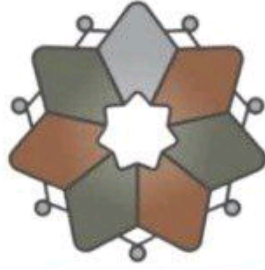


جَائِزَةُ الْحُسَيْنِ
بْنِ عَبْدِ اللَّهِ الثَّانِي
لِلْعَمَلِ التَّطَوُّعِيِّ

AL HUSSEIN BIN ABDULLAH II
AWARD FOR VOLUNTARY WORK



النادي الطبي
Medical Club



General Surgery



Subject: Gallstone disease & cholecystectomy, Dr. Tawfiq Nawafleh

Group no: C9

Done by: Maha Ayman



هَذَا خَلَقَ اللَّهُ فَأَرْوَاهُ مَاذَا خَلَقَ الَّذِينَ مِنْ دُونِهِ بَلِ الظَّالِمُونَ فِي ضَلَالٍ مُبِينٍ

Cholecystectomy, Gallstone Disease, Dr. Tawfiq Nawafleh

1. Indications for Cholecystectomy in Asymptomatic Gallstones Patients

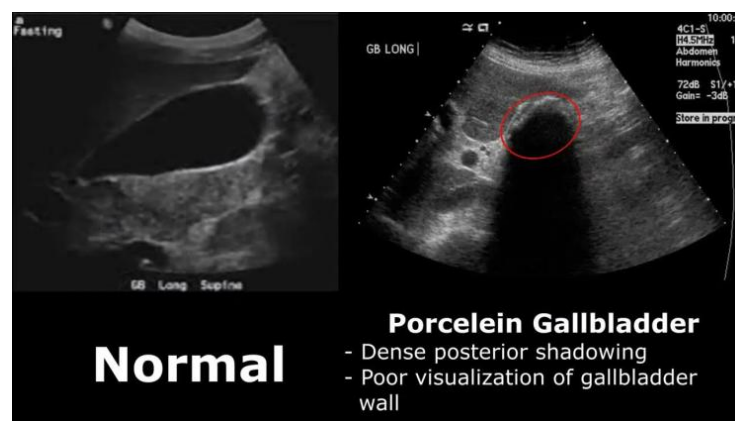
Generally, asymptomatic gallstones are left alone and observed. However, cholecystectomy is indicated for asymptomatic patients in specific high-risk scenarios.

A• Size of the Stone:

Stones larger than **2.5 cm** should be removed because they are associated with a higher risk of prolonged irritation and subsequent malignancy, and they can cause occlusion of the gallbladder neck, leading to an obstruction.

B• Porcelain Gallbladder:

Calcification of the gallbladder wall. Historically associated with a high rate of cancer (up to 10% in older literature). **While current evidence suggests the risk is lower, the standard practice remains removal to avoid the risk of malignancy.**



C• Specific Patient Populations:

- **Children:** Specifically those with hemolytic blood diseases (e.g., sickle cell, thalassemia).
- **Military/Travelers:** Personnel deploying to remote areas (e.g., rural missions) for long periods (6 months to a year) where surgical care is inaccessible.

D• Historical/Debated Indications (Now generally not done):

◦ Bariatric Patients:

Surgeons previously removed gallstones routinely during weight loss surgery (sleeve/bypass) due to high stone formation risk (to prevent stone formation during rapid weight loss). Currently, they can be treated medically, and are only removed if they become symptomatic.

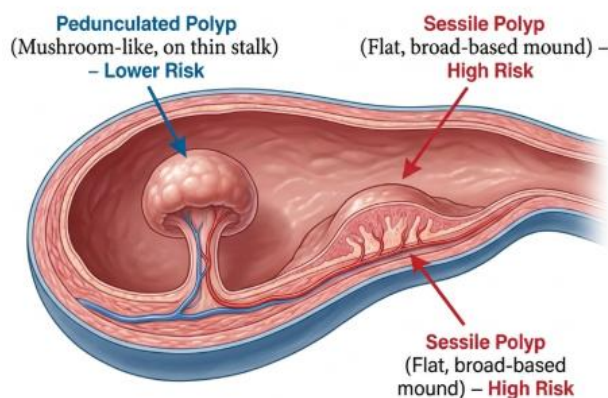
- **Cardiac Surgery:** Previously removed prior to open-heart surgery; but this is no longer standard practice.

2. Gallbladder Polyps

Not all polyps require surgery. Management depends on malignancy risk factors.

- **Risk Factors requiring Cholecystectomy:**

- **Size:** Polyps > 10 mm (1 cm) are high risk. (Transcript mentions >9mm, The size threshold is **≥10 mm** or >1 cm in most guidelines, though as you noted, some sources use >9 mm).
- **Morphology:** **Sessile** polyps (flat, attached directly to the wall) carry a higher cancer risk than pedunculated ones.



- **Patient Age:** > 65 years old.
 - **Co-morbidities:** Primary Sclerosing Cholangitis (PSC) or **Ulcerative Colitis**.
 - **Type:** Adenomatous polyps are the most concerning (similar to colonic polyps).
-

3. Clinical Presentation: Biliary Pain vs. Acute Cholecystitis

It is crucial to differentiate between simple pain and acute inflammation.

The pain of the gallbladder is not a colicky pain, so the term biliary colic is not correct. (The pain is **constant**, not intermittent/colicky. However, the term "biliary colic" is **still widely used in clinical practice and literature** to describe the episodic pain of temporary cystic duct obstruction.)

A. Biliary Pain:

- **Mechanism:** Temporary obstruction of the cystic duct.
- **Pain Characteristics:**
 - Located in the Right Upper Quadrant (RUQ) or Epigastrium.
 - **Radiation:** Radiates to the back or the tip of the right shoulder/scapula.
 - **Timing:** Post-prandial (after eating). Lasts **>30 minutes but <6 hours**.
 - **Resolution:** Occurs when the stone dislodges from the gallbladder neck/infundibulum.

B. Acute Cholecystitis:

- **Mechanism:** Stone remains impacted in the **infundibulum (Hartmann's pouch)** or cystic duct for **>6 hours**, leading to ischemia and inflammation.

- **Symptoms:**

Continuous pain (does not resolve after 6 hours),

systemic signs of inflammation: **fever** and **leukocytosis** (high white blood cell count)

- **Physical Exam:** Positive **Murphy's Sign** (Inspiratory arrest upon deep palpation of the RUQ as the inflamed gallbladder touches the examiner's hand).

4. Diagnostic Imaging

- **Ultrasound (US):** The gold standard and first-line imaging. It is superior to CT for gallbladder pathology.

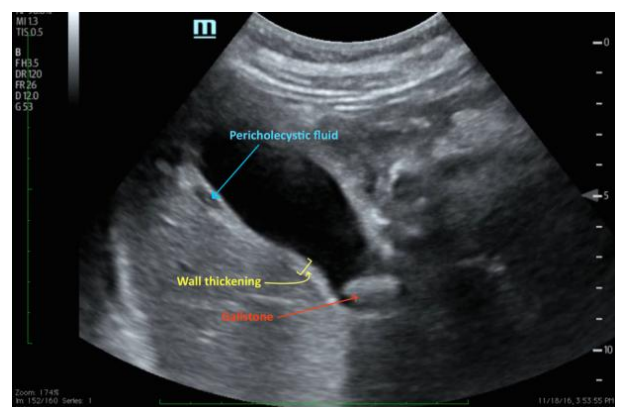
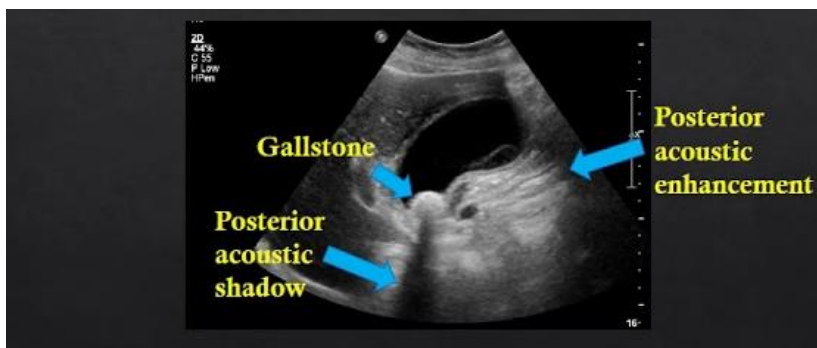
- **Findings in Acute Cholecystitis:**

- a▪ Distended gallbladder.

- b▪ **Gallstones:** Visible as hyperechoic structures with **Posterior Acoustic Shadowing**.

- c▪ **Wall Thickening:** Edema of the wall.

- d▪ **Pericholecystic Fluid:** Fluid around the gallbladder.



• **Sonographic Murphy's Sign:** Tenderness when the ultrasound probe presses on the gallbladder (**highly diagnostic**).

• **HIDA Scan (Hepatobiliary Iminodiacetic Acid scan):** Used if Ultrasound is equivocal.

◦ **Positive Finding: Non-visualization (filling defect)** of the gallbladder after 1 hour.

This indicates the cystic duct is obstructed (e.g., by Heister's valves edema or stone), preventing the tracer from entering the gallbladder.

A positive scan for acute cholecystitis is **non-visualization of the gallbladder at 60-90 minutes** while the common bile duct and small bowel are visualized, confirming a patent biliary system but an obstructed cystic duct.

5. Surgical Anatomy of the Liver and Biliary Tree

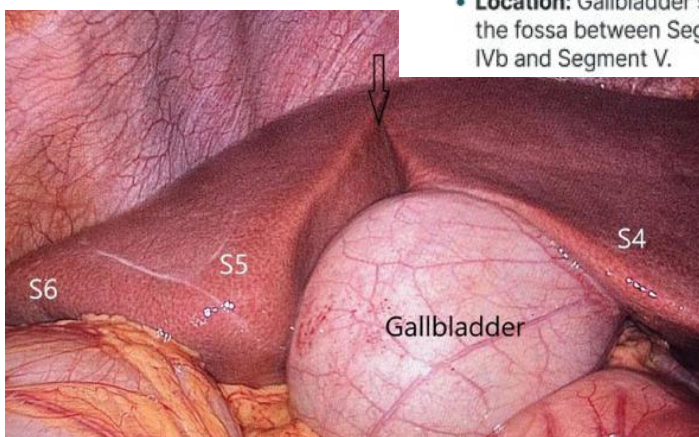
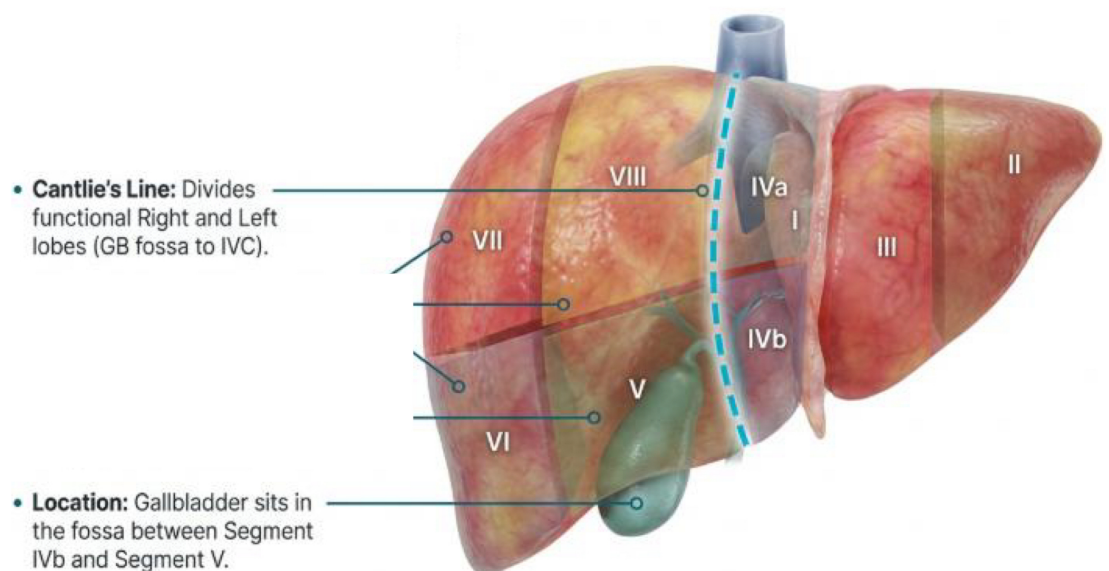
• **Liver Segmentation:** Based on the Couinaud classification (8 segments).

◦ **Right Lobe:** Anterior Sector (Segments 5 & 8) and Posterior Sector (Segments 6 & 7).

◦ **Left Lobe:** Segments 2, 3, and 4. (Segment 1 is the Caudate lobe).

◦ **Gallbladder Location:** Sits in the gallbladder fossa between **Segment IVb and Segment V**.

• **Cantlie's Line:** An imaginary line from the gallbladder fossa to the Inferior Vena Cava (IVC). It divides the liver functionally into Right and Left lobes.



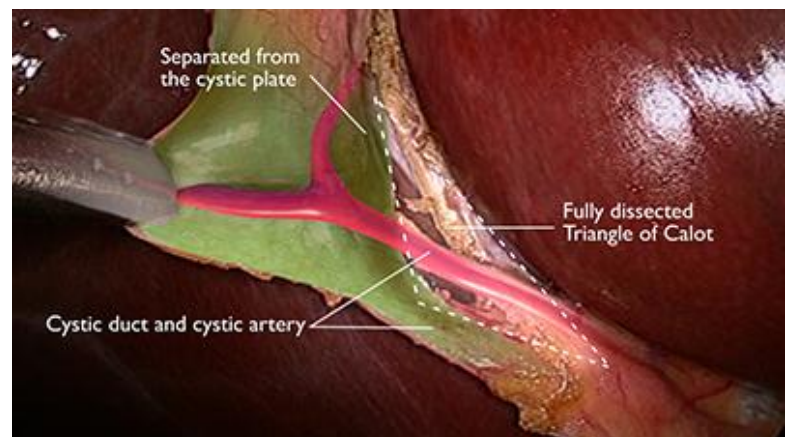
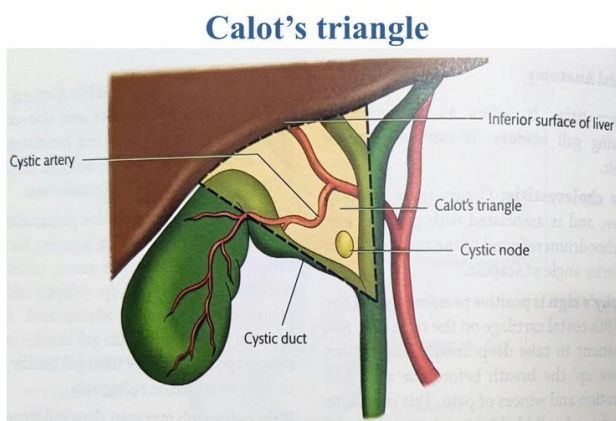
- **Calot's Triangle:** The critical anatomical space for surgery.

Calot's triangle is bounded by:

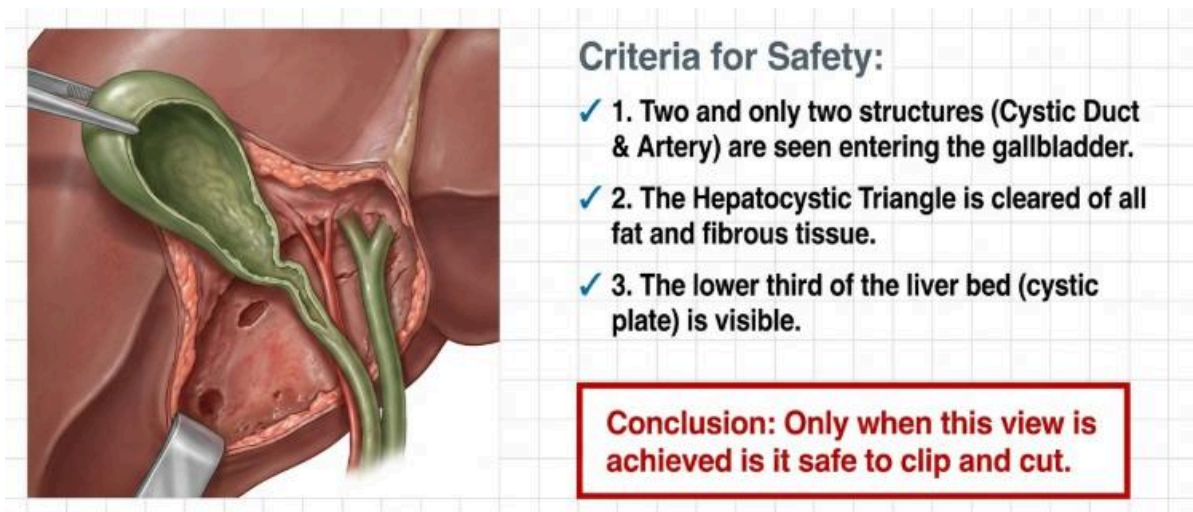
1. **Inferior border:** Cystic duct.
2. **Superior border:** Inferior surface of the liver.
3. **Medial border:** Common hepatic duct.

- **Content:** Contains the **Cystic Artery**

The **Cystic Lymph Node (Node of Lund)** is often found within or near the triangle.



The Critical Point: The triangle's importance is that **dissecting within this triangle to achieve the "Critical View of Safety"** (clearly exposing the cystic duct and artery with no other tissue between) is the standard method to avoid injuring the common bile duct.



the gold standard technique for preventing bile duct injury during laparoscopic cholecystectomy

6. Management of Acute Cholecystitis

• Initial Medical Management:

- Admission and IV Fluids (resuscitation).

- **Antibiotics:**

To cover gram-negative gut flora (E. coli, Klebsiella).

Note: While bile is sterile in healthy people, bacterial translocation or infection occurs in 20-40% of acute cholecystitis cases and nearly 100% of cholangitis cases.

• Surgical Management:

- **Standard of Care: Early Laparoscopic Cholecystectomy** during the **same admission** (typically within 72 hours to 10 days).

- **Conversion Rate:** The risk of converting from laparoscopic to open surgery increases from ~5% in elective cases to **~20%** in acute cases due to inflammation and adhesions.

- **Critically ill Patients:**

If the patient is unfit for anesthesia (e.g., ICU patient, severe cardiac failure), perform a **Cholecystostomy** (percutaneous drainage tube placed by interventional radiology) to drain the infection.

Stone Types & Management

Gallbladder Stones

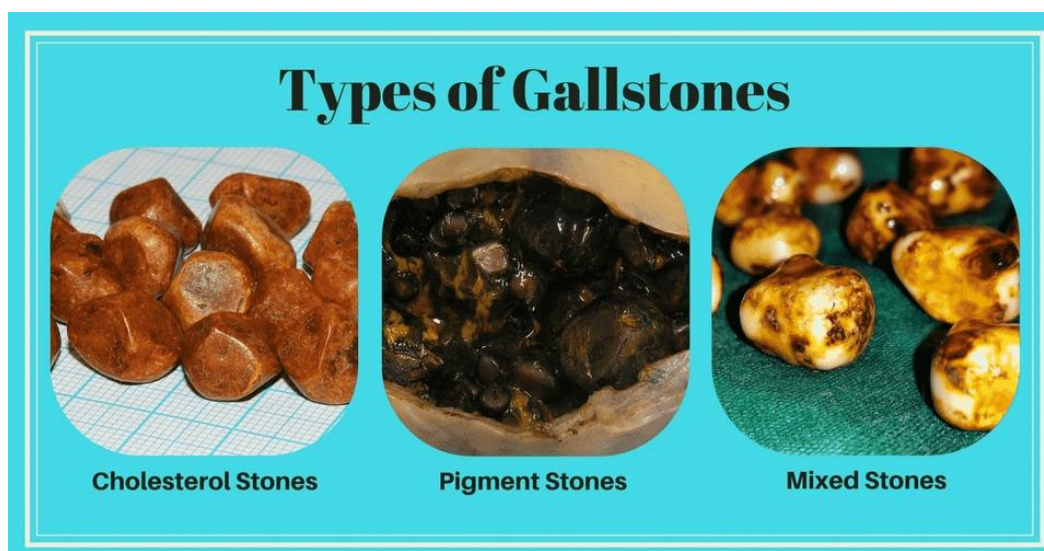
• Cholesterol Stones.

• Pigment Stones:

- **Black:** Associated with hemolysis or cirrhosis.

- **Brown:** Associated with infection.

• Mixed Stones.

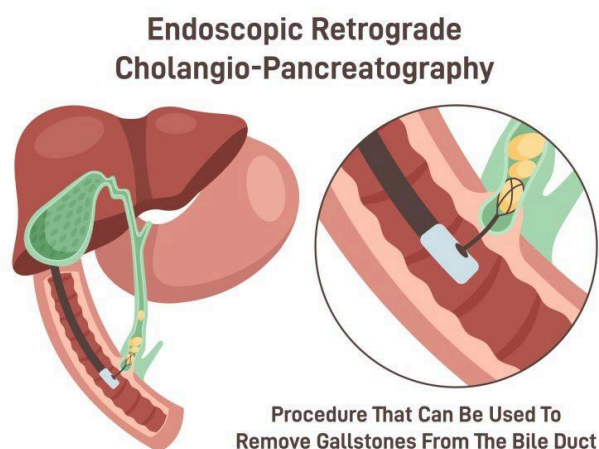


Common Bile Duct (CBD) Stones

- **Secondary:** Migrated from the gallbladder (most common).

secondary stones are most often **cholesterol stones**.

- **Primary:** Formed within the duct (typically defined as occurring > 2 years post-cholecystectomy).
- **Management:** ERCP (Endoscopic Retrograde Cholangiopancreatography) is used to extract stones (via basket, balloon, or sphincterotomy).



7. Complications of Gallstone Disease

1. Acute Pancreatitis:

Caused by a stone obstructing the pancreatic duct (distal CBD obstruction).

2. Ascending Cholangitis:

Infection of the biliary tree due to obstruction (Charcot's Triad implied: fever, jaundice, RUQ pain).

Culture positivity is nearly 100% here.

Charcot's Triad (RUQ pain, fever, jaundice) is classic

Reynolds' Pentad (Charcot's Triad + hypotension and mental status changes) indicates **septic shock** and is a surgical emergency.

Acute Cholangitis: Charcot's Triad vs. Reynolds' Pentad	
1 Charcot's Triad	2 Reynolds' Pentad (Severe!)
 Fever 	Charcot's Triad 📌 +
 Jaundice 	 Hypotension (Shock) 
 RUQ Pain 	 Confusion (AMS) 
	URGENT BILIARY DECOMPRESSION NEEDED!

3. Gallstone Ileus:

- A mechanical bowel obstruction caused by a large gallstone eroding through the gallbladder wall into the duodenum (cholecystoduodenal fistula).

- The stone that entered the duodenum travels down and obstructs at the narrowest point: just **proximal to the Ileocecal Valve** leading to ileus.

- **Rigler's Triad:**

1. Pneumobilia (air in the biliary tree),
2. Ectopic stone in the intestine,
3. Small bowel obstruction.

Rigler's triad is a classic radiological sign for **gallstone ileus**

4. Mirizzi Syndrome:

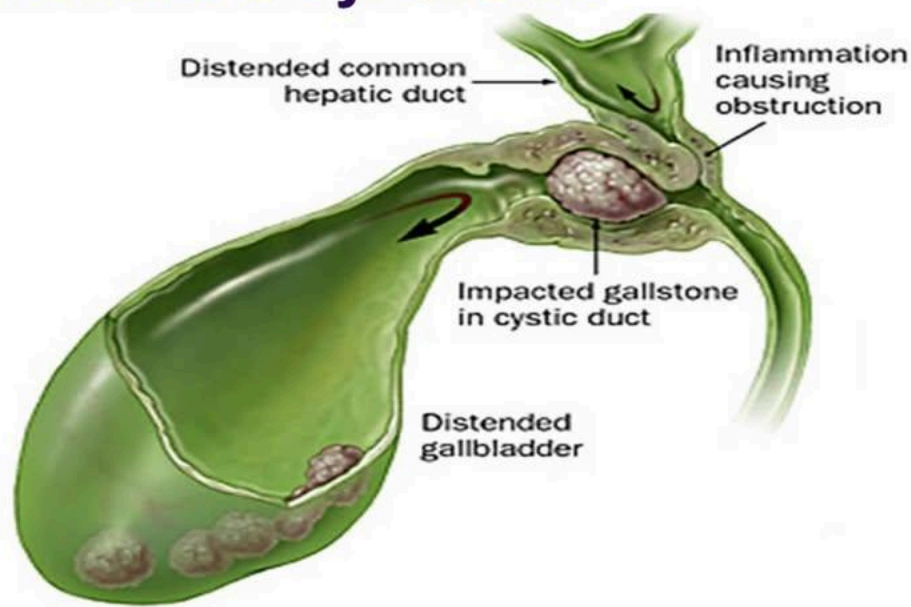
- Extrinsic compression of the Common Hepatic Duct (CHD) or Common Bile Duct by a large stone impacted in the cystic duct or Hartmann's pouch.

- Can lead to fistula formation between the gallbladder and the bile duct.

- **Mirizzi Syndrome has 5 classes (Csendes classification):**

- **external compression (Type I)**
- The formation of a **cholecystobiliary fistula (Types II-IV)**
- Type V involving a cholecystoenteric fistula *plus* Mirizzi.

MIRIZI's syndrome



5. **Cholelithiasis:** Stones in the Common Bile Duct (CBD).

- **Primary Stones:** Formed in the duct (usually brown pigment, associated with stasis/infection).
 - **Secondary Stones:** Migrated from the gallbladder. A stone found < 2 years after cholecystectomy is usually considered secondary (retained).
-

8. Case Study: Pancreatic Pseudocyst

Case Study: Pancreatic Pseudocyst

- **Context:** A patient presented with pancreatitis caused by gallstones.
- **Complication:** Developed a fluid collection. If this persists > 4 weeks with a mature wall, it is called a **Pseudocyst**.

[The current revised **Atlanta Classification** defines a pancreatic **pseudocyst** as:

a **well-circumscribed, walled-off collection of pancreatic fluid that persists for >4 weeks** after an episode of acute pancreatitis]

- **Symptoms:** The cyst was compressing the stomach, preventing the patient from eating (gastric outlet obstruction).

- **Treatment:**

1. **Cystogastrostomy:**

Using endoscopy to place a stent between the pseudocyst and the stomach to drain the fluid internally.

[Endoscopic ultrasound (EUS)-guided cystogastrostomy with stent placement is first-line for symptomatic cysts]

Procedure: EUS-Guided Cystogastrostomy

First-line therapy for symptomatic cysts.

Mechanism

Creating a fistula between the pseudocyst and the stomach to allow internal drainage of the fluid collection.



2. Cholecystectomy:

Removal of the gallbladder (the source of the pancreatitis) once the patient is stable.

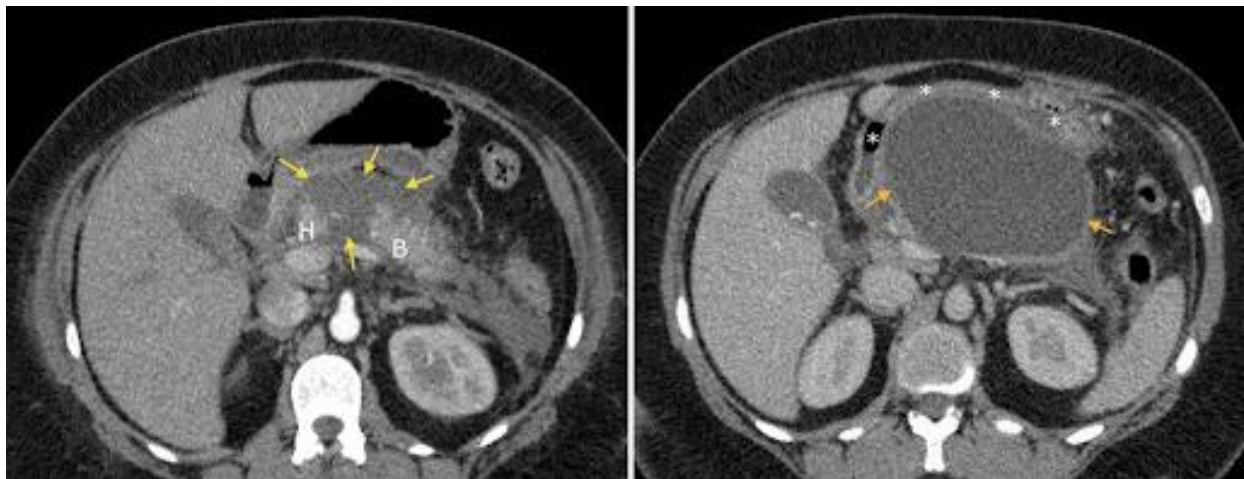
[Performing **cholecystectomy** to prevent recurrent gallstone pancreatitis is mandatory once the acute inflammation has resolved and the patient can tolerate surgery]

3. Follow-up:

Stent removal after the cyst collapses (approx. 6 weeks).

[Stents are often left for several weeks to months until the cyst resolves, confirmed by follow-up imaging.]

• The Patient CT Image:



Initial CT, left, shows normal density of the pancreatic head (H) and lateral aspect of the body (B), however the large area of low density between them (yellow arrows) represents pancreatic necrosis.

He represented 6 weeks later with nausea and upper abdominal pain and follow-up CT showed a 12 cm thick-walled pseudocyst extending from the site of previous necrosis into the lesser sac (orange arrows).

Note the mass effect on the stomach, which is stretched around the anterior aspect of the pseudocyst (indicated by the asterisks). Also note the calcified gallstones in the gallbladder.