



# Post Cholecystectomy Syndrome ) PCS (

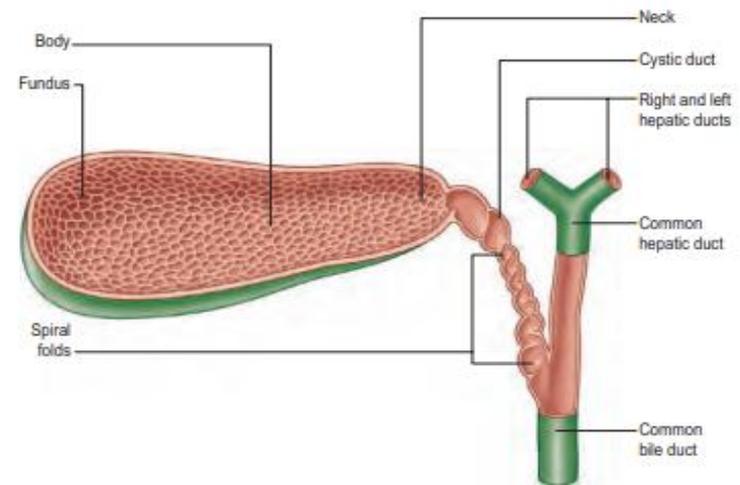
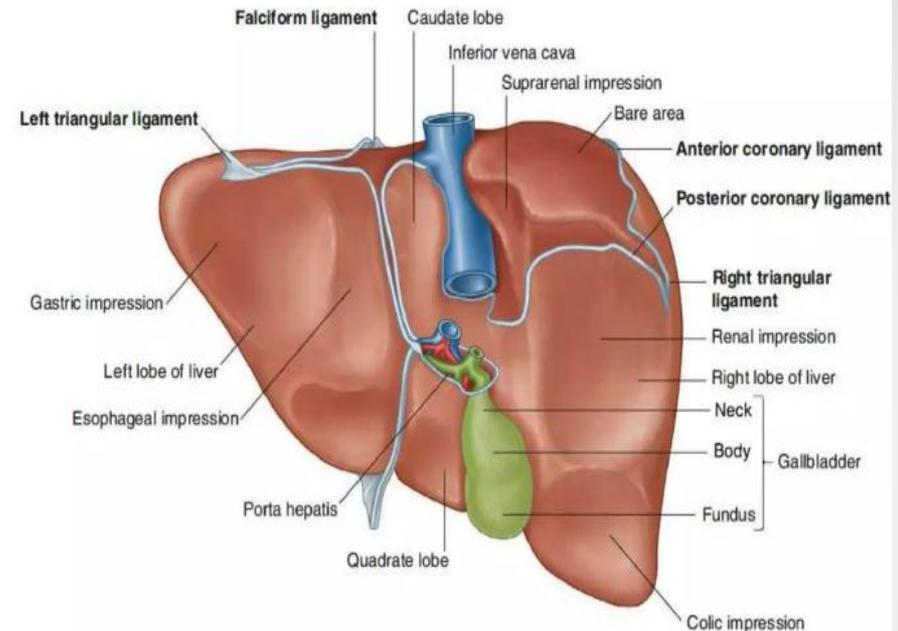
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# Anatomical overview of the Gallbladder

The gallbladder is a pear-shaped, blind-ending diverticulum, attached by connective tissue to the inferior surface of the right lobe of the liver, between segments IV and V .

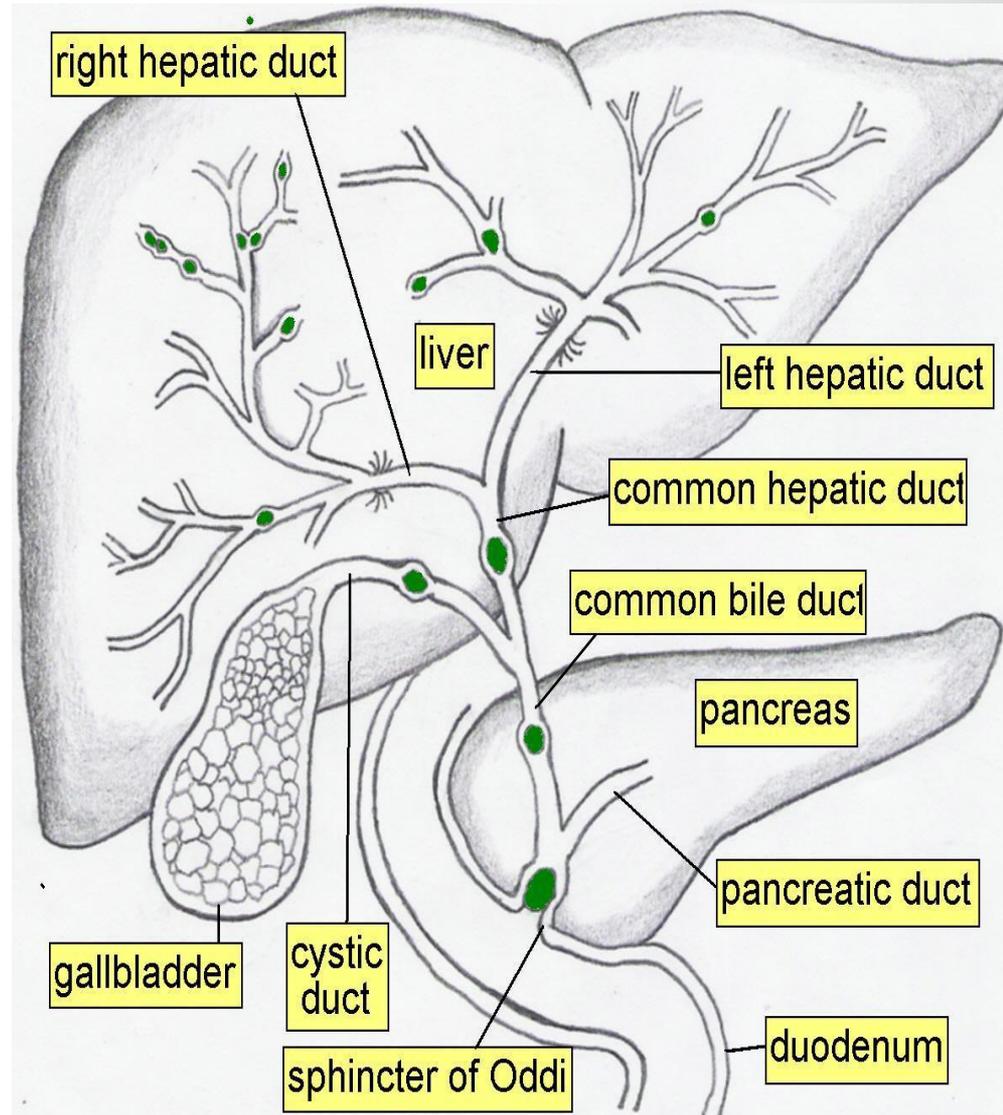
It usually lies in a shallow fossa (the gallbladder bed) on the visceral surface of the right lobe of the liver, covered by peritoneum continued from the liver surface .

In the adult, the gallbladder is between 7 and 10cm long , 3 cm broad at its widest part , 30 – 50 ml in capacity.



## EXTRA-HEPATIC BILIARY PASSAGE

1. **Right & Left hepatic ducts** which collect bile canaliculi from right & left lobe of liver .
2. **Common hepatic duct (C.H.D.)** formed in the porta hepatis by union of right & left hepatic ducts .
3. **Cystic duct:** arises from the neck of G.B. & S shaped. Its mucosal folds form spiral valves which keep the duct opened .
4. **Common bile duct:( CBD )**  
*Formed by* union of C.H.D. & cystic duct below porta hepatis.  
It is 4 inches long and about 6 m.m. in diameter (max. 1 cm).



# Physiology of the gallbladder

Bile is secreted continually by the liver cells, but most of it is normally stored in the gallbladder until needed in the duodenum.

The maximum volume that the gallbladder can hold is **only 30 to 60 milliliters**.

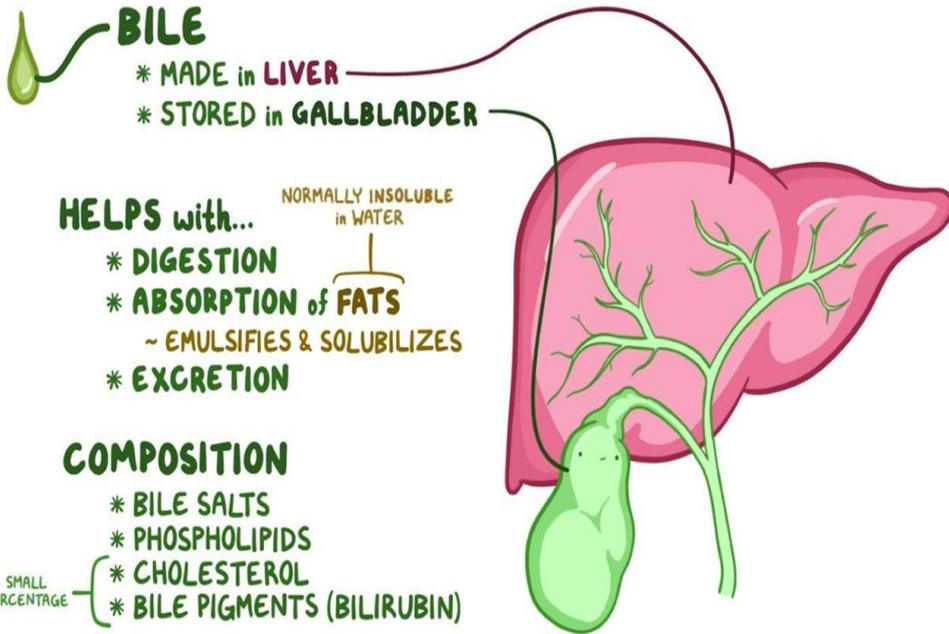
Nevertheless, as much as 12 hours of bile secretion (usually about 450 milliliters) can be stored in the gallbladder because water, sodium, chloride, and most other small electrolytes are continually absorbed through the gallbladder mucosa, concentrating the remaining bile constituents that contain the bile salts, cholesterol, lecithin, and bilirubin.

Most of this gallbladder absorption is caused by active transport of sodium through the gallbladder epithelium, and this is followed by secondary absorption of chloride ions, water.

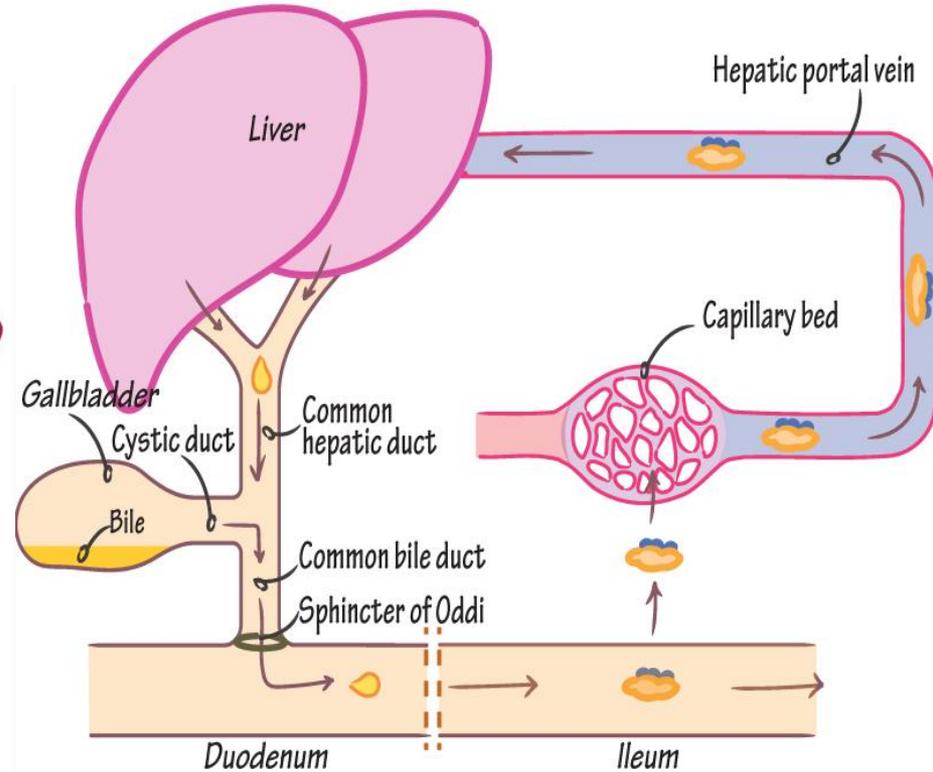
# Bile

- Bile is a physiological aqueous solution produced and secreted by the liver
- The hepatocyte produces bile continuously and excretes it into bile canaliculi
- Bile leaves the liver through the right and left hepatic ducts, into common hepatic duct and then the common bile duct
- With an intact sphincter of Oddi, tonic contraction diverts bile flow into the gallbladder for storage, while mealtime stimulation allows its passage into the duodenum
- About 500mL is secreted per day
- In the small intestines, bile acids facilitate lipid digestion and absorption
- 5% → excreted
- 95% → reabsorbed from the ileum, secreted into the portal venous system, and returned to the liver in a process known as enterohepatic recirculation

# Physiology



## Enterohepatic Circulation



✓ 5% bile salts excreted in feces

# Gall stones

Gallstones form as a result of **supersaturation of the bile**. It is the most common biliary pathology . There are three main types of gallstones-:

## Cholesterol stones

composed purely of cholesterol, from excess cholesterol production

There is a well recognised link between poor diet, obesity, and cholesterol stones

## Pigment stones

composed purely of bile pigments, from excess bile pigments production

Commonly seen in those with known haemolytic anaemia

## Mixed stones

\_comprised of both cholesterol and bile pigments



Cholesterol Stones

Pigment Stones

Mixed Stones

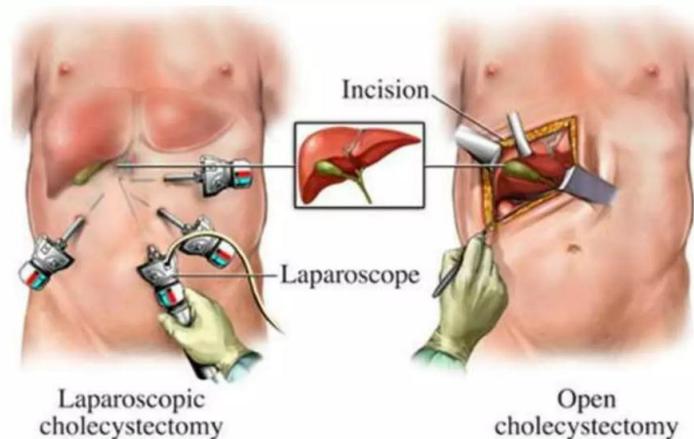
# cholecystectomy

Cholecystectomy is one of the most commonly performed abdominal surgical procedures, and in developed countries many are performed laparoscopically. As an example, 90 percent of cholecystectomies in the United States are performed laparoscopically .

Laparoscopic cholecystectomy is considered the "gold standard" for the surgical treatment of gallstone disease.

This procedure results in less postoperative pain, better cosmesis, shorter hospital stays and disability from work than open cholecystectomy .

However, the overall serious complication rate in laparoscopic cholecystectomy remains higher than that seen in open cholecystectomy



# Indications of cholecystectomy

The indications for laparoscopic cholecystectomy are the same as for open cholecystectomy

- Symptomatic cholelithiasis with, or without, complications.
- Asymptomatic cholelithiasis in patients who are at increased risk for gallbladder carcinoma or gallstone complications.
- Acalculous cholecystitis.
- Gallbladder polyps >0.5 cm.
- Porcelain gallbladder .
- Pancreatitis ( due to gall stones ) .

# Complications of cholecystectomy

Serious complications that occur with laparoscopic and open cholecystectomy, including :

- bile duct injury
- bile leaks
- bleeding
- bowel injury
- Infection
- Hernia at the incision site
- **PCS**

# Meaning of PCS

## DEFINITION:-

Postcholecystectomy syndrome (PCS) is a complex of heterogeneous symptoms, including persistent abdominal pain and dyspepsia, that recur and persist after cholecystectomy.

which represent either a **continuation of symptoms caused by gallbladder pathology** before cholecystectomy **or development of new symptoms** that usually correlate with the gallbladder, in which the cause of these symptoms is unknown **so we say syndrome.**

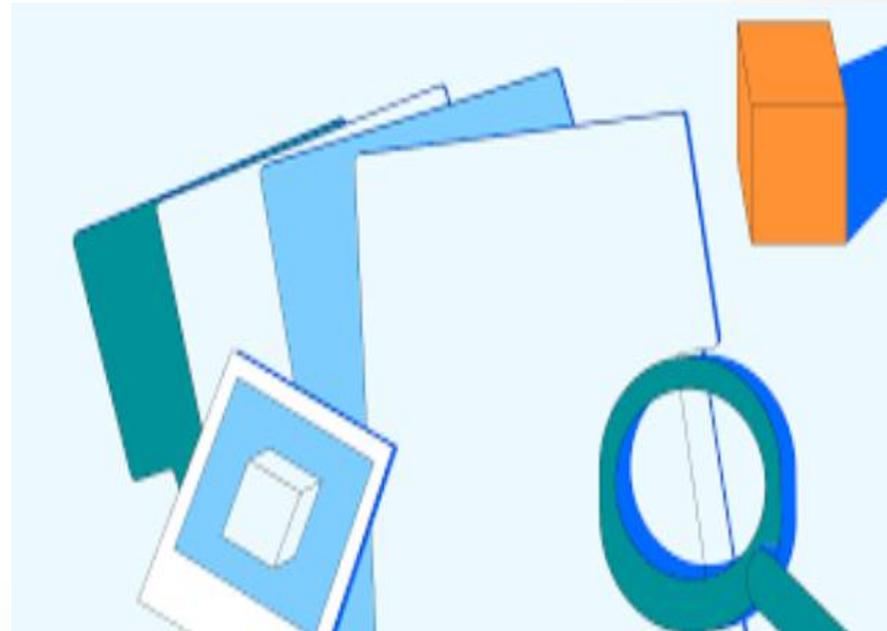
**Post-cholecystectomy syndrome** can present early, typically in the post-operative period, but can also manifest months to years after surgery.

**\*only 60% of patients reported complete relief of abdominal pain at 12 weeks after cholecystectomy for uncomplicated symptom**

# Clinical presentation

A 31-year-old female patient presenting with abdominal pain 1 week after laparoscopic cholecystectomy with RUQ pain, severe bloating/ gas and irregular stools.

So They commonly manifest as upper abdominal pain (primarily the right upper quadrant) and dyspepsia, with or without jaundice, and can be early, if occurring in the postoperative period, and late, if it manifests after months or years.



# Sings and symptoms

usually manifested by abdominal symptoms following GB removal

Although used widely in the medical literature, but inaccurate  
Encompasses a large number of biliary and non-biliary disorders

**Onset:** within a few weeks -months to years later after surgery

**Symptoms:** nonspecific and vary with the underlying etiology ... most often include

- .1RUQ or epigastric pain after meals
- .2Jaundice
- .3dyspeptic symptoms
- .4diarrhea
- .5younger age, especially <50
- .6postoperative fatty food intolerance

# Postcholecystectomy diarrhea :

This problem results from the fact that without the gallbladder, there is nothing to regulate the amount of bile that passes into the small intestine. The resulting higher amount of bile can create stools that are watery and more frequent.

A small number of patients were investigated and only 1.5% were diagnosed with post-cholecystectomy diarrhoea

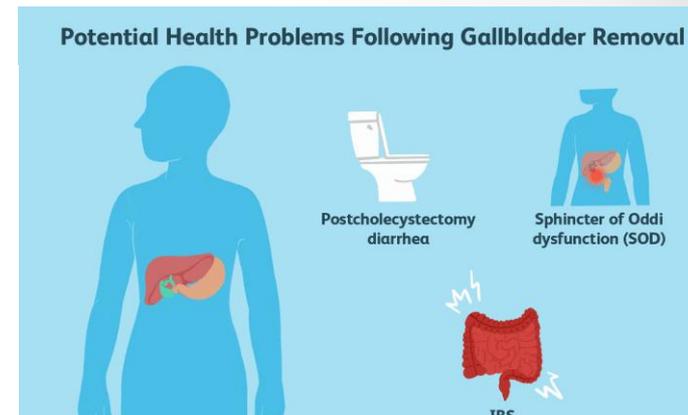
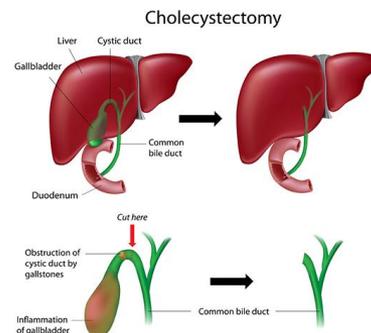
6-3 watery bowel movements daily

Increasing bile acid in colon

Mostly recovered 2-3 months after cholecystectomy

**The working theory is that removal of the gallbladder, thus removing a bile storage \* system, will lead to over synthesis of bile acids by interrupting the same negative feedback loop, thus causing diarrhoea by overloading the uptake mechanisms in the terminal ileum**

*National.library.of.medicine*



# CAUSES

PCS can be caused by a wide spectrum of conditions, both **biliary** and **extrabiliary**. About **half** of the patients with PCS are found to have biliary, pancreatic, or gastrointestinal extraintestinal disorders, while the **remaining** patients have extraintestinal disease

1-Biliary causes of PCS include:

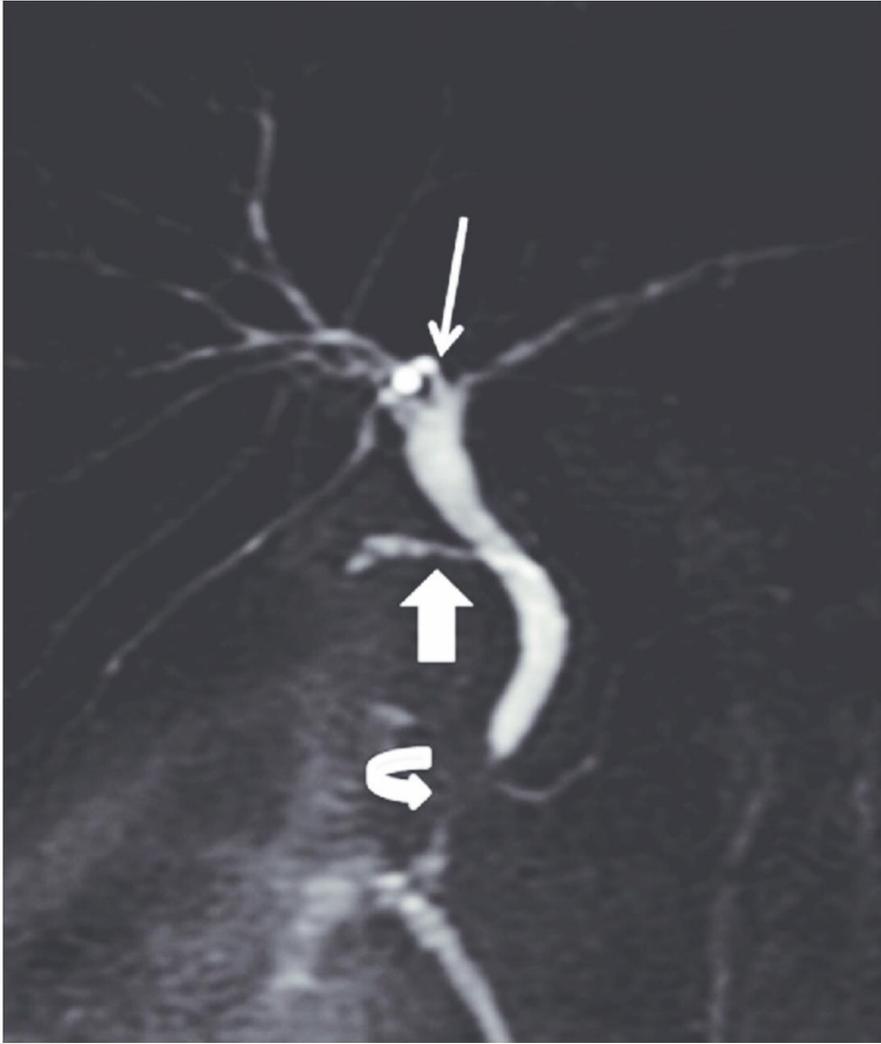
- Early PCS can be due to **biliary injury, retained cystic duct, or common bile duct stones.**

- Late PCS can be due to recurrent CBD stones, bile duct strictures, an inflamed cystic duct or gallbladder remnant, papillary stenosis, or biliary dyskinesia

. Biliary dyskinesia refers to motor forms of sphincter of Oddi dysfunction. Sphincter of Oddi dysfunction can be evaluated with sphincter of Oddi manometry.

**NOTE:** Cystic duct remnant is defined as a duct remnant more than 1 cm with or without calculus causing PCS.

PCS is defined "late" if it occurs months or years after surgery



## 2-Extrabiliary causes of PCS include:

- **Gastrointestinal causes** such as irritable bowel syndrome, pancreatitis, pancreatic tumors, pancreas divisum, hepatitis, peptic ulcer disease, mesenteric ischemia, diverticulitis, or esophageal diseases
- **Extraintestinal causes** such as intercostal neuritis, wound neuroma, coronary artery disease, or psychosomatic disorders

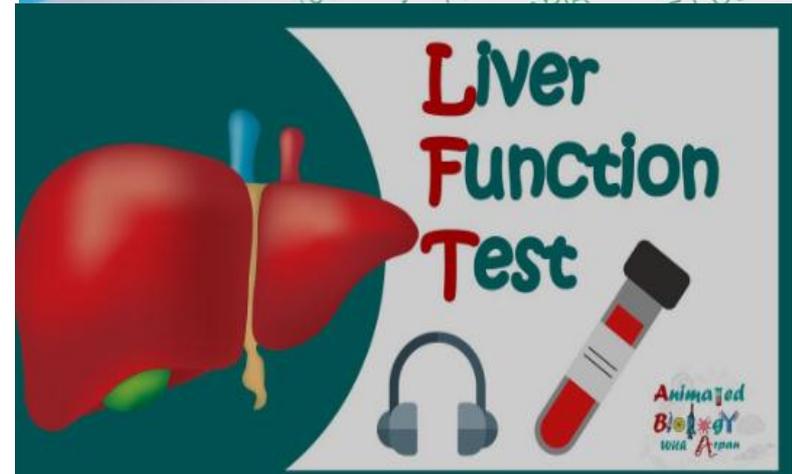
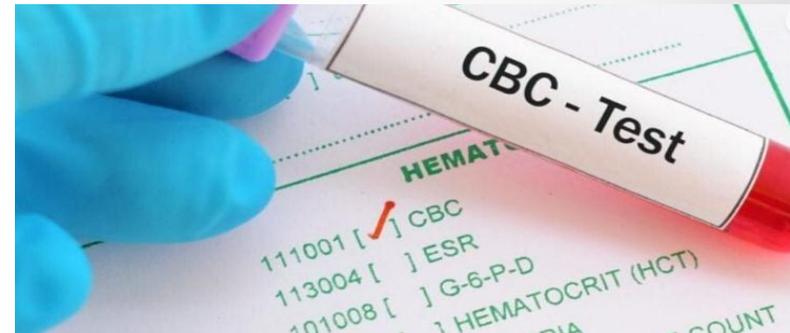
# LABORATORY INVESTIGATIONS

.1 **Complete blood count (CBC):** to eliminate infectious etiologies.

.2 **Complete metabolic panel (CMP):** amylase, lipase, and prothrombin time (PT) to evaluate for possible hepatobiliary or pancreatic diseases.

.3 **Liver Function Test (LFT) :** total and direct bilirubin for liver disease

.4 **ECG and cardiac enzymes:** to exclude inferior MI



# Radiographic investigations

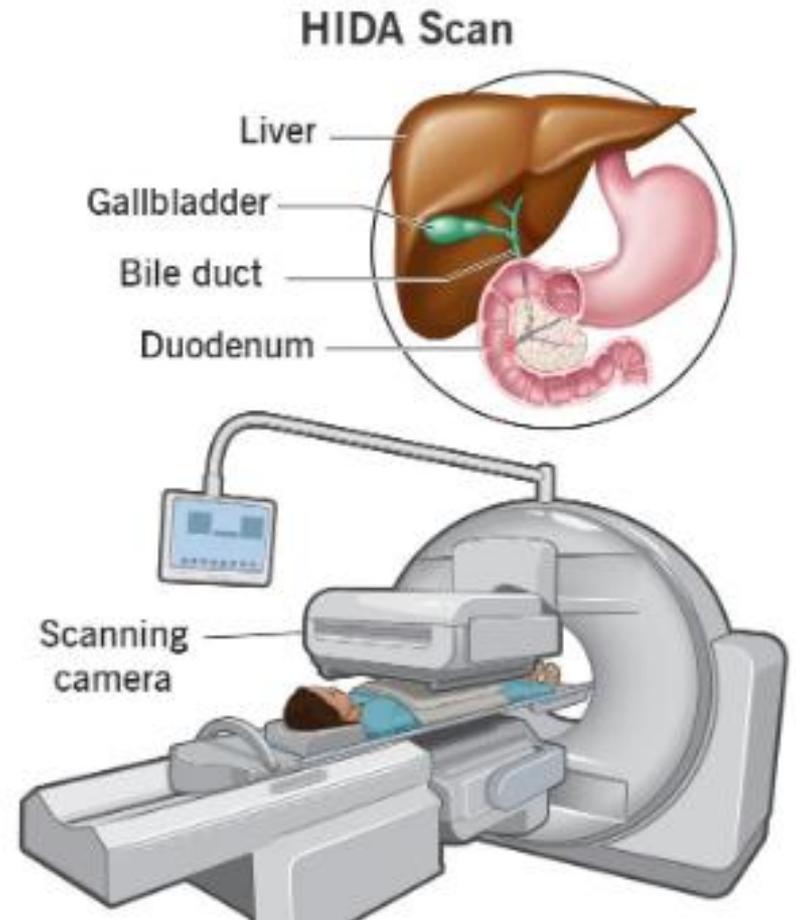
.1**US** for retained stones, CBD dilatation (more than 8 mm) and fluid collection (bile leak (

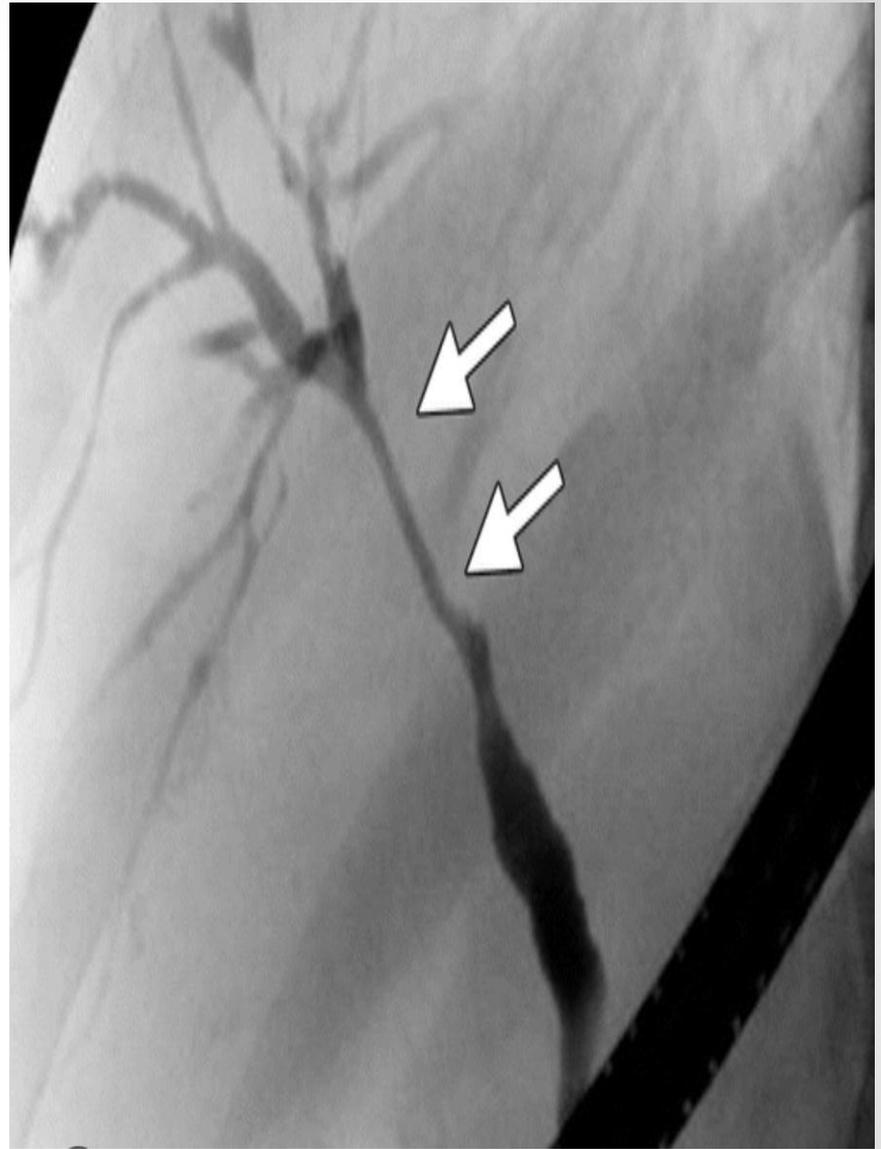
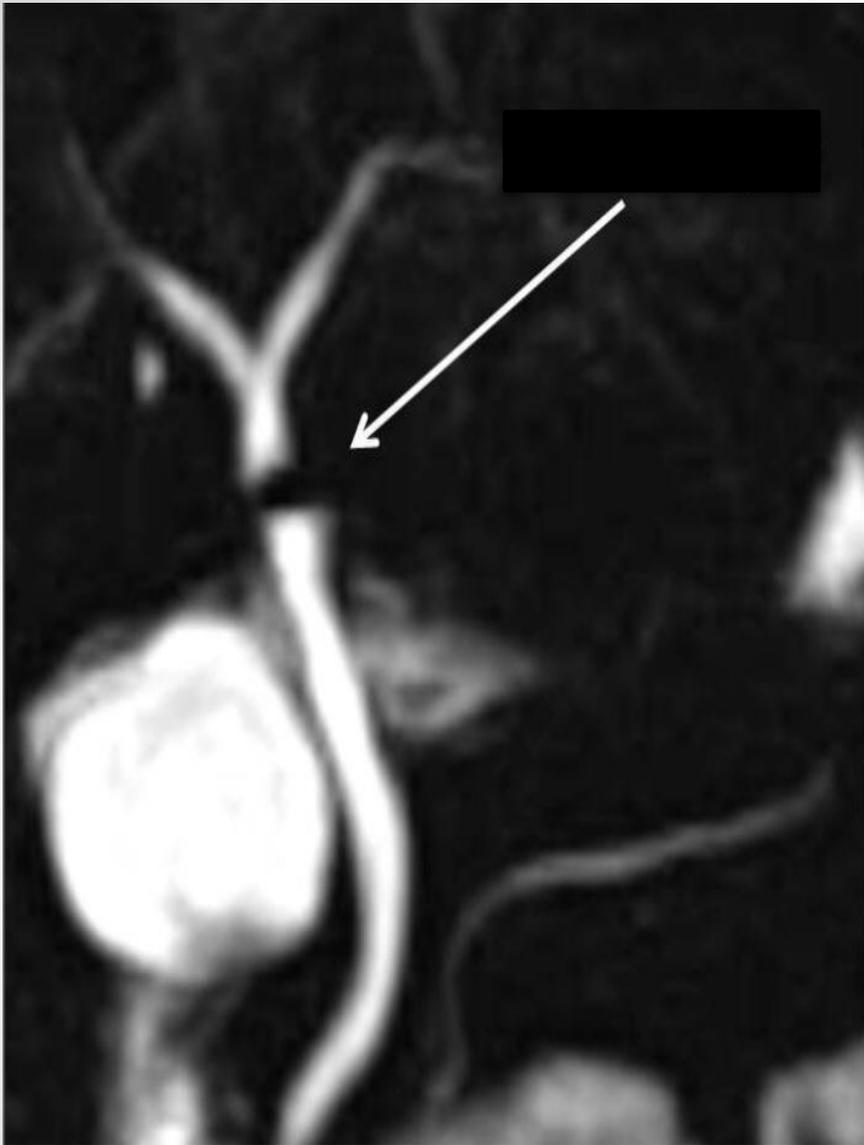
.2**CT** to confirm the results of US

.3**HIDA** for sphincter of oddi dysfunction

.4**MRCP** and **ERCP** for tapering (stricture) of lower CBD (filling defect of bile to duodenum) and biliary tree injury

**Endoscopy may be benefit to looking for the cause**





# Treatment

ERCP which can be both diagnostic and therapeutic for complications of PCS  
With ERCP most of the PCS complications could be ruled out such as :-

**Neuroma , Remnant of cystic duct lithiasis(RCDL), SOD, Bile retention of the duodenum and stomach (Duodenogastric bile retention) , ...etc**

However, Patients abusing alcohol or narcotics are difficult to manage Exploratory surgery should be postponed until they have stopped these drugs, Exploratory surgery is the last resort after ERCP.

## **1. Neuroma formation on the cystic duct :**

It is difficult to distinguish neuroma and malignant tumor because radiological findings of neuroma mimic findings of malignancy. However ,Intraoperative diagnosis is necessary to select an appropriate surgical procedure ,also the idea of amputation of neuroma is controversial.

## **2. Remnant of Cystic Duct Lithiasis(RCDL) :**

Endoscopic therapy may suffice, but surgical excision of the RCDL may be necessary in some cases.

# Treatment

## 3. Sphincter of Oddi Dysfunction (SOD):

There are 3 methods:-

**A. Medical**

**B. Endoscopic**

**C. Surgical**

### **A. Medical:**

Calcium channel Blockers (nifedipine) & Nitrates.

### **B. Endoscopic:**

Endoscopic sphincterotomy alone ,but if we have abnormal pancreatic basal pressure we go for Pancreatobiliary Sphincterotomy.

### **C. Surgical:**

There is a medical test to identify who the most beneficial from sphincteroplasty & septectomy which is **Morphine-prostigmine provocative test of Nardie**.

Sphincteroplasty and septoplasty between the CBD and the pancreatic duct should be performed unless the head of the pancreas is hard, fibrotic, or indurated from chronic pancreatitis, in case of the previous complication **Choledochoduodenostomy** may prove more effective.

# Treatment

## 4. Bile retention of the duodenum and stomach (Duodenogastric bile retention):

We usually use medications such as:

- A. Proton pump inhibitors (PPI)**
- B. Ursodeoxycholic acid (UDCA)**
- C. Cholestyramine (Biogenic diarrhea)**

### **A. Proton pump inhibitors (PPI):**

Inhibit secretion of the gastric acid & relieve digestive symptoms caused by acid reflux.

### **B. Ursodeoxycholic acid (UDCA):**

Protecting gastric mucosa and reducing gastric reflux.

It's the drug of choice because it has minimal side effects.

### **C. Cholestyramine (Biogenic diarrhea):**

Binds with the bile acids and removes them from the body by stopping the enterohepatic circulation.

**NOTE:** If medication didn't work we go for surgical management of bile reflux with diverting bile away from the stomach to the duodenum, due to risk factors like smoking, wine drinking, H.pylori or stress.

**The sphincter of Oddi is a muscular structure that encompasses the confluence of the distal common bile duct and the pancreatic duct as they penetrate the wall of the duodenum**

## **PATHOPHYSIOLOGY**

SOD has been associated with two clinical syndromes: biliary pain and idiopathic recurrent acute pancreatitis

Patients with SOD have been divided into two groups based upon manometric findings:

- Patients with structural alterations of the sphincter of Oddi (stenosis)
- Patients with functional abnormalities (dyskinesia)

— Sphincter of Oddi stenosis is an anatomic abnormality associated with narrowing of the sphincter of Oddi. It can result from any process leading to inflammation or scarring, such as pancreatitis, passage of a gallstone through the papilla, intraoperative trauma, infection, and adenomyosis.

Sphincter of Oddi stenosis is associated with abnormal sphincter of Oddi motility and elevated basal pressure

Patients with stenosis are identified by an abnormally elevated basal sphincter of Oddi pressure (>40 mmHg), which is the most widely clinically accepted diagnostic finding for SOD .

This finding is reproducible, and the elevated sphincter of Oddi pressure does not relax following administration of smooth muscle relaxants

However, available data suggest that both biliary and pancreatic SOD occur more often in **women than in men**

Sphincter of Oddi dyskinesia refers to a functional disturbance of the sphincter of Oddi, leading to intermittent biliary obstruction. The cause of sphincter of Oddi dyskinesia is not well understood.

Other manometric characteristics of this group are: rapid sphincter of Oddi contraction frequency ( $>7/\text{min}$ ) or tachyoddia, Spasm and relaxation of the sphincter of Oddi can be induced pharmacologically with agents known to affect smooth muscle function (such as nitroglycerin), suggesting that the spasm may be influenced by local hormonal or neurologic disturbance.

**Patients with sphincter of Oddi dyskinesia may also have elevated basal sphincter of Oddi pressure. However, in contrast to sphincter of Oddi stenosis, the elevated pressure decreases dramatically following amyl nitrite inhalation or glucagon bolus injection, which relaxes smooth muscle**

The approach to a patient with suspected sphincter of Oddi dysfunction (SOD) depends upon the patient's clinical presentation as well as the results of laboratory testing and abdominal imaging.

To determine if patients fulfill the Rome IV criteria, liver tests and pancreatic enzymes and structural abnormalities need to be excluded. Transabdominal ultrasound.

Rome Ivcriteria is

- Functional gallbladder disorder
- Functional biliary sphincter disorder
- Functional pancreatic sphincter disorder

### **Noninvasive tests**

**Transabdominal ultrasound** — Otherwise unexplained dilation of the common bile duct (>6 mm)

**Biliary provocation tests** provocation tests have been developed that use either a fatty meal or cholecystokinin the bile duct diameter remains constant or decreases following stimulation; an increase of more than 2 mm is considered to be abnormal

**Magnetic resonance cholangiopancreatography**

**Hepatobiliary scintigraphy**

**Sphincter of Oddi manometry** — Sphincter of Oddi manometry (SOM) remains the gold standard for diagnosing of SOD. Basal pressure and phasic wave contractions are routinely recorded from the common bile duct and pancreatic duct segments of the sphincter of Oddi

## **TREATMENT**

**PHARMACOLOGIC:** Calcium channel blockers ,Nitrates, Ursodeoxycholic acid.

**ENDOSCOPIC THERAPY:** Endoscopic sphincterotomy

**SURGERY** — Biliary and pancreatic sphincterotomy

**Electroacupuncture**

# THANK YOU

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medscape.com

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