکھیں گے۔ اس بارے میں GRs
 لکھیں گی۔ دوسرے نفعہ belching + flatulence + distension کے ہیں۔ انہ لکھیں گے۔

diverticular disease - FRS - hiatal hernia - GERD - PUD و مری ستیقا

بذلك يمكن استغلال المراهق وهدى المراهقة من أجل صحتهم إذا لم يفت بار وال صوابه يعني في صحتهم النفسية والصحى

تكون بصيب هذا الحال. فبنيت هذه المرأة سبعة فاسم - ١١ - في هذا الجاهل خلال أسبوعين من علم هذا الزوال.

- Maybe associated with nausea and vomiting, radiates to back in Rt infrascapular region and Rt shoulder, awakes pt. from sleep.

- less than 20% reduced by bowel motion or acid suppression, or postural change.

acute cholecystitis → parietal pain - well localized - (+) Murphy sign - leucocytosis.

bilious colic → visceral pain - autonomic - partly localized - due to distention of GB

acute cholecystitis → obstructive and anti-biliary

Idemthological studies

CBC

16. aspirin → leukocytosis

acute bilary colic

Cholesteryl, مسطح في كل الحالات اربعه مائل

11 WBL و S.W في 11 Appendix

۱۰۰٪ بزرگواران

• perawatan si cholangitis

liver function test.

بعلی سٹوڈنٹ ALP

ALP, AST, 11

mild. es

لو علی کثیر بیوکر

obstructive jaundice.

للموقعية الـ GGT عالي بكمية liver AC، لكن لو في المستقيم Isoenzyme سبقت ادمان أي مكان الوصافي

GGT is other liver function. ALP is enzyme.

serum amylase and lipase

↳ to exclude

- Fair blue sugar -

renal Euxhem tech

↳ For dehydration.

pancreatic

Inwirkung 140

① Plain film abdomen. [PFA]

بیلوفاضہ 15% only

تھلے سے نیچے کی ہول دہندہ acute pain اور epigastrium میں

واقعية air under diaphragm يعني عند ASD بالولعيت المرارة جوارها هوا فقير يا كيتيا از

rupture pleurisy emphysema cholecystitis

– تنفیلًا بالانساس عند تنفوس الـ *air- under diaphragm* أو حركات کلی الحجاب الحاجز – الممرارة.

② $V/S \rightarrow$

First investigation to do. آپ ایسے مزارعہ

↳ Accuracy 98% (sensitivity).

لما لا جينا 100 مريض، وشفاهم المرأة وضكت المرأة لعينها صوتا

در این عاملیتها ۱۸۱ جنس الحشری ۶۹۸٪ در فصلی ۱ و ۲٪ در فصل ۲.

true (+) False (-)

Sensitivity of mammogram to detect breast cancer in female,

above 45 years in 92%)

mammogram 27 lines Cancer cells FMA West 10/10/10

تکرم جلد 6 92% سو-تاکا (سو) Cancer مار 2: 20 (20) انجینئرنگ

10

④ U/S is the best modality for gallbladder. U/S is more sensitive than CT scan for GB stones.

Done in supine and lateral decubitus.

U/S sensitivity is 95% (better than CT scan).

- Diagnose intra - extra hepatic biliary dilatation.

- More sensitive to GBs than bile duct stones.

distal bile duct and duodenum ampulla dilatation.

- CBD stone is operator dependent.

GB sensitivity is 98% - bile duct 70-80%.

⑤ U/S is the best modality for bile duct diameter.

⑥ U/S is the golden way to diagnose GB stones.

⑦ acute cholecystitis signs: wall thickness > 3-4mm + pericholecystic fluid.

⑧ wall thickness = 3mm normal.

⑨ acute cholecystitis signs: wall thickness > 3mm.

⑩ signs of acute cholecystitis: hypoproteinemia, edema, ascites.

⑪ liver cirrhosis - CHF - signs of acute cholecystitis.

⑫ signs of acute cholecystitis: wall thickness > 3mm.

⑬ CT scan - staging of tumors.

⑭ HZPA scan - non-visualized biliary tree -> GB stones.

⑮ signs of acute cholecystitis: biliary duct blockage.

⑯ only used in acute cholecystitis or biliary leak.

⑰ signs of acute cholecystitis: wall thickness > 3-6mm.

⑱ acute cholecystitis signs: biliary duct blockage.

⑲ signs of acute cholecystitis: Murphy sign.

⑳ signs of acute cholecystitis: GB wall thickness > 3mm.

㉑ signs of acute cholecystitis: ulceration.

⑤ Per-cutaneous transhepatic cholangiogram → liver - يفتح عن طريق
 cholangium. also bile duct and cholangium.

⑥ MRCP → magnetic resonance cholangiopancreatography.
 [non-invasive] - diagnostic only.

⑦ ERCP → invasive - diagnostic and therapeutic.

↳ most common complication is pancreatitis.

Symptoms of biliary diseases

Abdominal pain - Jaundice - Nausea and vomiting - loss of appetite -
 Fever and chills - Fatigue and itching - clay-colored stool, tea-colored urine.
 due to bile salt ↓ ↳ in obstructive jaundice.

normal urine ↳ dark brown ↳ hemolytic jaundice ↳ stool ↳

GB stone ↳ pain ↳ CBD stone ↳ pain ↳

stone ↳ cholecystectomy ↳

CBD ↳

stones in GB then CBD - (زقزقة في CBD) ↳

primary stones in CBD ↳

↳ 10%

90% ↳ [retained stones]

↳ usually brown in color

الأسود في 10-15% ↳ في CBD يعني وقت

Acute cholecystitis means admission.

التهاب الكبد الحاد

↳ requires hospital admission - surgical emergency.

↳ Caused by stones blocking the cystic duct continuously.

↳ Pain in RUQ and epigastrium, more than 4-hrs.

↳ Associated with nausea and vomiting

↳ leukocytosis is 75%, fever not common

↳ mass in RUQ

↳ Mild elevation of bilirubin. - ALP/AST/ALT may rise.

↳ (+) Murphy sign.

(Gram-) bacillus

E. coli

acute cholecystitis

البكتيريا السالبة

pseudomonas

klebsiella

proteus

4

التهاب الكبد الحاد
 (التهاب الكبد الحاد) أكثر شيوعاً في
 infection in hands and feet
 in wound.

④ لا يسى NG tube وسط اللوز أخضر أصفر من الأمعاء
 Gastric juice.
 small intestine
 surgery obstruction

أما حاجته إلى أن يكون كبد و لونه.

- Symptoms maybe muted or absent in

steroids. ① الستيرويدات

② DM.

③ immunocompromised.

④ Obse

⑤ Change of level of consciousness.

④ هذه الفئات الستيرويدات DM immunocompromised
 أمراض الكبد 65 years old. acute cholecystitis
 DM asthma biliary colic acute cholecystitis bad prognosis
 prophylactic cholecystectomy.

CBD stones

↳ Mirizzi syndrome = stone in Hartmann's pouch or in
 cystic duct itself

CBD is common hepatic duct. the external compression is
 jaundice. type 1.

Common hepatic duct CBD fistula Cystic duct type 2
 with fistula → type 2 → as gallstone ileus
 without fistula → type 1.

↳ 90% from GB - 10% primary in CBD.

asymptomatic

① Size > 3cm

GB cancer

② Calcification in wall of GB [porcelain GB]

↳ premalignant.

③ Family hx. of GB cancer. 5th common cancer in GZ.
very bad

GB cancer is biliary tree cancer

DM is associated with GB cancer

فصل (١٢)

Benign surgery

GB stones rapid loss of cut

Cholecystectomy

Most patients cholecystectomy not needed in most of cases.

Cholangitis

↳ infection of biliary system
↳ very urgent problem

acute cholecystitis

acute cholangitis

very strong antibiotic 48h

decompression

bile duct

ERCP, duodenoscopy

ERCP, E. coli

decompression, bile drainage

gram (-) bacillus, E. coli

Charcot triad → *fever* - RUQ abd. pain, jaundice.
chills, rigors

Reynolds pentad → mental status change + hypotension + fever

Percutaneous GB → *fit* → cholecystectomy.

Acute acalculous cholecystitis

في الشك في الالتهاب بدون حصى

leukocytosis - thickened wall, edema

↳ 5-10% of GB stones

↳ acute calculous -
mortality 5% → 90%.

calculous → mortality 10-30%

↳ 10%
إلتهاب حصى

GB infection

dehydrated ICU patients - *ICU* بالتهاب

bile duct obstruction

↳ Usually in ICU patients, with biliary stasis, icterus, anorexia.

rupture emphysematous

decompression (cholangitis)

hypohydration, RUQ tenderness, Fundus of GB

drainage

[cholecystostomy].

fever-sepsis.

abd. local - general symptoms

tenderness, Murphy sign

more urgent.

↳ In DM - ICU

↳ *fit* patients → laparoscopic cholecystectomy / not *fit* → decompression.

(15)

acute perforated ulcer → severe pain

acute pancreatitis → " =

mesenteric ischemia → " =

افزودن سریع از اینها ulcer به سبب sudden
بروز سریع من خلال اینها acute pancreatitis
perforated , acute pancreatitis
guarding - tenderness - abdomen is rigid
اینها از mesenteric ischemia
به سرعت بروز من الی الی signs
this is the signs

④ TSI = 5 normal

normal ← 5 عدد

hypothyroid ← 5 عدد

hyper → 5 عدد

④ کفیفه از jejunum در colon

از jejunum به یک مایه کلاش

(concertina appearance)

اینها colon به یک مایه کلاش $\frac{1}{7}$ از wall از جزیره

④ Most common cancer in GUT is colon cancer.

2nd : → stomach =

3rd → pancreatic

4th → esophageal

5th → GB cancer

(*) What are the tumors which leads to biliary obstruction?

cholangiocarcinoma

tumor in bile duct.

2nd most common

malignant tumor of liver

after hepatocellular

carcinoma.

- pancreatic tumor - metastatic tumors.

liver

stomach

pancreatic

jaundice due to biliary obstruction

80% of hepatocellular carcinoma occur in cirrhotic liver [HBV - HCV]

(*) Emphysematous cholecystitis

emergency surgery due to gas-forming organism

(*) Asymptomatic GB stones

In America, 25% of females and 12% of males have GB stones by age of 60.

80% are asymptomatic

- 1-2% become symptomatic each year.

- 2 types: ① Asymptomatic GS in asymptomatic pt.

② Asymptomatic GS in symptomatic pt.

non-specific symptoms

colic

non-specific symptoms - distension - bloating - belching - pt.

typical biliary colic