

Biliary Obstructions and Biliary Stones

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Color Index:

 Important

 Doctor's Notes

 Extra

 Davidson's

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Basic review of anatomy

Biliary tree:

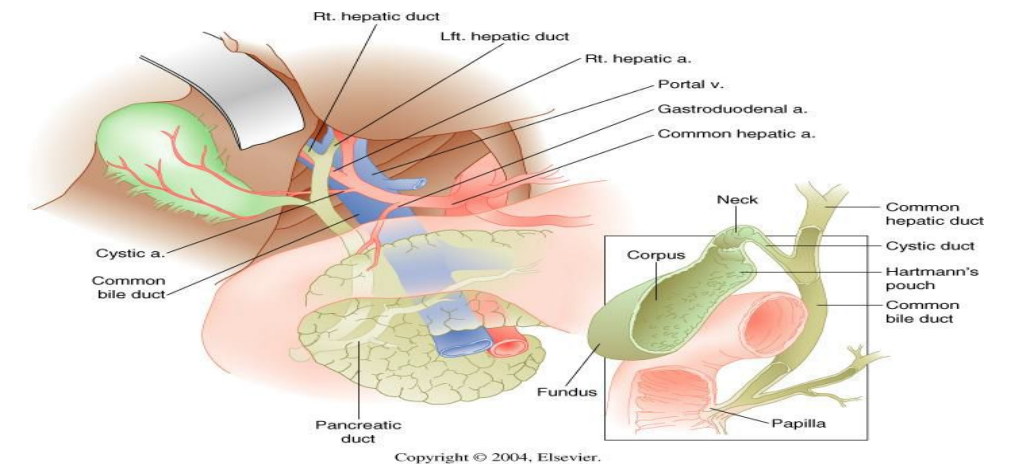
consists of fine intrahepatic biliary radicles that drain individual liver segments before forming the right and left hepatic ducts. The left hepatic duct joins the right hepatic duct to form \Rightarrow common hepatic duct \Rightarrow common bile duct, which ends at the ampulla of Vater (usually in the second part of the duodenum), It is usually joined by the pancreatic duct just before entering the duodenum.

Gallbladder:

lies in a bed on the undersurface of the liver between its right and left halves with a fundus, body and neck. Hartmann's pouch: is a dilatation of the gallbladder outlet adjacent to the origin of the *cystic duct*, in which *gallstones frequently become impacted*.

Blood supply:

Gallbladder and cystic duct are supplied by: the *cystic artery*.
(Celiac trunk \rightarrow common hepatic a. \rightarrow right hepatic a. \rightarrow cystic a.)



So chronic emptying of bile (such with aging) leaves some salts in the gallbladder which may lead to stone formation.

The gallbladder capacity is 50ml, so how can it contain the 1 liter bile secreted from the liver?

1- The bile secretion is intermittent during the day & with the food.

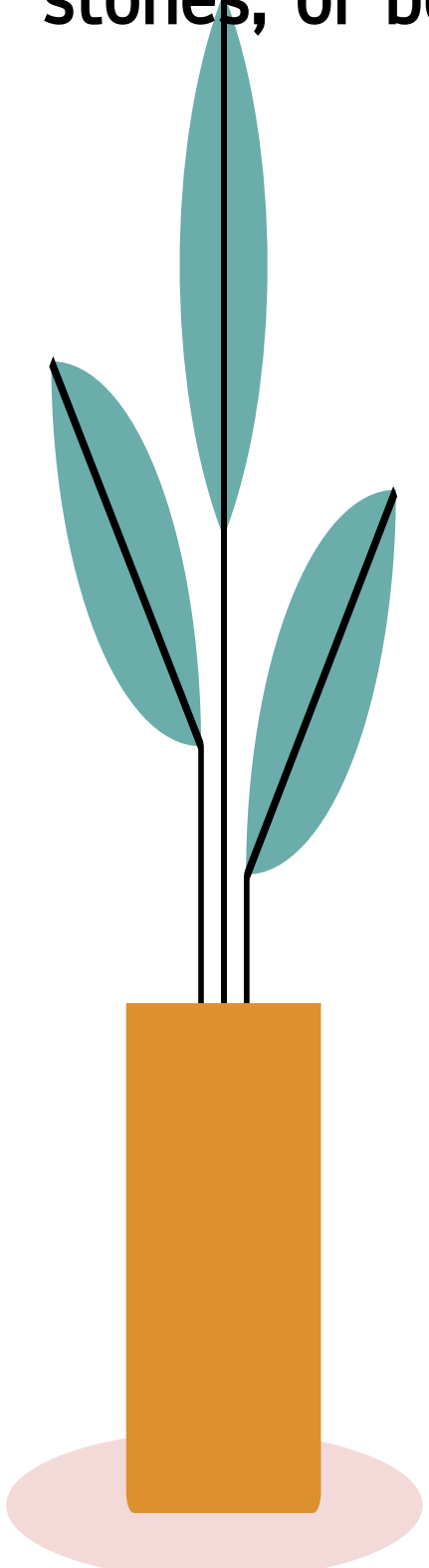
2- The bile is reabsorbed after secretion from the liver to get concentrated in the gallbladder.

#Impaired motility can predispose to stones.

Sludge: is crystals without stones. It may be a first step in stones, or be independent of it.



Highly recommended video about Gallstones (pathogenesis, diagnosis and symptoms) [8:12 min](#)



SUMMARY: Tip: go through this table before studying the lecture and make sure you read it after 🍷

Disease	Cholelithiasis	Cholecystitis	Choledocholithiasis	Cholangitis
Definition	presence of gallstones in the gallbladder	Inflammation of the gallbladder	Presence of a gallstone in the common bile duct	Inflammation of the Common bile duct (by infection)
Site of obstruction	Obstruction in the neck of the gallbladder	Cystic duct	Common bile duct	Common bile duct
Clinical presentation	<ul style="list-style-type: none"> * Pain ~ RUQ ~ Colicky/Intermittent ~ Radiates to right shoulder ~ worse with fatty food +/- N/V 	<ul style="list-style-type: none"> Pain ~ RUQ ~ Constant ~ Radiates right shoulder or back ~ worse with fatty food +/- N/V * Fever 	<ul style="list-style-type: none"> * Pain (mild) ~ RUQ ~ Radiates to shoulder * Jaundice * +/- hepatitis * +/- pancreatitis * +/- N/V * +/- Fever 	<p>Charcot's triad: RUQ pain + jaundice + fever (with rigors)</p>
Murphy's sign youtube	NEGATIVE	Positive	NEGATIVE	NEGATIVE
Obstructive jaundice	NEGATIVE	NEGATIVE	Positive	Positive
Lab	NORMAL	↑WBC	<ul style="list-style-type: none"> - ↑WBC - ↑ LFTs (ALP & GGT)4 - +/- ↑ amylase & lipase 	<ul style="list-style-type: none"> ↑WBC ↑ LFTs (ALP & GGT)
Imaging	<ul style="list-style-type: none"> US: <ul style="list-style-type: none"> • Gallstones 	<ul style="list-style-type: none"> - US: (3 findings) <ul style="list-style-type: none"> - 1. Stones - 2. Thickened wall - 3. Pericholecystic fluid - 	<ul style="list-style-type: none"> US: <ul style="list-style-type: none"> • Obstruction • Dilated ducts Endoscopic US & MRCP 	<ul style="list-style-type: none"> US: <ul style="list-style-type: none"> • Obstruction • Dilated ducts
Management	<ul style="list-style-type: none"> * Avoid fatty meal * Elective cholecystectomy + Ursodeoxycholic acid: Effective agent for dissolving cholesterol gallstones 	<ul style="list-style-type: none"> NPO + IVF + IV Abx * Urgent Cholecystectomy if cholecystectomy is of an option 	<ul style="list-style-type: none"> * NPO + IVF + IV Abx * ERCP + Elective cholecystectomy 	<ul style="list-style-type: none"> * NPO + IVF + IV Abx * Urgent ERCP + urgent cholecystectomy -

Gallstones pathogenesis:

Bile consists of 3 component in a balance:

- Lecithin (Phospholipids)
- Bile acids
- Cholesterol

● The solubility of cholesterol in bile **depends on the concentration of lecithin, bile salts and cholesterol.**

● Lecithin and cholesterol are insoluble aqueous solutions but dissolve in bile salt-lecithin micelles.

● Conversely, increasing the biliary concentration of lecithin and bile salts should hinder cholesterol stone formation.

● Cholesterol will only crystallize into stones when the bile is supersaturated with cholesterol relative to the bile salt and phospholipid content and gradually stone growth occur.

Normally the gallbladder secretes 1-1.5L/day of bile which contains **glucaro-1,4-lactone**, which inhibit the conversion of conjugated to unconjugated bilirubin, and thus stop the formation of calcium bilirubinate stones.

Differential diagnosis of RUQ pain:

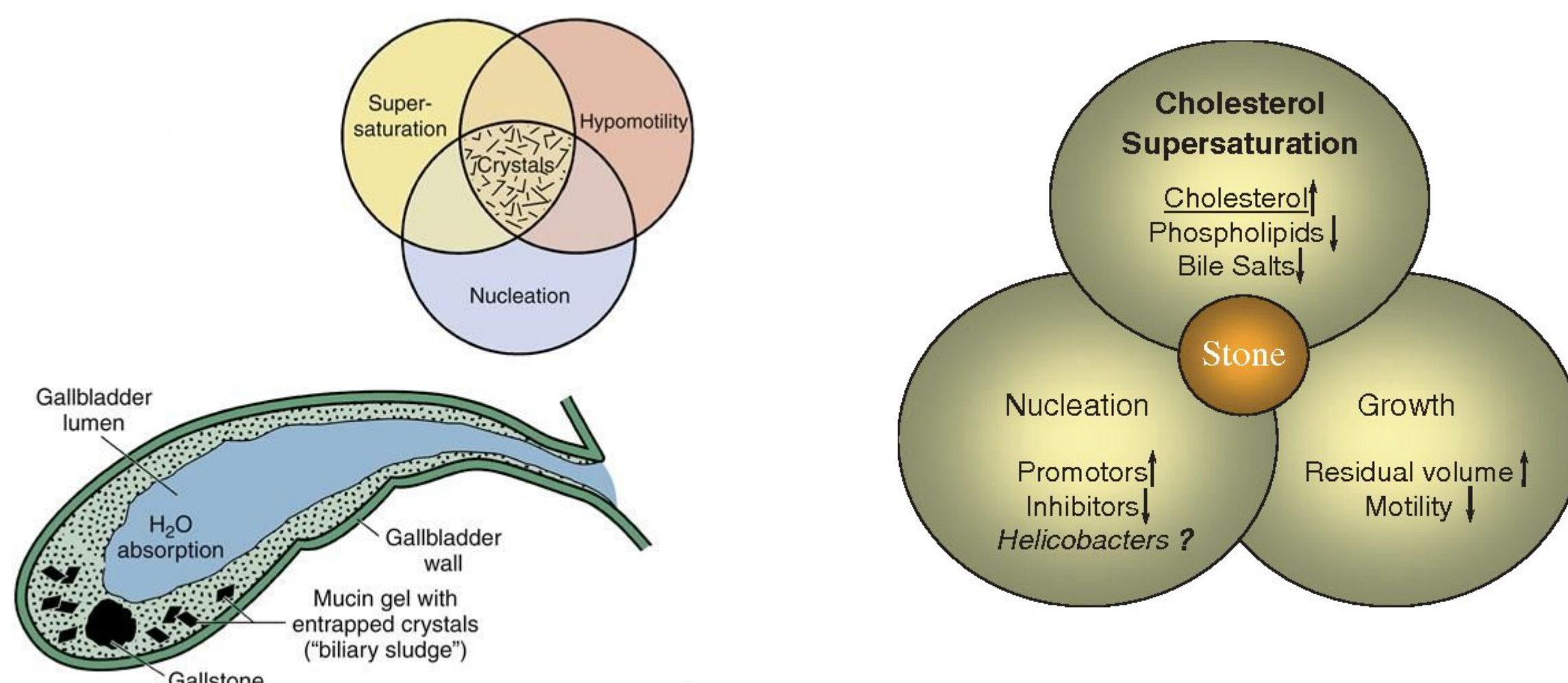
1-Biliary diseases: CBD stones , Acute or chronic cholecystitis and Cholangitis.

2-Inflamed perforated peptic ulcer.

3-Pncreatits.

4-Hepatitis.

-Rule out: appendicitis,renal colic ,pneumonia ,pleurisy.



Types of stones (you don't have to know the details just read them to understand)

Gallstones are conveniently classified into cholesterol, pigment stones, and of mixed composition.

Cholesterol gallstones

Most common

Account for 80% of all gallstones

Cholesterol is held in solution in bile by its association with bile salts and phospholipids in the form of micelles and vesicles.

Crystallization can be due to either of the following:

- Relative deficiency of bile salts
- Relative excess of cholesterol

Pathogenic factors leading to production of lithogenic bile:

- Defective bile salt synthesis (hepatic dysfunction)
- Excessive cholesterol secretion (Increased HMG-CoA reductase activity).
- Abnormal gallbladder function (impaired motility)
- Excessive intestinal loss of bile salt



Pigmented stones

Account for 15-20% of all gallstones, Composed of calcium bilirubinate.

Dark, multiple, and smaller in size.

And this is the only type of biliary stones that can be seen on X-ray, but the US still the one to choose.

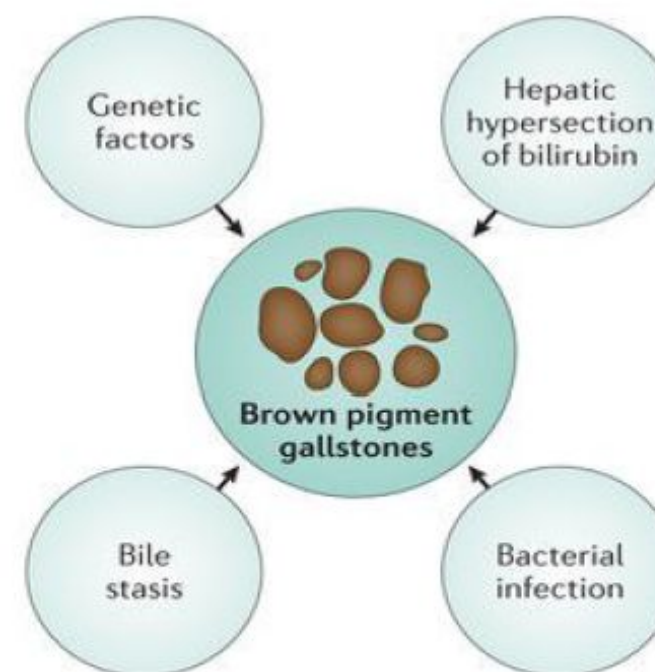
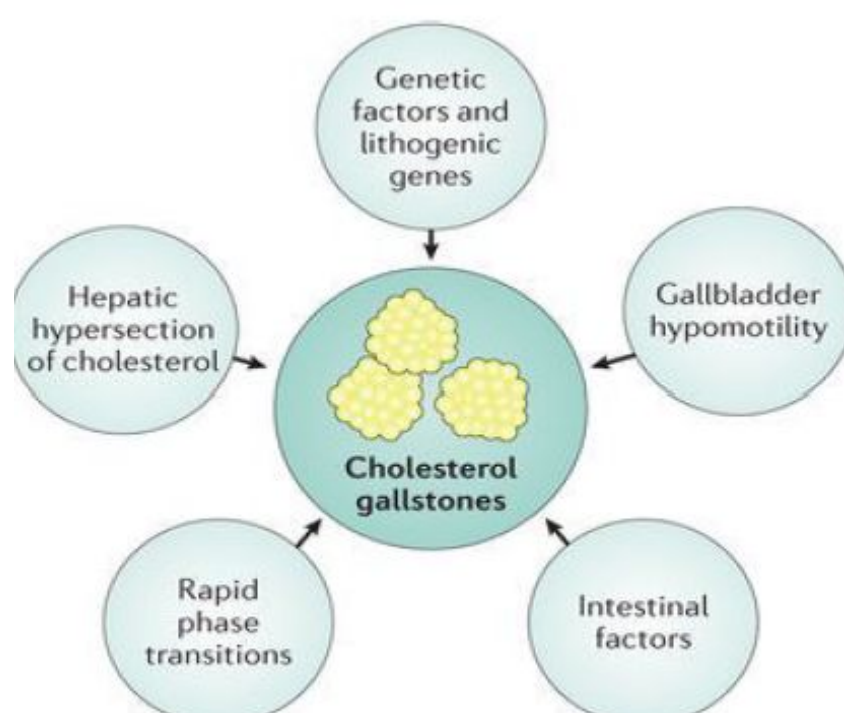
A-Black stones⁷:

Black pigment stones are mostly seen in patients with hemolytic conditions such as: sickle cell disease and spherocytosis, which there is a chronic excess in bilirubin production.

They can be also found in Cirrhotic patients

B- Brown stones⁸:

These stones are composed of calcium salts of fatty acids as well as calcium bilirubinate. They are almost always found in the presence of bile stasis and/or biliary infection.



Extra

7 form primarily in the gallbladder in sterile bile and are associated with advanced age, chronic hemolysis, alcoholism, cirrhosis, pancreatitis, and total parenteral nutrition

8 Brown stones form not only within the gallbladder but also within the intrahepatic and extrahepatic ducts; they are uniformly infected with enteric bacteria and are usually associated with ascending cholangitis .

Gallbladder stones (Cholelithiasis)

Background:

Cholelithiasis is the presence of gallstones in the gallbladder only without symptoms..

● Presentation and complications:

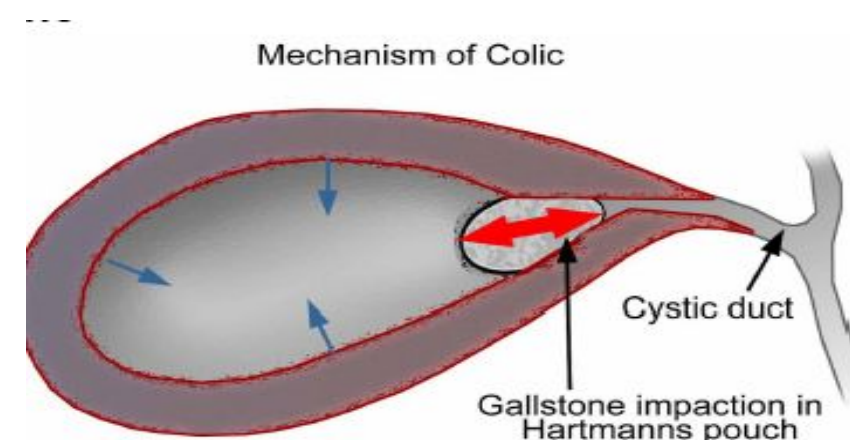
- May remain asymptomatic for decades and incidentally get found in ultrasound exam for other problems, some patients has vague, upper abdominal discomfort and dyspepsia which cannot be explained by a specific disease. **Routine cholecystectomy is not indicated.**

- May cause biliary colic type of pain (Pain associated with temporary gallbladder contraction against a stone.
- May lead to:
 - Cholangitis: Infection of the biliary tree
 - Choledocholithiasis: Gallstone in common bile duct
 - or Cholecystitis: Inflammation of gallbladder from obstruction of CBD or cystic duct

Do we have to remove every gallbladder with stones?

Only if symptomatic we have to remove.

(Symptoms of biliary colic; slide 8)



Complications of gallbladder stones :

-cholangitis - acute pancreatitis - obstructive jaundice

Other symptoms are related to site of obstruction of stone

Obstruction of:

- Common bile duct leading to pain & jaundice.
- Pancreatic duct leading to pancreatitis (In Saudi Arabia More than 80% of patient with acute pancreatitis are due to gallstones) .

- Gallstones increased risk of carcinoma of the gallbladder.
- Biliary pain(pain caused by gallstones) usually manifest in the epigastrium and right hypochondrium (RUQ).

Epidemiology,

affected by race, ethnicity, sex, medical conditions, fertility..

- Internationally: 20% of women, 14% of men.
- Patients over 60 prevalence was 12.9% for men, 22.4% for women. F > M
- Every year 1-3% of patients develop symptoms.
- **Morbidity and mortality is associated only with symptomatic stones.**

Causes and risk factors:

<p>Ethnicity</p>	<ul style="list-style-type: none"> - High in Native americans Pima Indians (75% of elderly). AND Asians are more likely to have pigmented stones than others. - African origin with Sickle Cell Anemia. - Highest in fair skinned people of northern European descent and (in Hispanic populations 1-2% yearly.)
<p>Sex</p>	<p>More common in women. Etiology may vary being 2ndary to estrogen¹¹ (plz read footnote) ; causing increased cholesterol, and progesterone causing bile stasis.</p> <ul style="list-style-type: none"> • Pregnant women more likely to have symptoms. • Women with multiple pregnancies at higher risk • Oral contraceptives, estrogen replacement therapy (hormones increases the risk of stone formation). - 5F's: Forty (The process needs time زي الغلاية الكهربائية تتعبى), Fair, Fatty (The fat metabolism will results in more cholesterol formation), Female (due to hormones) & Fertile (الوحدة) <ul style="list-style-type: none"> - تحمل وتولد والتي حولها يأكلو فيها ويسمونها وهي أساساً نحيفة -Drugs including:ceftriaxone and estrogen pills.
<p>Age</p>	<p>It is uncommon for children to have gallstones. If they do , it's more likely that they have congenital anomalies, biliary anomalies, or hemolytic pigment stones disease.</p>

<p>Causes :</p>	<p>Differential diagnosis:</p>
<ul style="list-style-type: none"> - High fat diet, Obesity - Rapid weight loss, TPN, Ileal disease. - Increases with age, alcoholism. - Diabetics have more complications - Hemolytics - Multiparity - Childbearing - First degree relatives 	<ul style="list-style-type: none"> - AAA (Abdominal Aortic Aneurysm) - Appendicitis, Cholangitis, cholelithiasis - Diverticulitis, Gastroenteritis, hepatitis - IBD, MI, small bowel obstructions (sbo) - Pancreatitis, renal colic, pneumonia

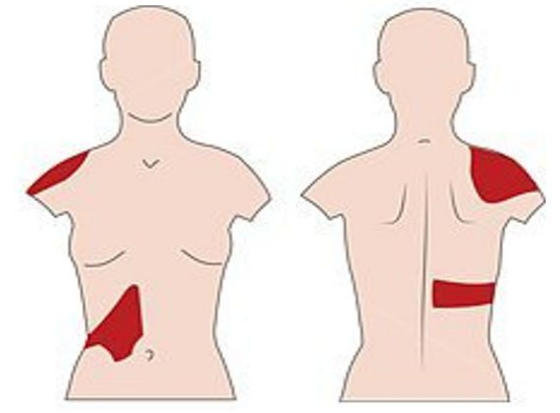
11 Estrogen increase HMG coA which will lead to: 1.more cholesterol synthesis and secretion to GB
2.increase the lipoprotein receptors on hepatocytes = more lipid uptake.

History:

- 3 clinical stages: **asymptomatic (60-80%)** , **symptomatic** , and **with complications (cholecystitis, cholangitis, CBD stones)**.
- Typical symptoms of biliary colic (why did we say biliary colic and not gallstones? Because typically gallstones are asymptomatic):
 - **RUQ colicky pain** , Radiating to the **back and shoulder**¹² and never radiates to the left side.
 - Aggravated by **fatty food**

If pain is associated w/ empty stomach ⇒ think more of duodenal ulcer.
(The pain can't be there when you are fasting!)

- **Associated with nausea and vomiting**
- **Usually recurrent pain (intermittent)**
- **No fever or leukocytosis** (Because the stones are present there but without inflaming the gallbladder yet unlike cholecystitis), Normal LFT.



A detailed history of the pattern and characteristics of symptoms along with the use of ULTRASOUND will help in the diagnosis.

Mechanism of pain in case of gallstones:

Cholecystokinin (CCK) will be secreted after eating a fatty food (CCK affect is in the muscular layer of gallbladder causing it to contract, in order to push bile into the duodenum -where the fatty food digestion happens-) and when the gallbladder contract it won't release bile (stones obstruct release of bile) stomach will secrete more and more CCK to get the bile so more and more contraction in the gallbladder causes pain

Sometimes the pain can be relieved by vomiting, (how? When you vomit → less CCK secreted → less contraction → less pain)

- Most patients develop symptoms before complications.
- Indigestion, bloating and fatty food intolerance occur in similar frequencies in patients without gallstones, and **are not cured with cholecystectomy**.
- atypical symptoms of gallstones could be in the epigastric area, could be also without nausea and vomiting, but if the pain is in the LUQ this is less likely to be gallstones
- **Small stones are more symptomatic**. How? It can move and obstruct ampulla of Vater that will lead to (obstructive jaundice/pancreatitis)

Physical examination:



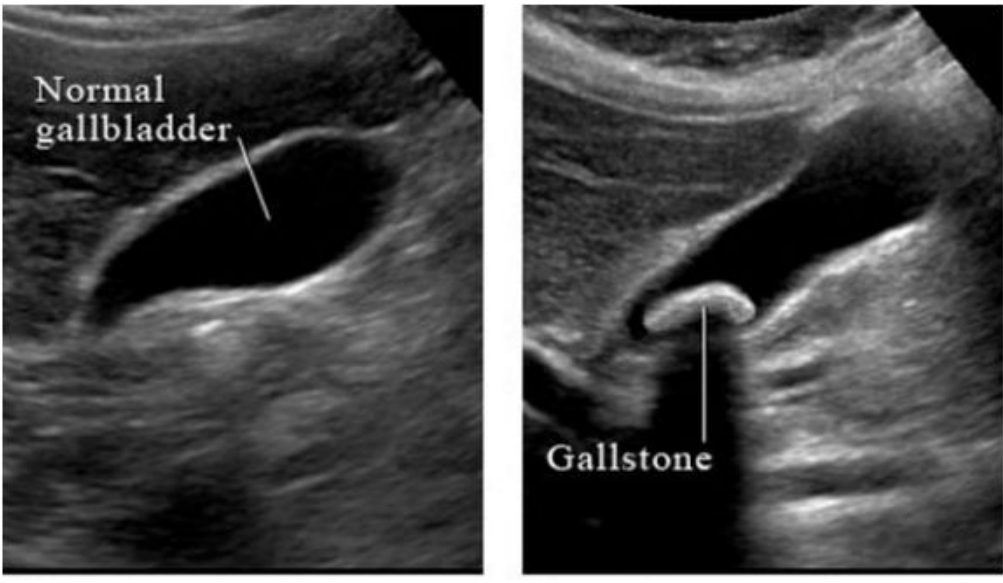
- Vital signs and physical findings in cholelithiasis are completely normal (maybe you will find tachypnea and tachycardia due to the pain).
- Fever, tachycardia and tachypnea ¹⁷, hypotension, alert you to more serious infections, Including cholangitis, cholecystitis.
- Negative Murphy's sign ¹⁸.

¹² Due to diaphragmatic irritation

¹⁷ tachycardia and tachypnea due to pain.

¹⁸ it is performed by asking the patient to breathe out and then gently placing the hand below the costal margin on the right side at the midclavicular line (the approximate location of the gallbladder). The patient is then instructed to inspire (breathe in). If the patient stops breathing in (as the gallbladder is tender and, in moving downward, comes in contact with the examiner's fingers) and winces with a 'catch' in breath, the test is considered positive.

Imaging studies for all biliary cases:

X-Rays	CT	Ultrasound
 <p>15% stones are radiopaque, porcelain GB may be seen. Air in biliary tree, emphysematous GB wall.</p>	 <p>for complications, ductal dilatation, surrounding organs. Misses 20% of GS. done only if diagnosis was uncertain. Denotes the wall thickening and the fluids around the GB also can show the distention</p>	 <ul style="list-style-type: none"> - 95% sensitive for stones, 80% specific for cholecystitis. It is 98% sensitive and specific for simple stones. - Wall thickening (>3 mm) positive in (Cholecystitis). - Pericholecystic fluid, sonographic Murphy's sign positive in (Cholecystitis). - Dilated CBD (7-8mm) (Positive in Choledocholithiasis and cholangitis). - The acoustic shadow due to absence of reflected sound waves behind gallstone <p>Last portion of common bile duct is normally invisible, thus if seen == it is dilated !!</p>

US is the most sensitive and available method to detect biliary stones and HIDA . Plain x-rays, CT 22 scans ERCP are adjuncts.

What to do for a patient coming with pain: cannula "painkillers (1g paracetamol) and IV fluid (1L saline)" after 1 hour the patient is no longer tachypneic nor tachycardic → meaning the pain is relieved. If you examine his/her abdomen will be soft and lax. All the lab tests will be normal, so how to confirm your diagnosis? **By ultrasound.**

What do you need to know from ultrasound 3 things to look for:

1. presence of stones.
2. is there any radiological signs of cholecystitis? "wall thickening of the gallbladder or pericholecystic 24 fluid" (if present it indicate inflammation "cholecystitis" not gallstones) 3. Dilation of the biliary system So in biliary colic (Cholelithiasis) : 1. presence of stones 2. no wall thickening
3. no dilation

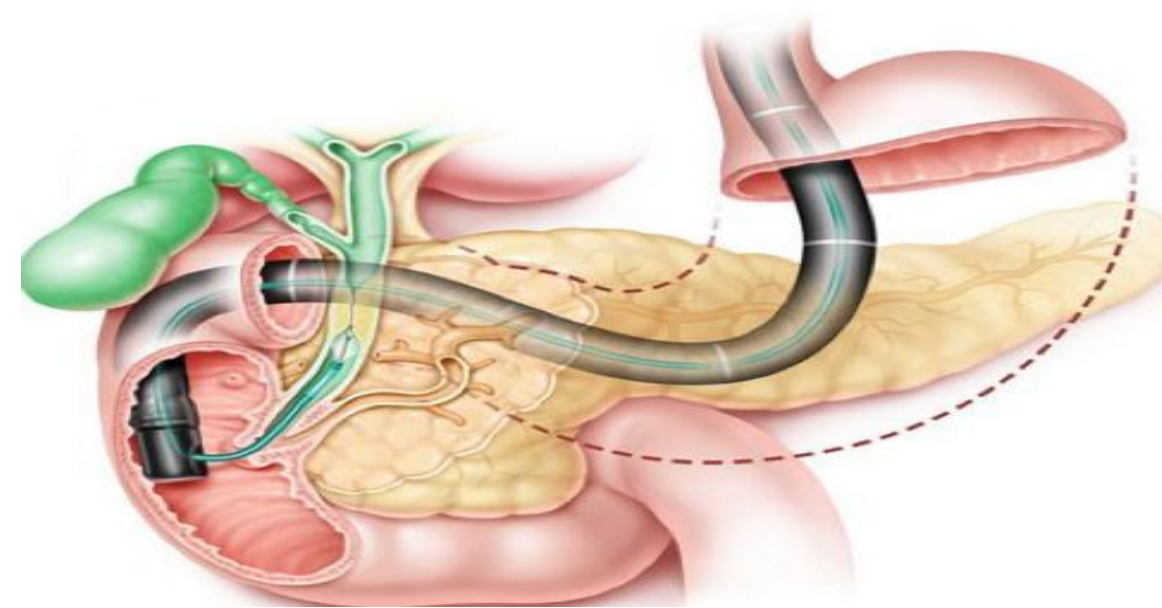
Imaging studies (cont..)

ERCP

- ERCP is **therapeutic not diagnostic** .
- **Never do if patient is having active pancreatitis, cholangitis, or when patient is hypotensive.**
- Provides radiographic and endoscopic visualization of biliary tree.
- Obstruction is visualized as a filling defect of contrast.
- Done only when CBD is dilated (if you can't prove dilation with US, don't use it as diagnostic) and elevated LFTs.
- **Complications include bleeding, perforation, pancreatitis the most common, ascending cholangitis (all complications are fatal) (هذا سؤال لكم بالاختبار)**

IMPORTANT MCQs!!!!

- **What is the best option to confirm biliary colic or (presence of stones in the gallbladder)? Ultrasound**
- **What is the most sensitive for gallbladder stones (biliary colic)? Ultrasound**
- **The cheapest or the most available? Ultrasound**



- What is the most sensitive modality for **BILIARY TREE SYSTEM** stones "not the gallbladder"?

- **EUS (endoscopic ultrasound)** You can use regular US to check if the system was dilated, and we don't use it to confirm the presence of stones because the stones might be invisible (because duodenum is on top of biliary tree, and it contains air which is not a good medium for the regular US waves to show the stones).

- **If not available use MRCP** (which is MRI picture which shows the biliary tract and the pancreas as a reconstructed image and removes other unneeded structures) is used, if stone present we do ERCP to remove it. if still there are multiple other stones we couldn't remove we do stenting. Then after sometime we do ERCP again !! it's a must.

Choledocholithiasis

- **Presence of gallstone in the common bile duct**
- **Presentation: same as biliary colic with:**
 - Jaundice
- **Imaging:**
 - US: gallstone and dilatation of the biliary system
- **Treatment:**
 - First we do **ERCP** then cholecystectomy (during the same admission)

Choledocholithiasis

Pathogenesis:

- Stone obstructing CBD (bear in mind there are other causes for obstructive jaundice) – danger is progression to ascending cholangitis.

USS

- Will confirm gallstones in the gallbladder
- CBD dilatation i.e. >8mm (not always!)
- May visualise stone in CBD (most often does not)

MRCP

- In cases where suspect stone in CBD but USS indeterminate
- E.g.1 obstructive LFTs but USS shows no biliary dilatation and no stone in CBD
- E.g. 2 normal LFTs but USS shows biliary dilatation

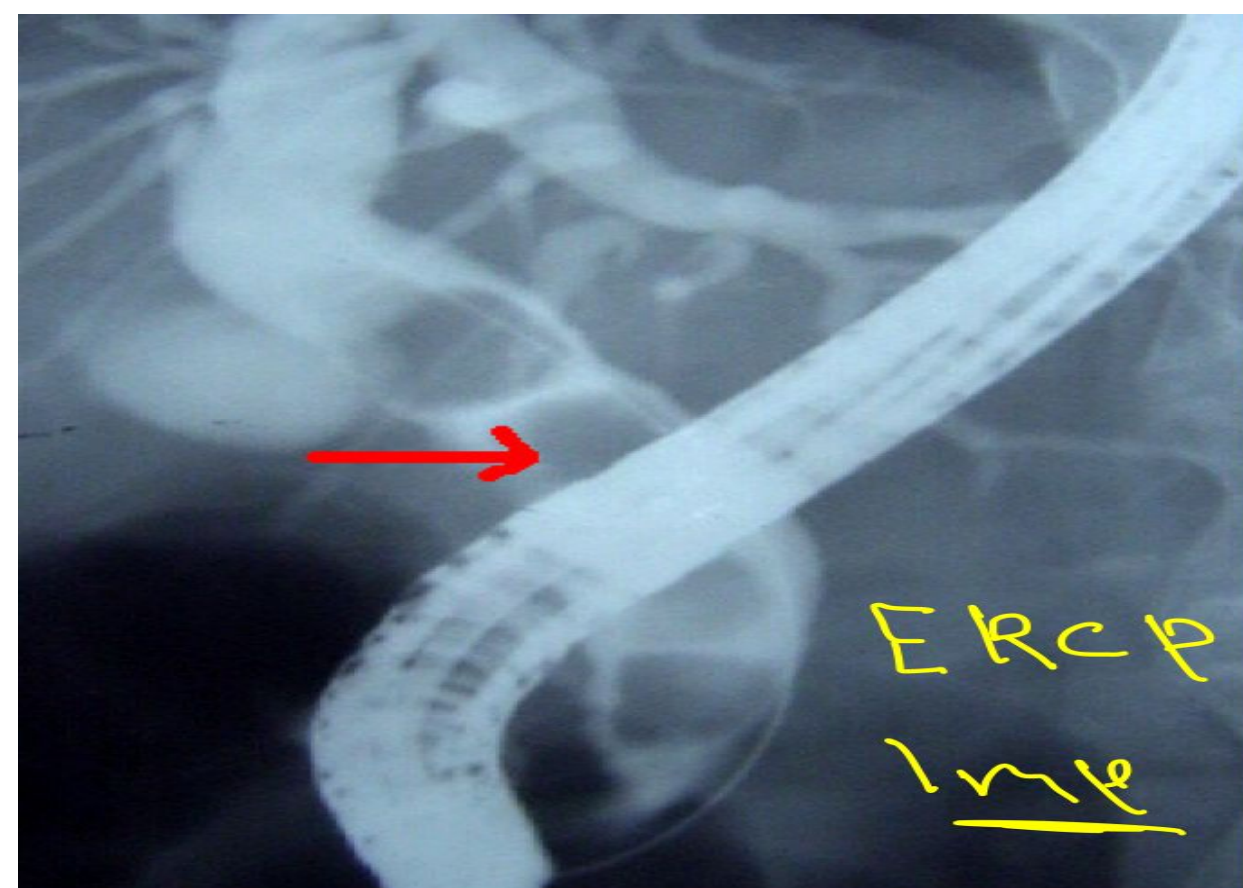
ERCP

- If confirmed stone in CBD on USS or MRCP proceed to ERCP which will confirm this (diagnostic) and allow extraction of stones and sphincterotomy (therapeutic)

Treatment

- Must unobstruct biliary tree with ERCP to prevent progression to ascending cholangitis
- Whilst awaiting ERCP monitor for signs of sepsis suggestive of cholangitis

- ★ Small stone goes through the cystic duct → obstruction of ampulla of vater → obstruction of common bile duct causing **obstructive jaundice** & → obstruction of pancreatic duct causing **acute pancreatitis** . **That's why small stones are more dangerous and symptomatic!**



Surgical approaches: **IMPORTANT**

Non-febrile

Patient comes to ER with

- Typical biliary colic symptoms and history of recurrent episodes of biliary colic. (متعودة دائماً)
- Order labs (CBC, LFTs, E&U, coagulation profile) >> **All NORMAL**
- US: confirm presence of stones in gallbladder.
- US (3)Qs
 1. Presence of stones? Yes
 2. Thickened wall/ pericholecystic fluid ? **NO**
 3. Dilated biliary tree? No

In ER:

- Given pain killers and rehydrated (IV saline) (symptoms will subside completely)

How to treat him?

- The patient may be tachycardic and tachypneic, and it is because of pain, once you give the patient painkillers he will be back to normal.
- You advise him to do cholecystectomy (**electively**), waiting won't increase risk as 80% are asymptomatic.

Febrile (cholecystitis)

Patient comes to ER with:

- Same symptoms, BUT **febrile** (maybe perforation)
- Order labs : (CBC, LFTS, E&U, coagulation profile)>> **CBC: ↑ WBC (inflammation)**
- Suspecting cholecystitis
- US (3)Qs
 1. Presence of stones? **Yes**
 2. Thickened wall/ pericholecystic fluid ? **Yes**
 3. Dilated biliary tree? **No**

In ER:

- Given pain killers and rehydrated (IV saline) (symptoms won't subside completely there will still be **tenderness**).
- **Admit patient (acute cholecystitis) need antibiotics and Cholecystectomy (Urgent mostly) .**

Management:

- Historically cholelithiasis was operated on emergently which increased mortality.
- Surgical consult is appropriate, and depending on the institution, either medicine or surgery may admit the patients for care. (**elective surgery**) **And manage the condition until the time of the surgery be advising the patient to avoid fatty food.**
- Get GI doctor involved early if suspect CBD obstruction.

Open cholecystectomy

can be performed after the first 24-48h or after the inflammation has subsided. Unstable patients may need more urgent interventions with ERCP, percutaneous drainage, or cholecystectomy.

Laparoscopic cholecystectomy

very effective with few complications (4%). 5% convert to open. In acute setting up to 50% open **(Mostly used)**.

Cholecystitis

Remember there is two types of cholecystitis: calculous cholecystitis (gallstones) & acalculous cholecystitis (without gallstones)

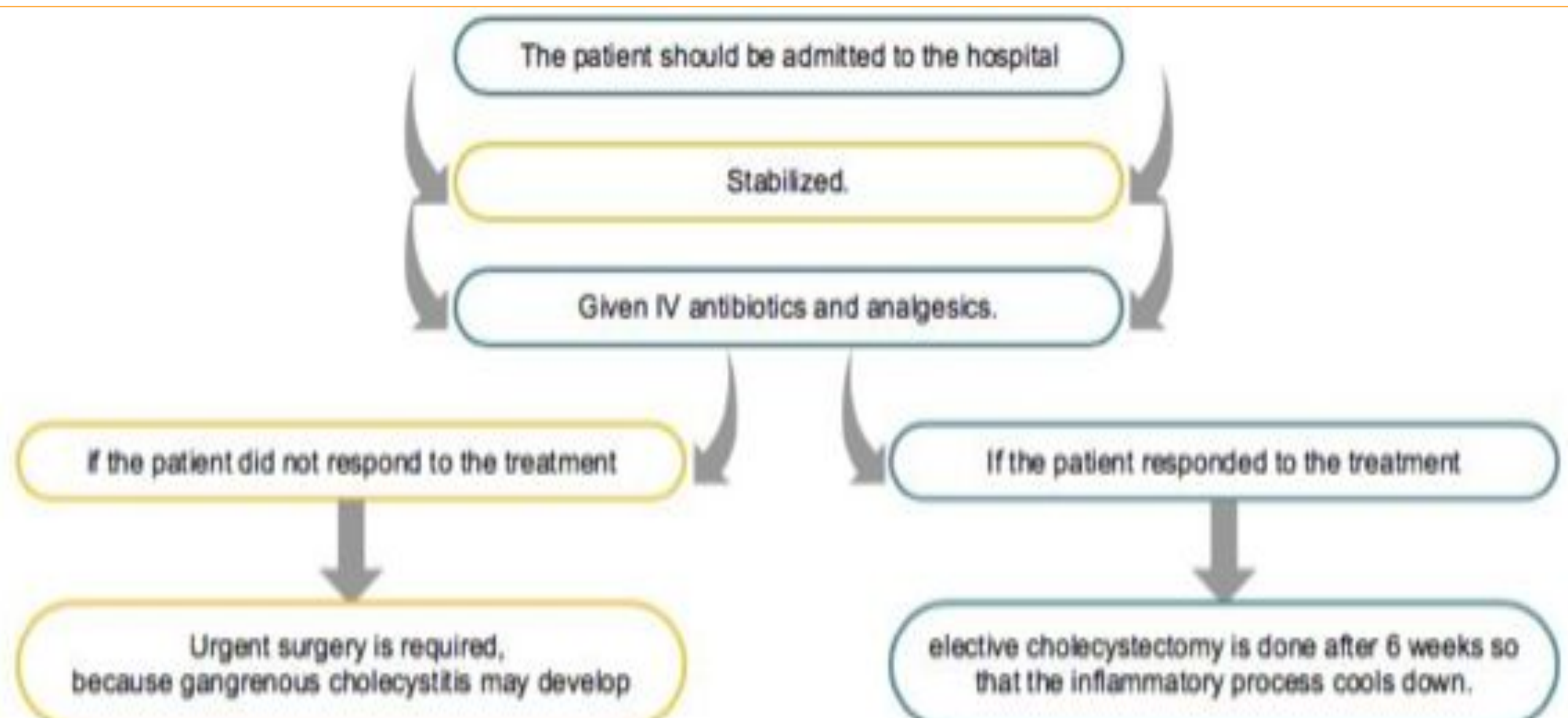
Characteristics

- **Continuous RUQ** pain (>24 hrs).
- **Fever**
- **High WBC count due to inflammation.**
- **Murphy's sign** on examination. (Inspiratory arrest)
- Distended gallbladder and **thickening of the wall on Ultrasound** due to inflammation.

Complications of acute cholecystitis (Dr skipped it)

- **Hydrops:** Obstruction of cystic duct followed by absorption of pigments and secretion of mucus to gallbladder (White bile) -There may be round tender mass in RUQ- Urgent cholecystectomy is indicated
- **Empyema of gallbladder:** Pus-filled GB due to bacterial proliferation in obstructed GB. Usually More toxic with high fever Emergent operation is needed.
- **Perforated gallbladder:** pericholecystic abscess is present (up to 10% of acute cholecystitis)
 - Percutaneous drainage in acute phase
- **Biliary peritonitis** due to free perforation (Require emergent laparotomy)
- **Chronic perforation** of adjacent viscus (cholecystoenteric fistula)
 - Air seen in the biliary tree
 - The stone can cause small bowel obstruction if large enough (gallstone ileus)
 - Laparotomy is needed for extraction of the stone, cholecystectomy and closure of the fistula

Management



Cholangitis

Infection of the biliary tree .

Characteristics

Charcot's triad

- RUQ pain.
- Jaundice.
- Fever.

Reynolds pentad : Charcot's triad + **septic shock** and altered mental status

30

Labs : High WBCs , high Alkaline phosphatase , high GTT

Management

- **No ERCP**, if the patient was hypotensive on inotropes , if sedated to do ERCP BP will drop .
- Percutaneous transhepatic cholangiography (PTC) ; by placing a percutaneous stent to drain inflammation and infection (pus)
- Patient doesn't need inotropes anymore → ERCP → Cholecystectomy (within the same admission)

Obstructive Jaundice

- When obstructive jaundice occurs it means that one of the stones moved down to the common bile duct and caused an obstruction which will obstruct the flow of bile from the liver to the small bowel.
- It can also be a mass (pancreatic head) that's causing the obstruction.

Symptoms And Signs (important to ask about them in your osce)

- Jaundice:
 - Look for it in the sclera (specially dark skinned people and during the sunlight), skin and mucosa
 - The bilirubin level in the blood is at least double the normal (Upper normal level is (17 mmol)
- Pale stool
- Dark urine
- Itching (due to accumulation of bile salts under the skin)

Differential Diagnosis

- Cancer (obstruction develops gradually), **Painless** obstructive jaundice with significant weight loss.
 - Head of pancreas cancer
 - ampulla of Vater cancer
 - Distal CBD cancer

Investigations

↑ Total bilirubin, 80% is direct

↑ alkaline phosphatase

↑ GGT

There is no obstructive Jaundice without high GGT and High Alkaline phosphatase!

(Obstructive pattern of obstructive jaundice)

US 3 Q?

1. Presence of stones? Yes

2. Thickened wall/ pericholecystic fluid ? No

3. Dilated biliary tree? Yes

Then ERCP to remove the stone as part of management.

Very Important: How to differentiate between the causes of Obstructive Jaundice (is it a tumor or a gallstone)?

1-If its a cancer (in the head of the pancreas for instance) the patient will present with : chronic course+Constitutional symptoms like (weight loss,fever and nausea with vomiting) *and It will be painless Jaundice.*

2-If its a gallstone the patient will present with: Acute onset, No constitutional symptoms (unlike cancer)+*it will be painful Jaundice*

Other Complications:

- Sepsis, Cholangitis
- Pancreatitis (80% of pancreatitis is due to stones)
- Perforation (10%)
- GS ileus (mortality 20% as diagnosis difficult).
- Hepatitis
- Choledocholithiasis

Prognosis:

- Uncomplicated cholecystitis has a low mortality.
- Emphysematous GB mortality is 15%
- Perforation of GB occurs in 3-15% with up to 60% mortality
- Gangrenous GB 25% mortality.

Chronic cholecystitis

- Recurrent bouts of biliary colic leading to chronic GB wall inflammation/fibrosis.
- No fever, No leukocytosis, Normal LFT
- Recurrent inflammation process due to recurrent cystic duct obstruction. 90% of the time due to gallstones
- Overtime, leads to scarring/wall thickening
- Attack of biliary colic may occur overtime

Surgical Recall

At what level of serum total bilirubin does one start to get jaundiced? 2.5

- Classically, what is thought to be the anatomic location where one first finds evidence of jaundice? Under the tongue
- What causes itching in obstructive jaundice? Bile salts in the dermis (not bilirubin!)
- What is the initial diagnostic study of choice for evaluation of the biliary tract/gallbladder/cholelithiasis? Ultrasound

Cholelithiasis:

- What are the "big 4" risk factors for cholelithiasis? "Four Fs":
 - Female
 - Fat
 - Forty
 - Fertile (multiparity)
- What are the causes of black-pigmented stones? Cirrhosis, hemolysis
- What is the feared complication of ERCP? Pancreatitis
- What are the indications for cholecystectomy in the asymptomatic patient?
 - sickle-cell disease
 - calcified gallbladder (porcelain gallbladder)
 - patient is a child
- What medication dissolves a cholesterol gallstone?
 - Chenodeoxycholic acid, ursodeoxycholic acid (Actigall); but, if medication is stopped, gallstones often recur

Cholangitis

- What are the common causes?
 - Choledocholithiasis (most common)
 - Stricture (usually postoperative)
 - Neoplasm (usually ampullary carcinoma)
 - Extrinsic compression (pancreatic pseudocyst/pancreatitis)
 - Instrumentation of the bile ducts (e.g., PTCI, ERCP)
 - Biliary stent
- Which organisms are most commonly isolated with cholangitis?
 - Gram-negative organisms (E. coli, Klebsiella, Pseudomonas, Enterobacter, Proteus, Serratia)

Gallstone ileus

- What is it? Small bowel obstruction from a large gallstone (>2.5 cm) that has eroded through the gallbladder and into the duodenum/ small bowel
- What is the classic site of obstruction? Ileocecal valve (but may cause obstruction in duodenum, sigmoid colon)
- What are the diagnostic tests of choice?
 - Abdominal x-ray: occasionally reveals radiopaque gallstone in the bowel; 40% of patients show air in the biliary tract small bowel distention, and air fluid levels secondary to ileus
 - UGI: used if diagnosis is in question; will show cholecystenteric fistula and the obstruction
 - Abdominal CT scan: reveals air in biliary tract, SBO +/- gallstone in intestine
- What is the management?
 - Surgery: enterotomy with removal of the stone +/- interval cholecystectomy (interval delayed)

Summary

- 80% of Cholelithiasis are asymptomatic
- Symptoms of cholelithiasis include:
 - RUQ colicky pain
 - Radiating to the back and shoulder.
 - Aggravated by fatty food
- **Most sensitive test for gallbladder stones is Ultrasound.**
- **Most sensitive test for biliary tree system stones is Endoscopic ultrasound**
- Surgical approaches for cholecystectomy depend on the clinical condition of the patient/Presence of symptoms/Imaging studies/lab results.
- Gallstones are considered the most common cause of pancreatitis
- Complications of gallstones include:
 1. Cholecystitis:

Continues RUQ pain, Fever, high wbc, **+Murphy sign, thickening of the gallbladder wall on US**, and usually recurrent
 2. Obstructive jaundice:

Yellowish discoloration of the sclera, pale stool, dark urine Investigations of obstructive jaundice:

 - a. Increase alkaline phosphatase
 - b. Increase Gamma glutamyl transferase
 3. Cholangitis:

(Charcot's triad: RUQ pain, Fever and Jaundice)

MCOs

1) 73-year old previously healthy man presents to the emergency room with several days of jaundice followed by 12 hours of RUQ pain and fever. He is mildly hypotensive. CT scan of the abdomen revealed dilation of the biliary tree. What is the most likely diagnosis?

- A. Cholecystitis
- B. Choledocholithiasis
- C. Cholangitis
- D. Cholelithiasis

2) The management of the previous case includes which of the following?

- A. Laparoscopic cholecystectomy
- B. Open cholecystectomy and Tube replacement.
- C. Open cholecystectomy and choledochojejunostomy.
- D. Fluid resuscitation, antibiotics, and ERCP.

3) all of the following are complications of ERCP except?

- A. bleeding
- B. Perforation
- C. Pancreatitis
- D. Cholecystitis

4) hypotensive patient diagnosed with Cholangitis . which of the following will be avoid in management?

- A. PTC
- B. EUS
- C. ERCP
- D. US

5) Which of the following is the most sensitive radiological modality to detect biliary stones ?

- A. CT
- B. X-Ray
- C. US
- D. MRI

- 1: C
- 2: D
- 3: D
- 4: C
- 5: C