



# الطب والجراحة لجنة

## GallBladder

Corrected by:  
Reem Gabayn

التبييض : بنفسجي  
 نوت الدكتور : أخضر

## Anatomy

pear-shaped sac

7 to 10 cm long

average capacity of 30 to 50 mL. When obstructed up to 300 ml

\*The most common emergency surgical procedure worldwide :: appendectomy.

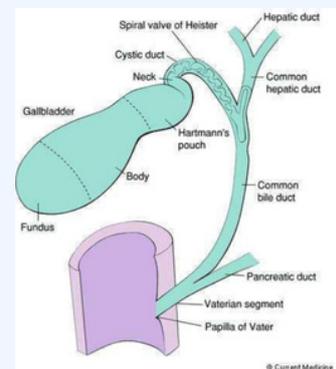
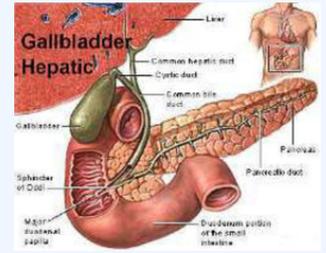
\*The most common elective laparoscope procedure:: Lapocholecystectomy (laparoscopic cholecystectomy)

Divided into:

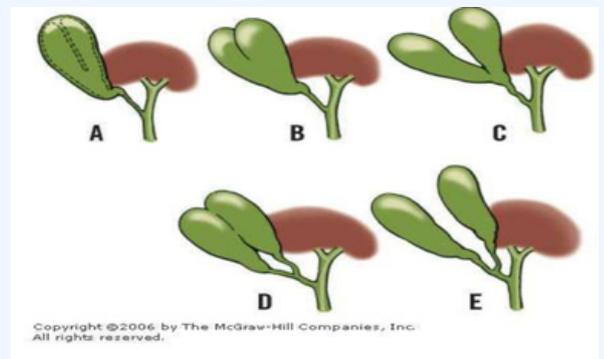
Neck: (has a small pouch called Hartmann's pouch. This is the location of most of the pathology)

Body

Fundus



The gallbladder and biliary tree have a lot of anatomical variations between patients or normal people in the biliary tree “الصور مش مطلوبة”



## Biliary Anatomy

Hepatocytes>canaliculi> biliary ductules> L & R hepatic ducts>common hepatic duct

**Common hepatic ducts & Cystic Duct> Common Bile Duct (CBD)**

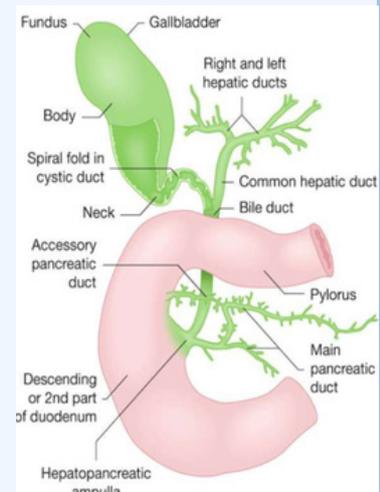
\*The left HD is longer than the right.

\*The two ducts join to form a CHD, close to their emergence from the liver.

☑CHD 1 to 4 cm in length and has a diameter of approximately 4 mm.

☑It lies in front of the portal vein and to the right of the hepatic artery.

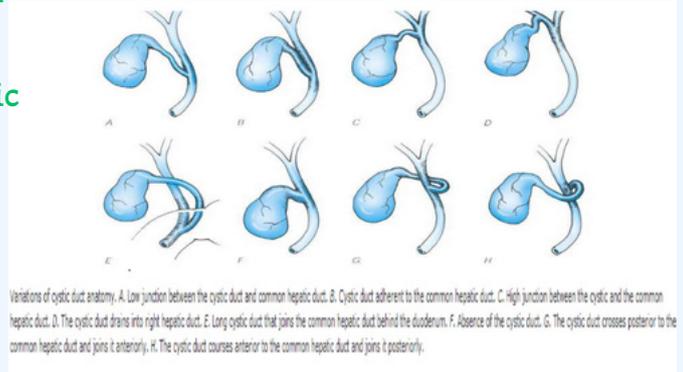
☑CHD is joined at an acute angle by the cystic duct to form the common bile duct.



# Cystic duct anatomy

الصور مش مطلوبات

- ☒ The cystic duct, which is 1 to 4 mm in diameter and 0.5 to 4.0 cm in length
- ☒ The cystic duct usually joins the common hepatic duct at an acute angle 2 to 4 cm distal to the confluence of the right and left hepatic ducts
- ☒ The common bile duct is approximately 8 to 10 cm in length and 0.4 to 0.8 cm in diameter, and it can be divided into three anatomic segments: supraduodenal, retroduodenal, and intrapancreatic

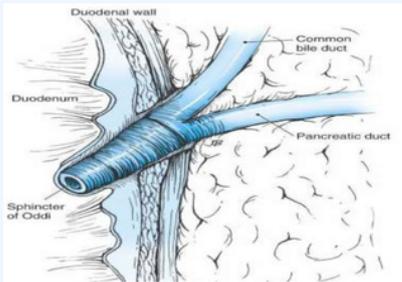


\*Gall bladder function ::

bile storage + concentrations.

:: \*duodenum\*

relaxation = يتحسس وجود fat ويفرز (cck) cholecystokinin إلى gallbladder ثم sphincter of Oddi (spastic)



فيخرج bile من gallbladder الى duodenum ويتم الهضم

Choledochal cyst (cyst in biliary tree).

1:: fistula type1

2:: fistula type2

3:: choledocoele on duodenal wall. \*\*sphincterotomy treatment\*\*.

4::intrahepatic dilatation

5::extrahepatic biliary dilatation

6::Caroli disease extrahepatic multiple biliary dilataion. (kinetic biliary dilataion- ( liver transplant).

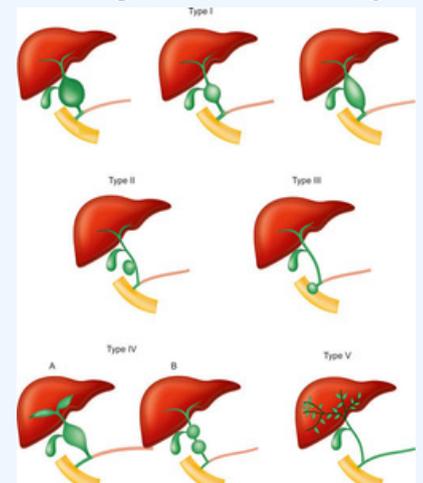
\*\* all need surgical intervention due to the risk of cancer and cholelithiasis except choledocoele.



مطلوبة

Classification of choledochal cysts. Type I, fusiform or cystic dilations of the extrahepatic biliary tree, are the most common type, making up over 50% of all choledochal cysts. Type II, saccular diverticulum of an extrahepatic bile duct, is rare, comprising less than 5% of choledochal cysts. Type III, bile duct dilations within the duodenal wall (choledochoceles), make up about 5% of choledochal cysts. Types IVa and IVb, multiple cysts, make up 5 to 10% of choledochal cysts. Type IVa affects both extrahepatic and intrahepatic bile ducts, while type IVb cysts affect the extrahepatic bile ducts only. Type V, intrahepatic biliary cysts, are very rare and make up only about 1% of choledochal cysts.

زيادة للتوضيح



incidence is between 1:100,000 and 1:150,000 in populations of Western

☒ females three to eight times more often than males

☒ frequently diagnosed in infancy or childhood, as many as one half of the patients have reached adulthood when diagnosed

☒ More than 90% of patients have an anomalous pancreaticobiliary duct junction with the pancreatic duct joining the common bile duct more than 1 cm proximal to the ampulla.

☒ . For types I, II, and IV, excision of the extrahepatic biliary tree, including cholecystectomy, with a Roux-en-Y hepaticojejunostomy are ideal. In type IV, additional segmental resection of the liver may be appropriate, particularly if intrahepatic stones, strictures, or abscesses are present, or if the dilatations are confined to one lobe.

☒ risk of cholangiocarcinoma developing in choledochal cysts is as high as 15% in adults, and supports complete excision when they are diagnosed. For type III, sphincterotomy is recommended Cystic artery

☒ usually a branch of the right hepatic arter

## Cystic artery

☒ usually a branch of the **right hepatic artery** (>90% of the time)

☒ course of the cystic artery may vary, but it nearly always is found within the hepatocystic triangle

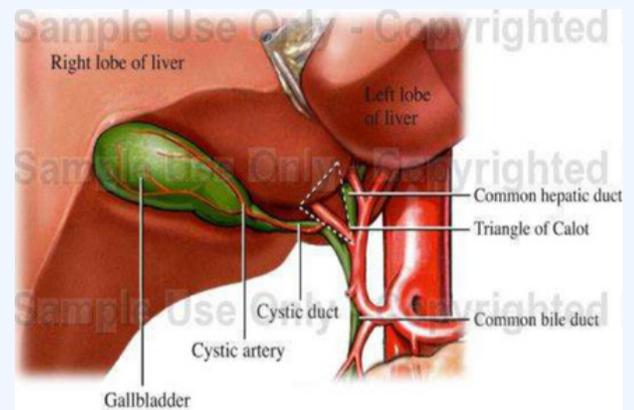
☒ it divides into anterior and posterior divisions

\*\*\*

-cholelithiasis: gallbladder stones

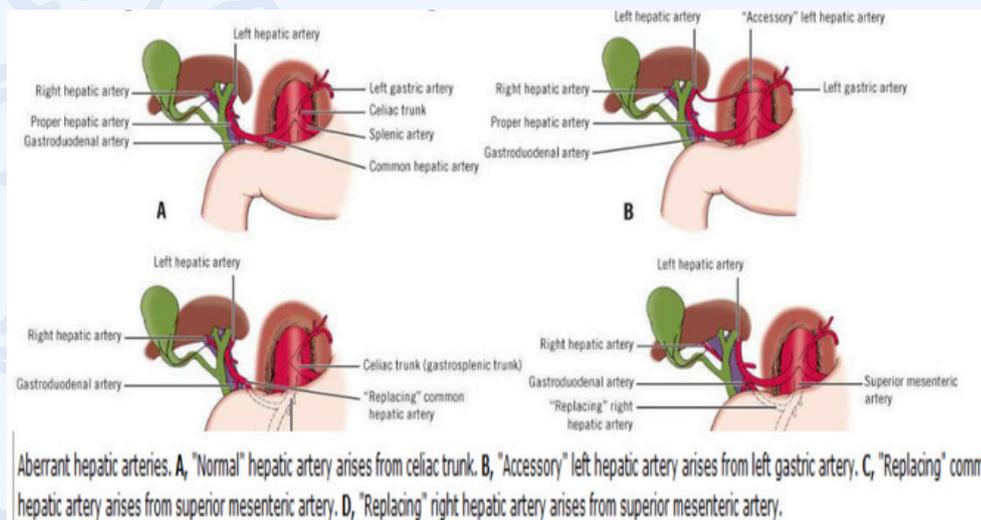
-choledocholithiasis: common bile duct stones

-cholangiocarcinoma: biliary tree cancer.



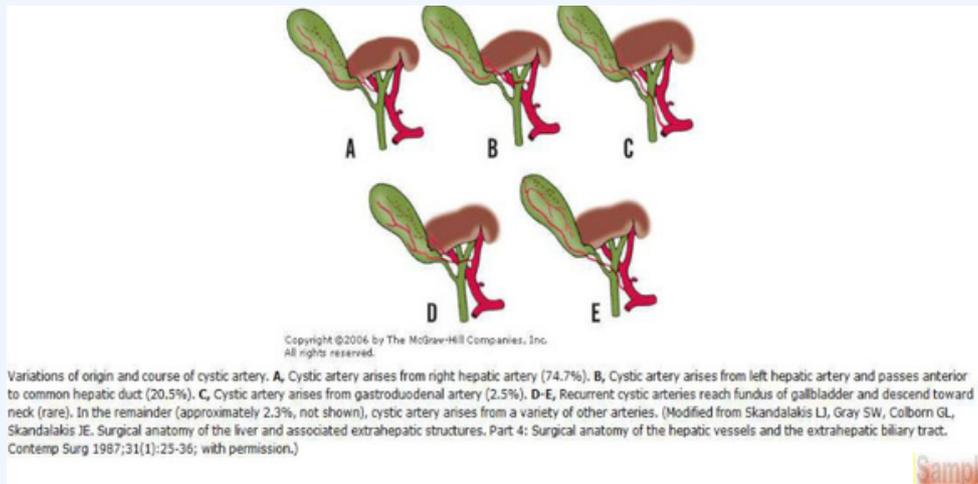
من هنا السلايدات “ مقروء مفهوح بصوت د.عماد “

## Hepatic Artery



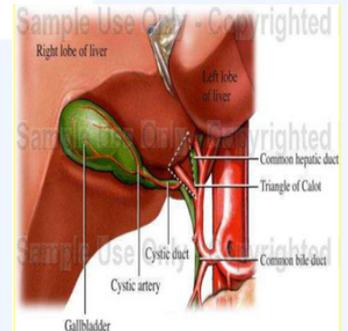
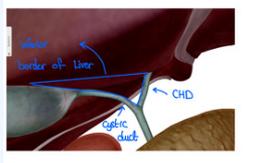
Aberrant hepatic arteries. A, "Normal" hepatic artery arises from celiac trunk. B, "Accessory" left hepatic artery arises from left gastric artery. C, "Replacing" common hepatic artery arises from superior mesenteric artery. D, "Replacing" right hepatic artery arises from superior mesenteric artery.

## Cystic Artery



## Triangle of Calot

- ☒ the area bound by the:
- ☒ cystic duct
- ☒ common hepatic duct
- ☒ liver margin
- ☒ Contents: cystic artery (ass. With lymph nodes (calot/cystic/Lund lymph nodes).
- ☒ \*carrot triangle dissection in order to veins two structures :  
(cystic artery + cystic duct) into gallbladder

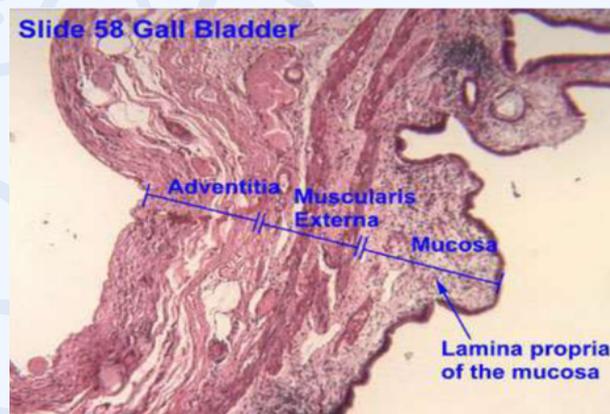


## Nerve supply

- ☒ Parasympathetic fibers from the left (anterior) trunk of the vagus nerve.
- ☒ Sympathetic fibers from the T7-T10 nerves coursing through the splanchnic and celiac ganglions.

## HISTOLOGY

- ☒ **mucus** secreted into the gallbladder originates in the tubuloalveolar glands found in the mucosa lining the **infundibulum and neck** of the gallbladder, but are absent from the body and fundus
- ☒ histologically differs from the rest of the gastrointestinal tract i.e. **lacks a muscularis mucosa and submucosa**

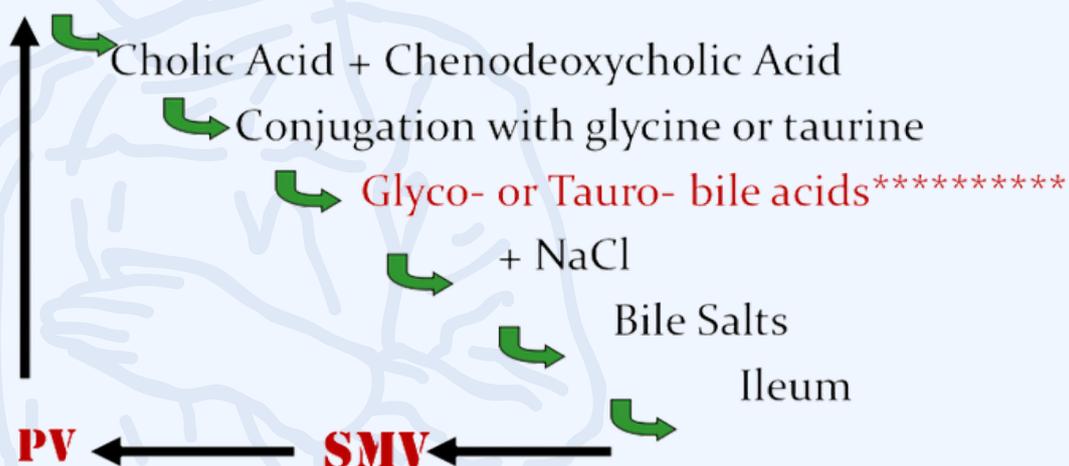


## Biliary Physiology

- ☒ Overall, the purpose is to modify, store and regulate the flow of bile
- ☒ The gallbladder concentrates & stores bile, then releases bile in response to a meal
- ☒ Biliary duct secretion of chloride-rich fluid controlled by secretin, cholecystokinin (CCK) and gastrin
- ☒ Gallbladder mucosa has greatest absorptive capacity per unit area of any structure in body
- ☒ Concentrates bile 5-10 fold
- ☒ NaCl transport by epithelium is driving force and water passively absorbed
- ☒ Vagal stimulation does not mediate gallbladder motility, but it does lower the threshold for CCK activity.
- ☒ Secretin potentiates the effect of CCK
- ☒ PP and peptide YY cause gallbladder relaxation and may facilitate gallbladder filling during the interdigestive phase
- ☒ Vasoactive intestinal polypeptide (VIP) and somatostatin inhibit CCK-mediated gallbladder contraction
- ☒ Motilin, a gastrointestinal polypeptide, has also been shown to mediate gallbladder contraction and may regulate activity during the interdigestive state
- ☒ **Bile**
- ☒ Bile salts (primary: cholic, chenodeoxycholic acids; secondary: deoxycholic, lithocholic acids)
- ☒ Phospholipids (90% lecithin)
- ☒ Cholesterol
- ☒ Cholesterol solubility depends on the relative concentration of cholesterol, bile salts, and phospholipid
- ☒ Fat in food >Cholecystokinin >Bile secretion.
- ☒ Cholesterol (Fat crystal) - Bile salts (soap)

## Entero-Hepatic Circulation

Liver Cholesterol



## Biliary Motility

- ☒ Filling is facilitated by contraction of ampullary sphincter (Sphincter of Oddi)
- ☒ After meal, sphincter of Oddi relaxes & CCK released—causing contraction of gallbladder
- ☒ When stimulated, 50-70% of contents ejected over 30- 40 minutes
- ☒ Refills over next 60-90 minutes

### Bile Flow

\*normal common bile duct: up to 6mm.

\*small gall stone ->cystic duct ->common bile duct (closed) -> obstructive jaundice.

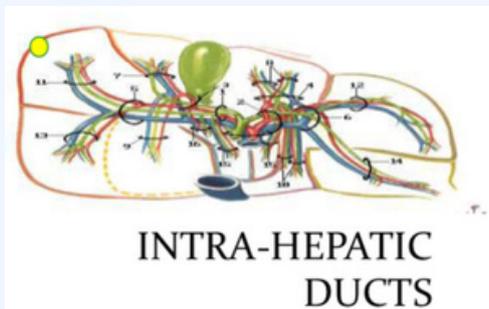
\*if superadded with bacterial infection (ascending hematogenous infection) => ascending cholangitis -> dilatation of common bile duct.

\*large gall stone -> stop in Hartman pouch or in neck (closed) = abdominal pain, right upper quadrant radiated to back. If continues more than 6hr = (edematous wall/pericholecystic fluid/tip of right shoulder pain= (acute cholecystitis) ass. With nausea and vomiting = absorption of bile ->diffuse mucous = mucocele.

\*\*mucocele of gallbladder + bacterial infection = empyema (pus inside gallbladder).

==acute cholecystitis on ultrasound = thick wall more than 4mm + pericholecystic fluid (hollow sign) + impacted stones in neck of gallbladder .

\*recurrent attack of biliary colic pain =>chronic cholecystitis☒ in ultrasound= thick wall of gallbladder (contracted) .



### Hepatic Bile vs. GB bile

	Liver Bile	Gallbladder Bile
Water	97.5 g/dl	92 g/dl
Bile salts	1.1 g/dl	6 g/dl
Bilirubin	0.04 g/dl	0.3 g/dl
Cholesterol	0.1 g/dl	0.3-0.9 g/dl
Fatty acids	0.12 g/dl	0.3-1.2 g/dl
Lecithin	0.04 g/dl	0.3 g/dl
Na <sup>+</sup>	145 mEq/L	130 mEq/L
K <sup>+</sup>	5 mEq/L	12 mEq/L
Ca <sup>++</sup>	5 mEq/L	23 mEq/L
Cl <sup>-</sup>	100 mEq/L	25 mEq/L
HCO <sub>3</sub> <sup>-</sup>	28 mEq/L	10 mEq/L

## Bacteriology

- Under “normal” conditions, the biliary tract is sterile
- Positive cultures found:
- 11-30% symptomatic stones & chronic cholecystitis
- 46% of acute cholecystitis
- 58% with gallstones & CBD stones without cholangitis
- 94% with gallstones, CBD stones and cholangitis

Organisms \*Gram-negative aerobes most common organism isolated

\*\*each infection has inflammatory process (not vice versa ).

- E. coli
- Klebsiella
- Pseudomonas
- Enterobacter
- Gram-positive aerobes
- **Enterococcus**
- Streptococcus viridans
- Anaerobes (~25%)
- Bacteroides fragilis
- Clostridium
- Fungal
- Candida sp.
- Parasitic
- Opisthorchis sp. (Thailand) (Liver fluke)

Clonorchis sp. (China)

☒ **Approximately 50% of positive cultures will have 2 or more different bacteria species present**

☒ \*\*\*culturing of normal bile = no bacteria(sterile)

☒ Chronic cholecystitis (biliary colic) = 11% positive culture

☒ Acute cholecystitis =50% infection + 50% inflammatory process (no positive bacteria).

☒ Obstructive jaundice =60%

☒ Ascending cholangitis=95%

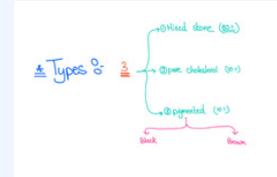
## Gallstones



# Cholelithiasis

- ☒ Formation represents failure to maintain bile components (cholesterol, Ca, bile pigments) in a solubilized state
- ☒ Majority of those with stones are asymptomatic
- ☒ **1-2% of asymptomatic individuals develop symptoms per year**
- ☒ Approx 65% of asymptomatic patients remain symptom free after 20 years

## Types of Gallstones



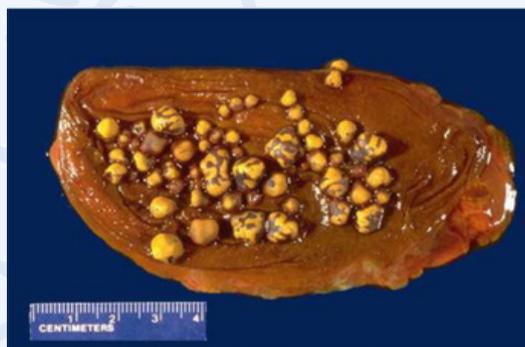
- ☒ Mixed (80%) **most common one.**
- ☒ Pure cholesterol (10%)
- ☒ Pigmented (10%)
- ☒ **Black stones (contain Ca bilirubinate, a/w cirrhosis and hemolysis((as thalassemia patient))**
- ☒ **Brown stones (a/w biliary tract infection)** are more common in southeast Asia, where biliary parasites, including Clonorchis sinensis, Opisthorchis viverrini, and Ascaris lumbricoides, are endemic.
- ☒ \*empyema : pus inside gall bladder.
- ☒ \*FAST ultrasound == (focused assessment sonography for trauma patient).

مش مطلوب

Characteristic	Cholesterol	Black Pigment	Brown Pigment
Color	Yellow-white with pigmented center ± rings. ± black or white shell	Black to dark brown	Yellow-brown to orange
Surface	Hard and shiny	Shiny or dull	Soft, greasy, laminated
Shape	Round or faceted	Faceted or spiky	Ovoid or irregular
Number	Single or multiple	Multiple, numerous	Single or multiple
Location	Usually gallbladder	Usually gallbladder	Usually bile ducts
Composition*	45-98% cholesterol + 2-20% Ca bilirubinate ± shell of pigment or CaCO <sub>3</sub>	10-50% black pigment polymer + calcium bilirubinate and phosphates ± CaCO <sub>3</sub>	Ca bilirubinate + polymer, 10-60%, Ca palmitate 5-20%; up to 45% cholesterol
Etiology	Increased cholesterol and/or decreased bile salt secretion into bile	Increased excretion of bilirubin and/or calcium into bile, increased bile pH	Bacterial infection, with hydrolysis of bilirubin conjugates and lecithins
Disease Associations	Multiparity, diabetes, obesity, oestrogen Rx, oral contraceptive use, cholestasis of pregnancy, prolonged fasting or rapid weight loss, vagotomy	Chronic hemolysis (hemoglobinopathies, artificial heart valves), cirrhosis, Crohn's disease of ileum	Biliary strictures, primary sclerosing cholangitis, intrabiliary parasites and sutures, prior biliary surgery
Other Factors	Female gender, Native Americans, high fat diets, relatives with gallstones	Total parental nutrition, older age	Low protein diets, chronic intrahepatic cholangitis, Asians

\*Note: Unmeasured residue (matrix) up to 50% in cholesterol stones, up to 75% in pigment stones

## Gallstones (mixed)



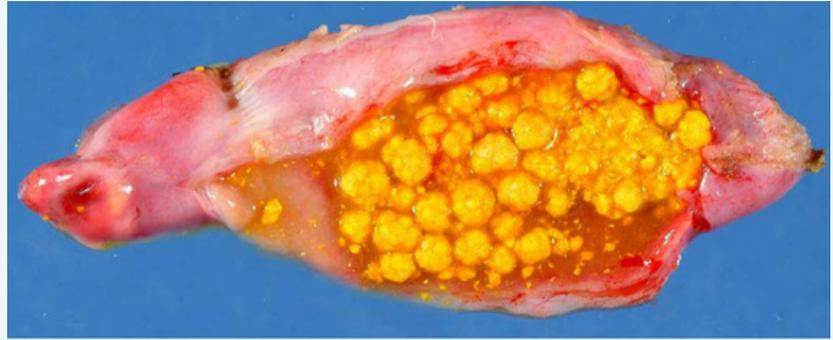
Mixed (Chol+Ca+Bile salt)\* Multiple, faceted, yellow-grey.

## Cholesterol Gallstones

- ☒ 75% of all gallstones in United States
- ☒ 3 stages of formation
- ☒ Cholesterol supersaturation
- ☒ Crystal nucleation
- ☒ Stone growth

### Risk factors

1. **Female**
2. **Multi gravid**
3. **Estrogen use**
4. **OCP**
5. **Old age**
6. **Obesity**
7. **Rapid weight loss**
8. **High fat diets**
9. **Positive F.H =nearly 30%**



pure cholesterol-Yellow spiky

## Pigment gallstones

- ☒ 25% of stones in US, 65% in Japan
- ☒ Black Pigment
- ☒ Made of Ca bilirubinate, bilirubin polymers & bile acids
- ☒ Increased concentration of bilirubin & Ca
- ☒ Hemolytic disorders & cirrhosis
- ☒ Chronic TPN
- ☒ Ileal resections
- ☒ Exact mechanism unclear, may be due to presence of bacterial  $\beta$ -glucuronidase that deconjugates bilirubin
- ☒ Brown Pigment
- ☒ Asian populations
- ☒ Infection & bacterial hydrolysis of bilirubin
- ☒ More commonly found in bile ducts

## Pigment stones in hemolytic anemia



Dark Black friable soft stones - Bilirubin

## Biliary Sludge الطين المراري

- ☒ Viscous bile
- ☒ Precursor to gallstone formation
- ☒ **Associated with prolonged TPN and fasting, ICU, renal failure, acutely elevation patients.**
- ☒ Often found during ultrasound evaluation
- ☒ Usually asymptomatic
- ☒ \*male/female young patient with sludge may develop obstructive jaundice.
- ☒ \*sludge + acute cholecystitis= acalculous cholecystitis (no stones)= thick wall, fluid, hollow sign.

## Spectrum of Gallstone Disease

- ☒ Symptomatic cholelithiasis can be a herald to:
- ☒ Biliary colic
- ☒ acute cholecystitis
- ☒ chronic cholecystitis
- ☒ \*mixed stones : most common one.

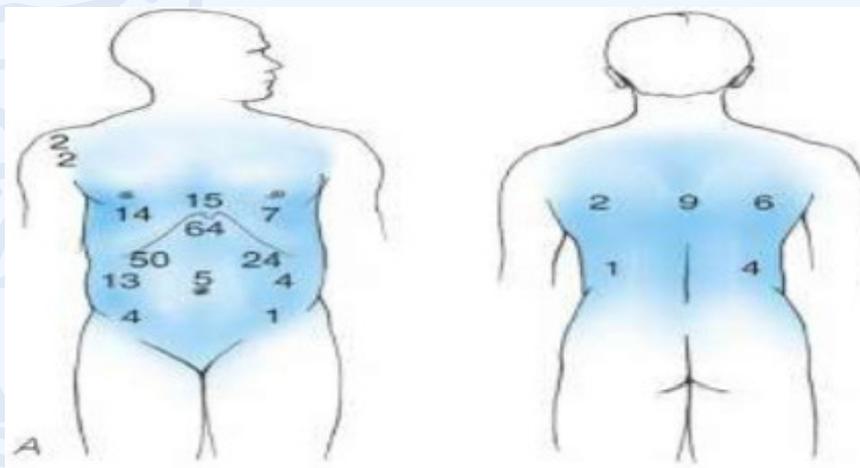
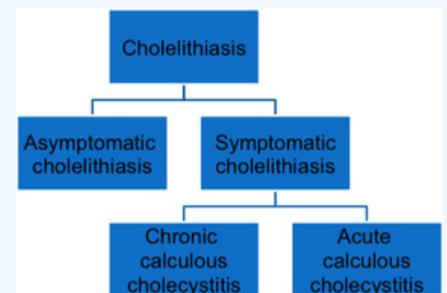
\*First stage after history examination= ultrasound.

\*epigastric pain (biliary): right upper quadrant and radiate to back ((if with 40 years female = gall stones)), surely is gallstones ,, if is male and not cardiac cause (MI) = gastritis (gastric ulcer), duodenitis (duodenal ulcer)= peptic ulcer disease.

\*acute cholecystitis= due to irritation of diaphragm that supply c3,4,5 = pain in right shoulder.

\*acute ascending cholangitis: high fever >38.5

\*obstructive jaundice= itching (pleuritis), jaundice due to bile salts in the dermis, clay color stools (acholic stools), dark urine, nausea, loss of appetite.



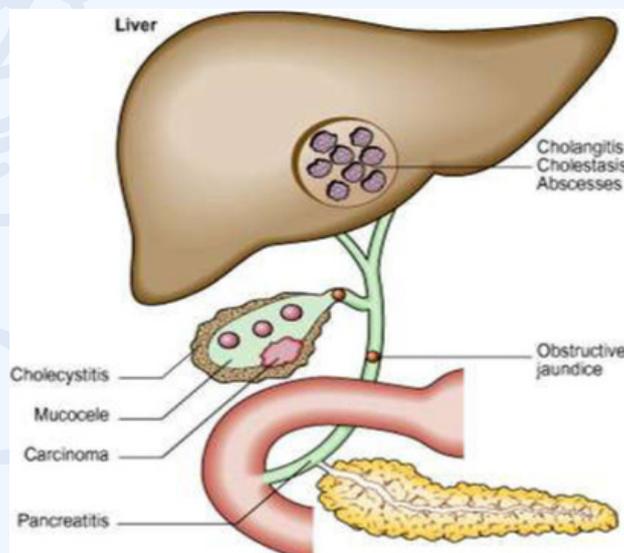
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## Cholelithiasis– Complications.



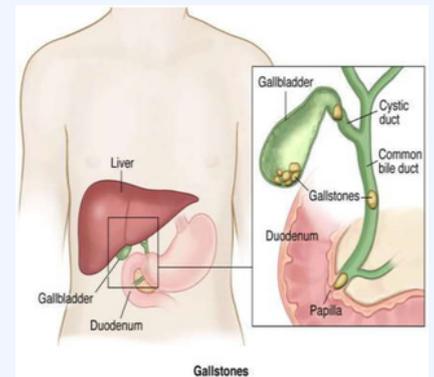
\*pancreatitis: inflammatory process due to autodigestion of pancreatic tissue by its activated pancreatic enzymes ((pancreatic enzymes become active only when get out from pancreas)).

\*if stone diffuse through sphincter of Oddi it get out from body (not stops)

\*if it stops on Hartman pouch = cause a communication between 2 epithelial lines that

form a fistula (cholecystoenteric fistula =acute cholecystitis and intestinal obstruction)

== (due to large stone between gallbladder and duodenum or jejunum)= stones reach ileocecal valve = cause gallstones ileus (very rare). = treated by longitudinal enterotomy (longitudinal open of small intestine only)



## Clinical presentations

- ☒ Asymptomatic Gallstones
- ☒ Biliary colic
- ☒ Acute Cholecystitis
- ☒ Hydrops of the Gallbladder
- ☒ Mirizzi syndrome
- ☒ Empyema of the gallbladder
- ☒ Choledocholithiasis
- ☒ Cholangitis
- ☒ Gallstone ileus (rare)
- ☒ Acalculous cholecystitis
- ☒ Oriental Cholangio-hepatitis

## Symptomatic cholelithiasis

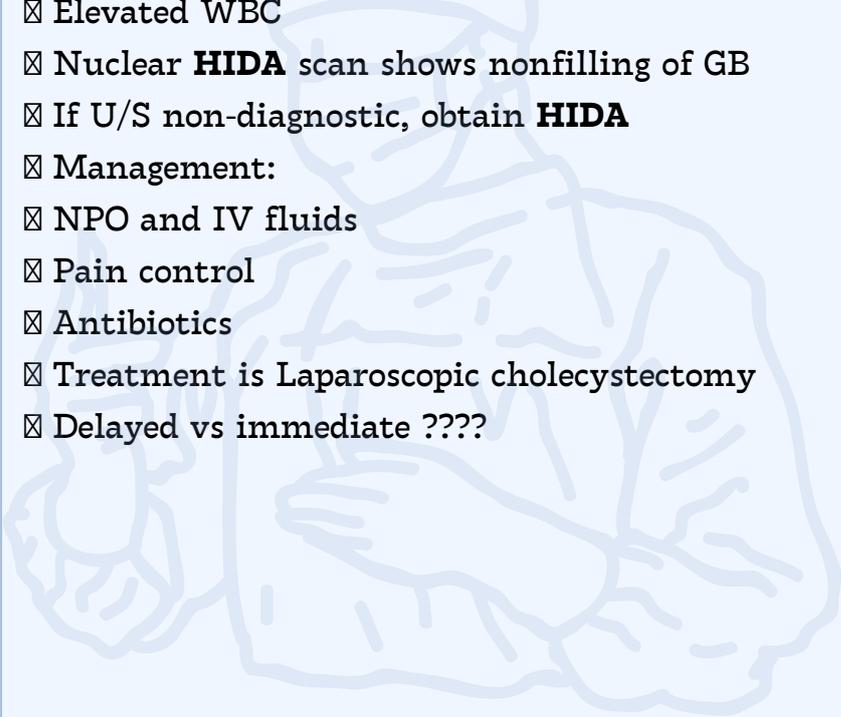
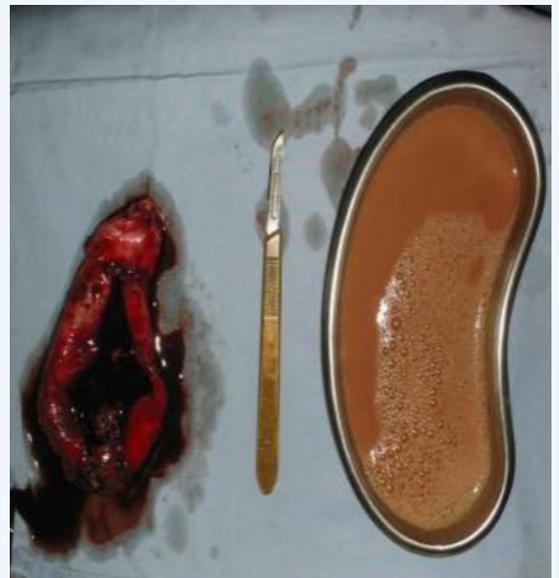
- ☒ biliary colic
- ☒ The pain occurs due to a stone obstructing the cystic duct, causing wall tension; pain resolves when stone passes
- ☒ Pain usually lasts 1-5 hrs, rarely > 24hrs
- ☒ Ultrasound reveals gallstones
- ☒ Exam, WBC, and LFT normal in this case
- ☒ Treatment: Laparoscopic cholecystectomy

## Chronic Calculous Cholecystitis

- ☒ Recurrent cystic duct obstruction & inflammation
- ☒ Presents with biliary colic
- ☒ Association with meals present in only 50%
- ☒ Symptoms
- ☒ Pain duration 1-5 hours (rare >24 hrs or <1 hr)
- ☒ Nausea & vomiting present 60-70% of time
- ☒ Bloating & belching in 50%
- ☒ Fever & jaundice rare
- ☒ Exam may be normal unless during attack
- ☒ Laboratory values usually normal
- ☒ Differentials include: GERD, PUD, IBS, pancreatitis
- ☒ Treatment is elective laparoscopic cholecystectomy

## Acute Calculous Cholecystitis

- ☒ Related to gallstones 90-95% of cases
- ☒ Non-resolving obstruction of cystic duct usually triggering event
- ☒ Can lead to ischemia and necrosis of gallbladder wall
- ☒ Can lead to: empyema, gangrene, rupture
- ☒ 50% will have positive bile cultures
- ☒ 75% will have had previous, less severe, attack of biliary colic
- ☒ Symptoms:
- ☒ RUQ pain lasting hours to days
- ☒ Pain usually unremitting
- ☒ Nausea, vomiting, anorexia & fevers common
- ☒ Positive Murphy's sign
- ☒ Palpable/tender or even visible RUQ mass
- ☒ Elevated WBC
- ☒ Nuclear **HIDA** scan shows nonfilling of GB
- ☒ If U/S non-diagnostic, obtain **HIDA**
- ☒ Management:
- ☒ NPO and IV fluids
- ☒ Pain control
- ☒ Antibiotics
- ☒ Treatment is Laparoscopic cholecystectomy
- ☒ Delayed vs immediate ????



\* Chronic calculous cholecystitis



\* Acute calculous cholecystitis obstruction cystic duct  $\rightsquigarrow$  inflammation gallbladder  
 $\rightsquigarrow$  HCC  $\leftarrow$  (calculous)  $\leftarrow$  التهاب حصى المرارة  
 $\rightsquigarrow$  gallbladder stones (90-95%)  $\leftarrow$  حصى المرارة

\* (5-10%) Acute acalculous gallbladder stone

\* Management  $\rightsquigarrow$  NPO, IV Fluid, IV antibiotic  
 inflammatory process  $\leftarrow$  التهاب حصى المرارة خلال 72 hrs  $\leftarrow$  لايز  
 $\rightsquigarrow$  ischemia  $\rightsquigarrow$  Necrosis  $\rightsquigarrow$  perforation

\* Complication

$\rightsquigarrow$  Acute calculous cholecystitis.  
 $\rightsquigarrow$  Empyema (Abscess), Rupture  
 - 50%  $\rightsquigarrow$  +ve bile cultures. (Antibiotic therapy  $\rightsquigarrow$  العلاج)

\* Chronic calculous cholecystitis  $\rightsquigarrow$  Assoc with meals

$\rightsquigarrow$  Recurrent biliary pain or acute cholecystitis. - elective laparoscopic cholecystectomy  
 $\downarrow$   
 التهاب حصى المرارة المتكرر  
 (Chronic)  $\leftarrow$  مزمن

(without stone)

\* Acute Acalculous cholecystitis

- (5-10%)  $\rightarrow$  Trauma
- ICU  $\rightarrow$  Burn
- $\rightarrow$  Long term TNP
- $\rightarrow$  Cardiac bypass
- More dangerous than calculous
- Perforation/empyema/gangrene  $\leftarrow$  التهاب حصى المرارة
- تشكل حصى (calculous)

- كسر حصى المرارة يمكن نفس calculous حصى المرارة في US يتشبه ذلك مع حصى المرارة (calculous)

\* Management  $\leftarrow$  (patient)  $\leftarrow$  unstable

$\leftarrow$  علاج حصى المرارة فاش  $\leftarrow$  عاجز  
 (drain)  $\leftarrow$  بزل حصى المرارة

called  $\rightarrow$  percutaneous cholecystostomy

(drain)  $\leftarrow$  حصى المرارة (gallbladder)  $\leftarrow$  بزل حصى المرارة  
 فيها السائل المرارة لونها  $\leftarrow$  تشكل مؤتمت حصى  
 بزر حصى المرارة stable  $\leftarrow$  عاجز حصى المرارة

## Acute Acalculous Cholecystitis

- ☒ 5-10% of all patients with acute cholecystitis
- ☒ occur in absence of stones
- ☒ Frequently progresses to gangrene, empyema or perforation
- ☒ Common following trauma, burns, long-term TPN, AAA repair or cardiac bypass
- ☒ Exact etiology unclear, but may be related to ischemia & stasis
- ☒ Symptoms similar to Acute Calculous cholecystitis
- ☒ HIDA scan has 40% false positive rate
- ☒ Emergency cholecystectomy or percutaneous cholecystostomy is treatment of choice
- ☒ Mortality as high as 40% in some studies, due to concomitant illnesses

**Mirizzi Syndrome:** (stone in Hartman pouch that closed common hepatic duct). symptoms and signs of acute cholecystitis + obstructive jaundice.

\*has grading: -attach to common bile duct or attach to common hepatic duct.

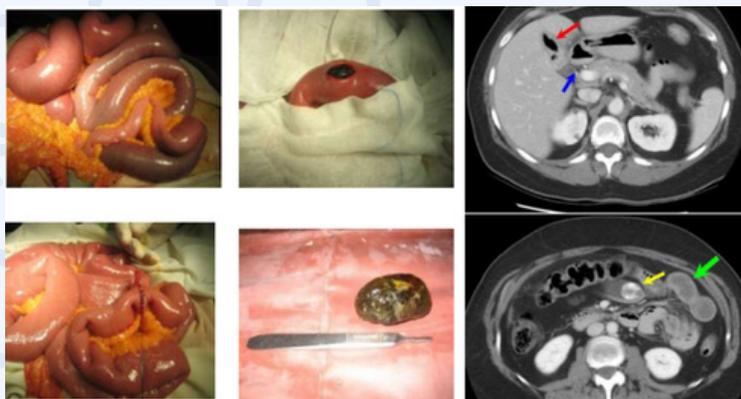
- ☒ Rare cause of biliary duct obstruction
- ☒ Large stone contained within gallbladder compresses the CBD
- ☒ Local spread of inflammation from gallbladder to CBD may also result in duct narrowing



## Oriental Cholangiohepatitis

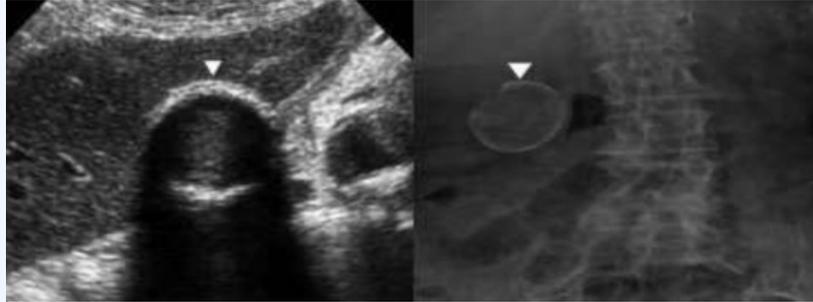
- ☒ Intrahepatic, extrahepatic BD with pigment stones
- ☒ Normal GB
- ☒ Hongkong
- ☒ Parasites in BD
- ☒ *Ascaris lumbricoides*, *Clonorchis sinensis* and *Opisthorchis viverrini*
- ☒ Segmental, hence, rare jaundice
- ☒ CBD exploration, biliary bypass

## Gallstone Ileus



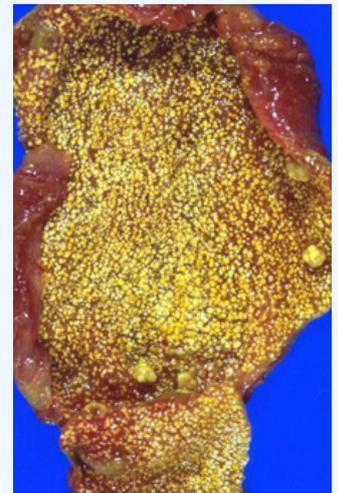
Porcelain gallbladder:: premalignant condition that need cholecystectomy even without symptoms.

- ☒ **Rare** disorder
- ☒ mural calcification of gallbladder wall
- ☒ Cholecystectomy is warranted as there is a risk of underlying gallbladder carcinom



### Cholesterosis: Strawberry GB.

- ☒ Yellow-speckled strawberry appearance.
- ☒ Cholesterol filled macrophages in the superficial mucosa.
- ☒ Clinically not significant. May present as chronic cholecystitis.



### Diagnostic Studies

- ☒ Blood tests
- ☒ CBC
- ☒ LFT
- ☒ OTHERS

☒ \*diagnosis::

-first: ultrasound (more sensitive of gallstones than CT scan.

☒ -second: upper endoscopy.

☒ -third: HIDA scan.

Abdominal plain film

☒ rarely useful as 10-15% of stones radiopaque enough to be seen

\*\*radiopaque: seen in Xray

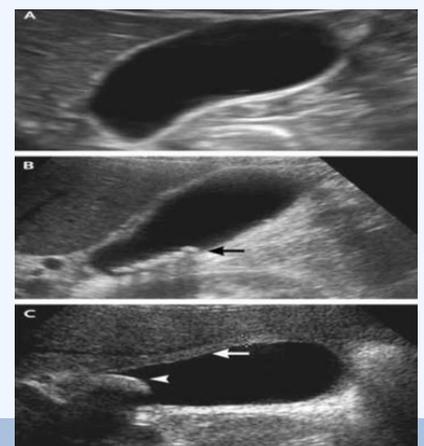
\*\*radiolucent: 85% not seen in Xray.



عكس النسب والحالة بال kidney stones

Ultrasound (most helpful)

- ☒ Non-invasive and cost- effective
- ☒ 95-98% sensitive for documenting presence of gallstones
- ☒ 80-95% sensitive, 78-80% specific for cholecystitis
- ☒ Operator dependant
- ☒ \*seen acoustic shadow of stone



Treatment of ::

- biliary colic= analgesia, laparoscopic, cholecystectomy.
- acute cholecystitis= early cholecystectomy or treatment conservative by IV fluid + antibiotics then laparoscopic cholecystectomy after 6 weeks.
- chronic cholangitis= elective cholecystectomy.
- obstructive jaundice= relieve obstruction by ERCP (endoscopic retrograde cholangiopancreatography), then cholecystectomy.
- ascending cholangitis= ERCP+IV fluid, antibiotics then cholecystectomy. (ass. With high mortality and morbidity).

## Aqueous shadow CT scan

(for CPD stones and acute cholecystitis)

- ☒ Less sensitive than ultrasound for detecting stones (50-70%)
- ☒ Used to detect complications or for other causes
- ☒ More expensive

Radionuclide scan-hepatobiliary iminodiacetic acid (HIDA), (cholecystokin scan) for biliary dyskinesia (low ejection fraction, gallbladder not respond for cholecystokin).

)\*stages of bile from liver to duodenum).

Treated by laparoscopic and cholecystectomy.

\*acute cholecystitis sensitivity 99%.

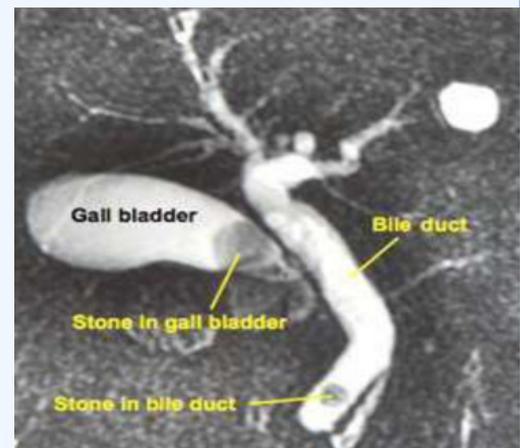
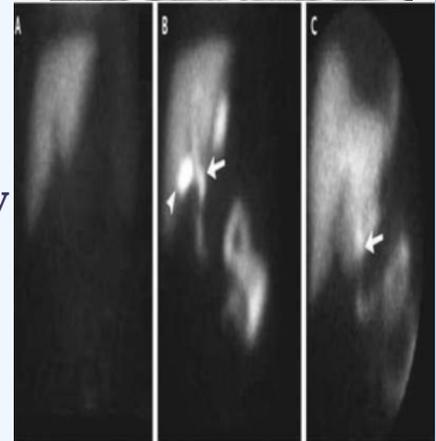
## Radionuclide scan – hepatobiliary iminodiacetic acid (HIDA)

- ☒ Good for detecting cystic duct obstruction or CBD obstruction
- ☒ Also very useful in determining bile leaks after cholecystectomy
- 
- ☒ Uptake by liver, GB, CBD, duodenum w/in 1hr = normal
- ☒ Slow uptake = hepatic parenchymal disease
- ☒ Filling of GB/CBD w/delayed or absent filling of intestine = obstruction of ampulla
- ☒ Non-visualization of GB w/ filling of the CBD and duodenum = cystic duct obstruction and acute cholecystitis (95% sensitivity & specificity)

## MRCP(best)

- ☒ Most often used to detect common bile duct obstruction

Figure 5. Acute Cholecystitis



## Gallbladder Cancer

\*cholangiocarcinoma most common in male ,, gallbladder cancer most in females.

\*risk factors of gallbladder cancer:

-large common bile duct, large gallstones more than 2.5cm, porcelain gallbladder.

\*gallbladder wall > 4mm= thickened wall.

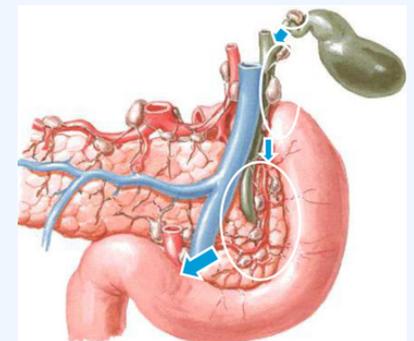
- ☒ **5th** most common GI tract malignancy
- ☒ 2-3 times more common in **females**
- ☒ 75% over age 65
- ☒ 5,000 new cases in US annually
- ☒ Found incidentally in 1% to 3% of cholecystectomy specimens
- ☒ Majority of the time, diagnosed in late stages with distant mets
- ☒ Cholelithiasis present in 75-90% of cases
- ☒ Only 0.4% of those with gallstones develop cancer

## Gallbladder Cancer

- ☒ Over 90% are adenocarcinoma
- ☒ 60% scirrhous, 25% papillary, 15% mucoid
- ☒ Squamous cell, oat cell, undifferentiated, adenosquamous & carcinoid tumors less common
- ☒ Only 10% are correctly diagnosed preoperatively
- ☒ **1-3 out of every 100 cholecystectomy specimens will show carcinoma at pathology**
- ☒ At diagnosis:
  - ☒ 25% contained to gallbladder wall
  - ☒ 35% metastases to regional lymph nodes
  - ☒ 40% have metastasized to distant sites
- ☒ Average survival is 6 months after diagnosis

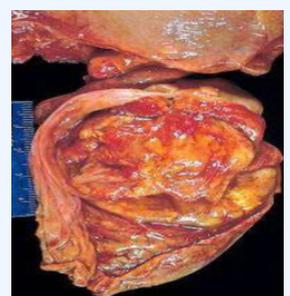
## Lymphatic drainage & spread

- ☒ Initial drainage to cystic duct node
- ☒ Descends along CBD nodes
- ☒ Nodes at posterior head of pancreas
- ☒ Interaortocaval nodes
- ☒ Can also spread by direct invasion into liver



## Gallbladder Cancer

- ☒ Most commonly presents with RUQ pain
- ☒ Weight loss, jaundice, palpable mass very late findings
- ☒ Many report change in quality or frequency of biliary colic episodes
- ☒ US sensitivity 70-99%
- ☒ CT approx 75% sensitive
- ☒ MRI 90-99% sensitive



## Management & Prognosis

- ☒ Tumor confined to mucosa or submucosa (T1a) or to muscularis (T1b) have overall 5-year survival of 100% & 85%
- ☒ Spillage of bile during cholecystectomy can seed abdomen
- ☒ Invasion beyond muscularis (T2 & T3) need extended cholecystectomy with lymph node dissection
- ☒ Stage III has ~15% 5-year survival
- ☒ Stage IV has median survival of 1-3 months from diagnosis
- ☒ Majority of cases, therapy is palliative
- ☒ Chemo & radiation

## Miscellaneous Biliary Pathologies

- ☒ Biliary atresia
- ☒ Most common cause of persistent jaundice in newborn
- ☒ Treat with hepatic portoenterostomy (Kasai procedure) or transplantation
- ☒ Hemobilia
- ☒ Most cases in US due to trauma or iatrogenic injury
- ☒ Diagnosis often requires arteriography
- ☒ Treatment of persistent hemobilia includes embolization or surgical ligation
- ☒ Benign polyps of gallbladder
- ☒ From cholesterol laden macrophages in mucosa
- ☒ Papilloma of bile duct
- ☒ Very rare, only ~90 cases in literature

## Indications for Prophylactic Cholecystectomy (even asymptomatic)

- ☒ Pediatric gallstones
- ☒ Congenital hemolytic anemia
- ☒ Gallstones >2.5cm
- ☒ Porcelain gallbladder
- ☒ Bariatric surgery
- ☒ Incidental gallstones found during intraabdominal surgery
- ☒ Recommended prior to transplantation
- ☒ Being away from medical service

## Medical Treatment

- ☒ Oral dissolution therapy
- ☒ Urso- vs. chenodeoxycholic acid for 6-12 months
- ☒ For small, non-calcified cholesterol stones
- ☒ ESWL
- ☒ Criteria: biliary colic, <3 stones, functioning GB
- ☒ 12-18 months therapy
- ☒ Experimental (2002)
- ☒ Complications
- ☒ Colic (20-40%)
- ☒ hemobilia (8-14%)
- ☒ Recurrence

فش فائدة من التفيت.

\*single stone 4mm cholesterol types given drugs (200 gm) for 6 months before any meal, if cause symptoms= cholecystectomy).

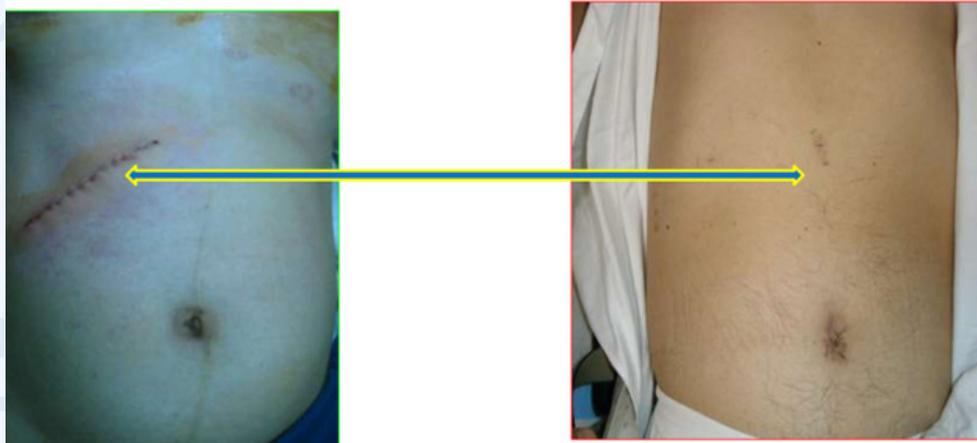
\*gallbladder wall if increase more than 4mm= thickened wall.

\*complications during surgery = bleeding, infection, slit stone, biliary injury, bile leak.

\*cholecystectomy better than release of stones from gallbladder



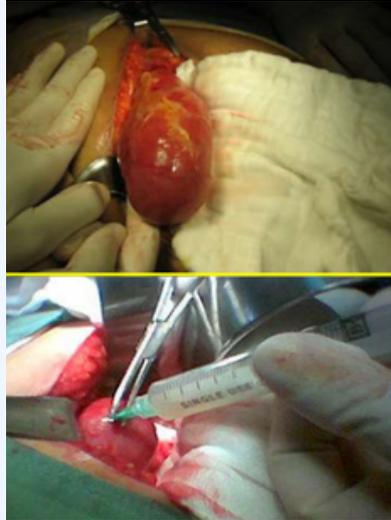
## Laparoscopic vs. Open Cholecystectomy



## Open cholecystectomy::

15-20 cm

In right upper quadrant near lung = which is risk of pneumonia and need more hospital sitting.



## Laparoscopic

Makes holes around the umbilicus (1cm) and on sides (0.5cm).  
Single trocker through umbilicus only.

For CPD exploration hepatocellular.

Loss of tactile sensation.(contraindication)

## Indications::

Previous adhesion))

Hemodynamic instability))

converge from laparoscopic to open if uncontrolled bleeding = unsecured anatomy



use inert clips not removers and seen on xray

Archive

\* . One of the following carries a risk for cholelithiasis :

Smoking

Crohns

Jejunal resection

Ibs

\* .Wrong about Acalculus cholecystitis -- managed conservatively

\* Which of the following is the appropriate investigation in a patient presenting with a recent episode of right upper quadrant pain and a normal physical examination?

a. abdominal CT scan

b. ERCP

c. plain X-ray of the abdomen

**d. upper abdominal ultrasound**

e. cholescintigraphy

\* The most aggressive biliary tumor with the shortest overall survival rate is:

a. gallbladder cancer

b. biliary cystadenoma

c. hepatocellular cancer

d. Caroli's disease

**e. distal cholangiocarcinoma (dCCA)**

\* in obstructive jaundice coagulopathy is due to deficiency of the following clotting factors EXCEPT:

a. Factor two

b. Factor seven

c. Factor eight

**d. Factor nine نفس المبدأ**

e. Factor ten

\* Cholangiocarcinoma is most commonly found:

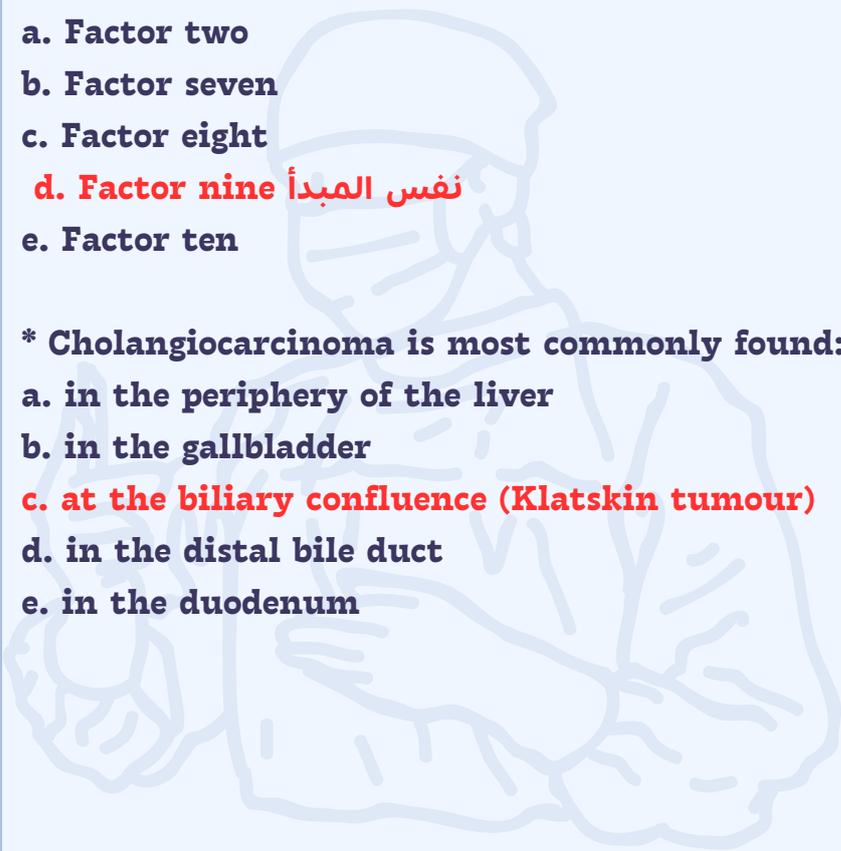
a. in the periphery of the liver

b. in the gallbladder

**c. at the biliary confluence (Klatskin tumour)**

d. in the distal bile duct

e. in the duodenum



\* Cholesterol gallstone which is wrong :

- a. white
- b. radiopaque
- c. round
- d. single not multiple
- e. friable

\*A 58-year-old man presents with a 3-day history of worsening abdominal pain and vomiting.

Abdominal x- ray reveals dilated loops of small bowel and air in the biliary tree. The most likely diagnosis is:

Select one:

- a. Ascending cholangitis
- b. Gallbladder cancer
- c. Choledochal cyst
- d. Gallstone ileus
- e. Emphysematous cholecystitis

الأرزاق المتأخرة تأتي بشكل أجمل  
ما يتمناه المرء طوال حياته" 🌿

