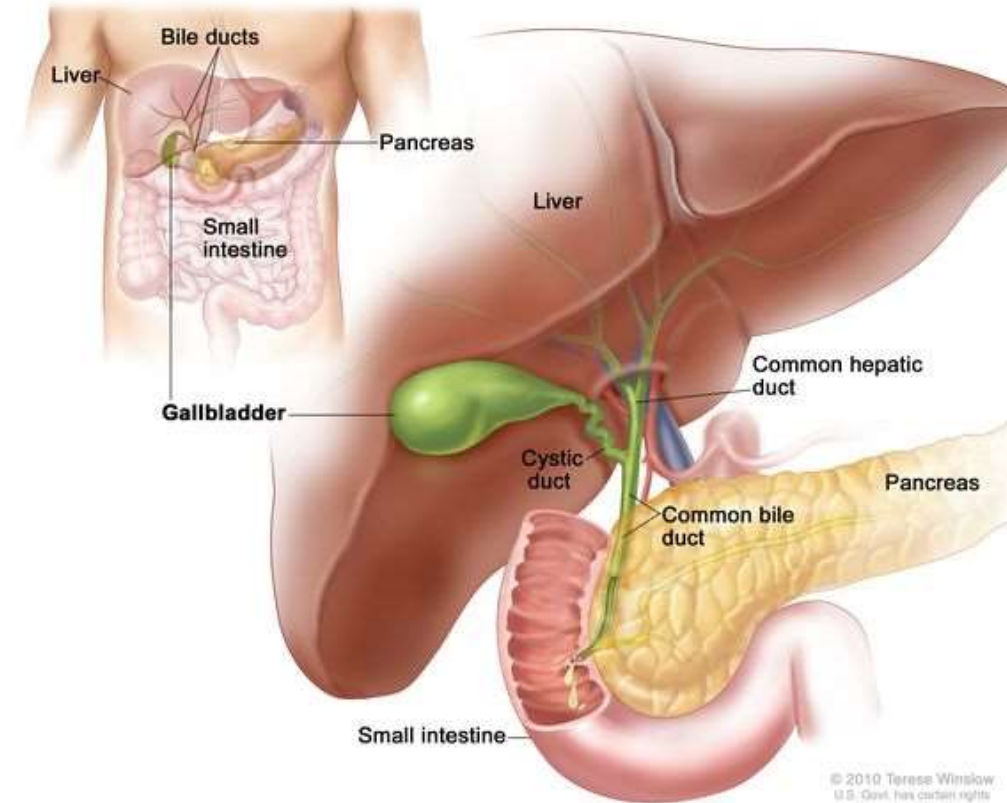


Gallbladder Stones (Cholelithiasis) and Its Complications

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The anatomy

- Gallbladder located under the liver
- Stores and concentrates bile
- Biliary system:
 - Gallbladder
 - Cystic duct
 - Common hepatic duct
 - Common bile duct (CBD)
 - Ampulla of Vater



What are gall stones ?

- **Gallstones or cholelithiasis** are formation of stones within the gallbladder.

Can be made of

- **Cholesterol (80–90%)**
- **Pigments**
 - Black pigment stones
 - Brown pigment stones
- Gallstones may remain asymptomatic or cause biliary obstruction and inflammation.

Rish factors

- **The "6 F's"**

- Female
- Fat
- Fertile
- Forty
- Fair
- Familiarity !

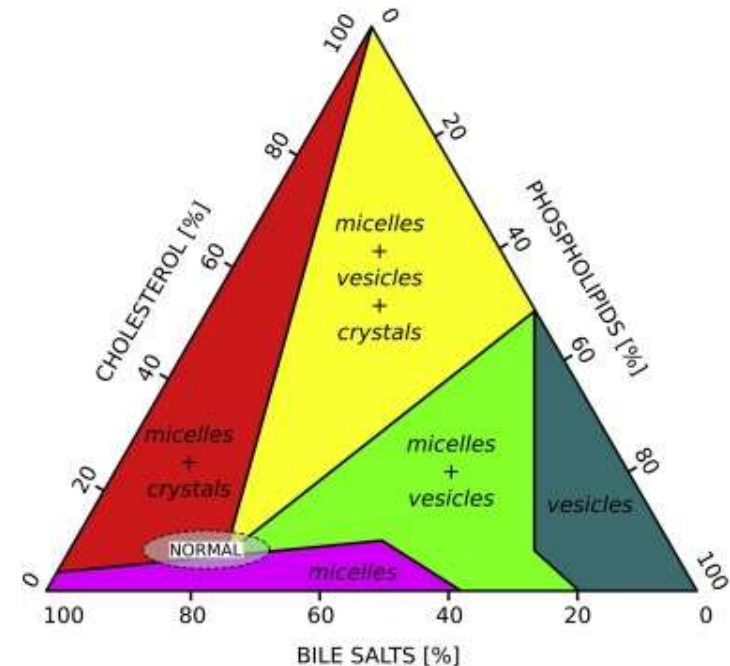
- **Other contributing factors**

- Rapid weight loss
- Diabetes mellitus
- Pregnancy
- Hemolytic disorders
- Liver disease

Solubility Balance: Lecithin and bile salts act together as detergents to solubilize water-insoluble free cholesterol.

Pathogenesis: A drop in lecithin (phospholipids/bile salt secretion or an excess secretion of cholesterol shifts the ratio past the boundary curve on the triangle, initiating stone nucleation.

Pathophysiology



A large orange circle on the left side of the slide, partially cut off by the edge.

Pathophysiology

- **Cholesterol Stones**
 - Cholesterol supersaturation
 - Gallbladder hypomotility
 - Crystal nucleation.
 - **Pigment Stones**
 - Increased bilirubin
 - Hemolysis
 - Infection
 - Result:
 - Stone formation
 - Duct obstruction
 - Inflammation and complications
- 
- A blue dashed line in the bottom right corner, consisting of several short, curved segments.

Clinical Presentat ion

- **Asymptomatic Gallstones**
: most common presentation

- **Symptomatic Gallstones**
- **Biliary Colic**
- Right upper quadrant pain
- Postprandial (especially fatty meals)
- May radiate to right shoulder/scapula
- Nausea and vomiting

- **Attention to**
- Discomfort after meals
- Bloatness
- Indigestions
-

Diagnostic tools

- **Laboratory Tests**

- CBC
- LFTs
- Bilirubin
- Amylase/Lipase

- **Imaging**

- **Ultrasound (gold standard) tell us:**

- Gallstones
- Gallbladder wall thickening
- Pericholecystic fluid
- **Additional:**
- CT scan
- MRI/MRCP
- HIDA scan
- ERCP



Major Complications Overview



Gallstones can lead to

Gallbladder complication

- Acute cholecystitis
- Empyema
- Gangrenous gallbladder
- Gallbladder perforation
- Mirizzi syndrome

Extra cholecystic complications

- Choledocholithiasis
 - Acute cholangitis
 - Gallstone pancreatitis
 - Gallstone ileus
- 

Acute Cholecystitis

- Is an acute inflammation of the gallbladder caused by cystic duct obstruction.
- **Signs and symptoms**
 - Persistent RUQ pain
 - Fever
 - Positive Murphy sign
 - Leukocytosis
- **Ultrasound Findings**
 - Thickened wall
 - Pericholecystic fluid
 - Gallstones



If
cholecysti
tis is
not
treated !

Empyema

- Pus-filled gallbladder ... sepsis .. MOF

Gangrenous Cholecystitis

- Ischemia and necrosis .. Sepsis ... MOF

Perforation

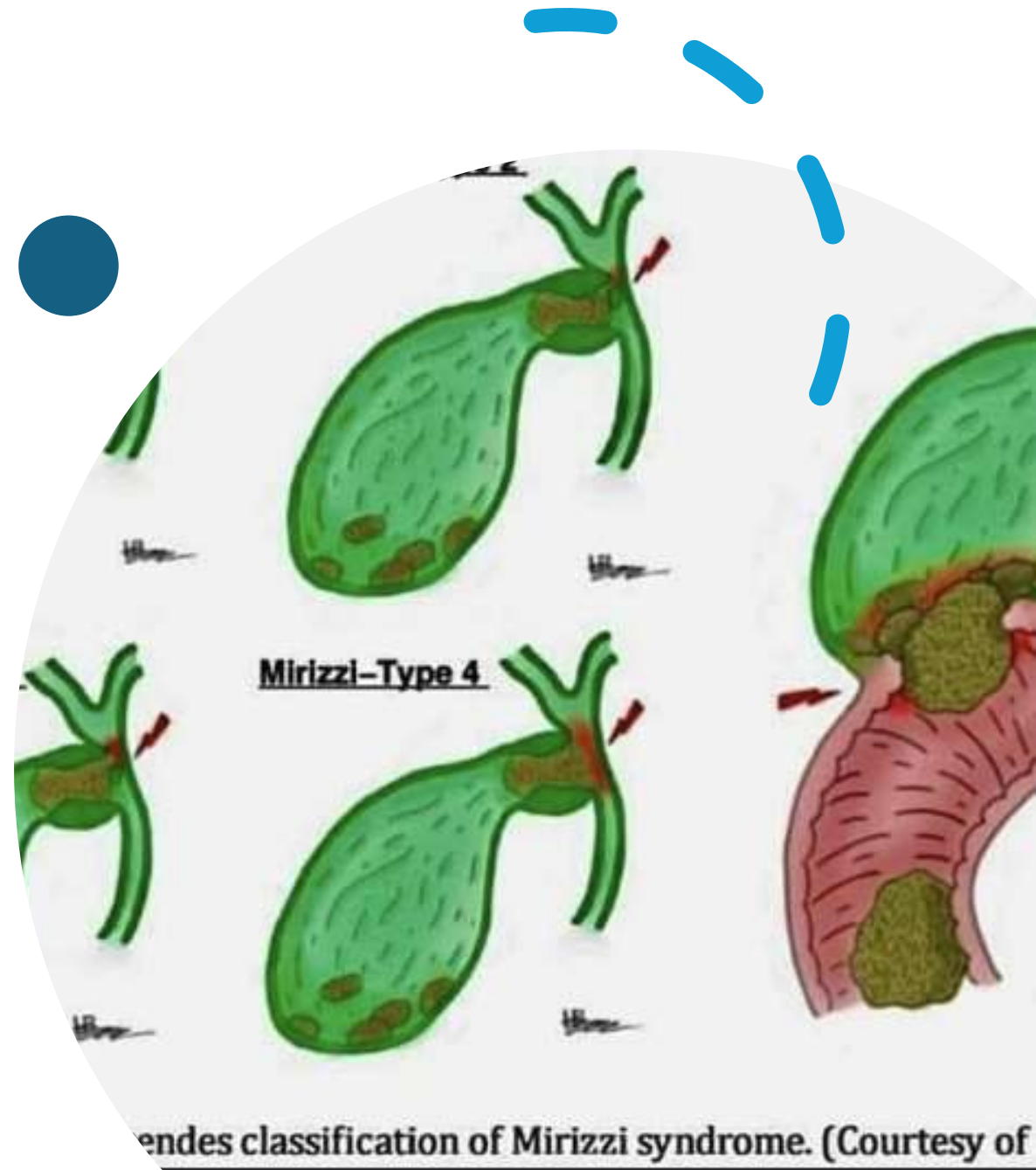
- Biliary peritonitis
- Sepsis
- High morbidity and mortality.



Other complications

Mirizzi Syndrome

- Compression of common hepatic duct
- **Cholecystoenteric Fistula**
- **Gallstone Ileus**
- Mechanical bowel obstruction caused by large gallstone



Acute Cholangitis is

Infection of the biliary tree due to obstruction.

- **Charcot's Triad**

- Fever
- Jaundice
- RUQ pain

Even more Reynolds Pentad

- Charcot triad +
- Hypotension
- Altered mental status
- This is a medical emergency, call your endoscopist or IR.



Pancreatitis

A stone passes out of the GB and obstructs ampulla of Vater.

Symptoms

- Severe epigastric pain
- Pain radiating to back
- Elevated lipase/amylase
- Management:
- IV fluids
- Analgesia
- Cholecystectomy after recovery



Prevention

- Weight control
- Regular exercise
- Avoid rapid weight loss
- Control diabetes
- Healthy diet



Treatment

- Treatment is indicated for symptomatic stones
- In some cases, in non symptomatic stones taking in consideration

Patients age

Stones size

Comorbidities

Patient's social history (type of Job etc)

Cholecystectomy

- Most commonly performed laparoscopically / robotically
- Through 4 small incisions , after insufflation of CO2, good vision is obtained.
- Dissection of the gallbladder from the liver bed, after control and division of the cystic duct and cystic artery.
- The gallbladder is removed from the umbilical port into a bag.

Operative risks

Bleeding

Infection

Bile leak

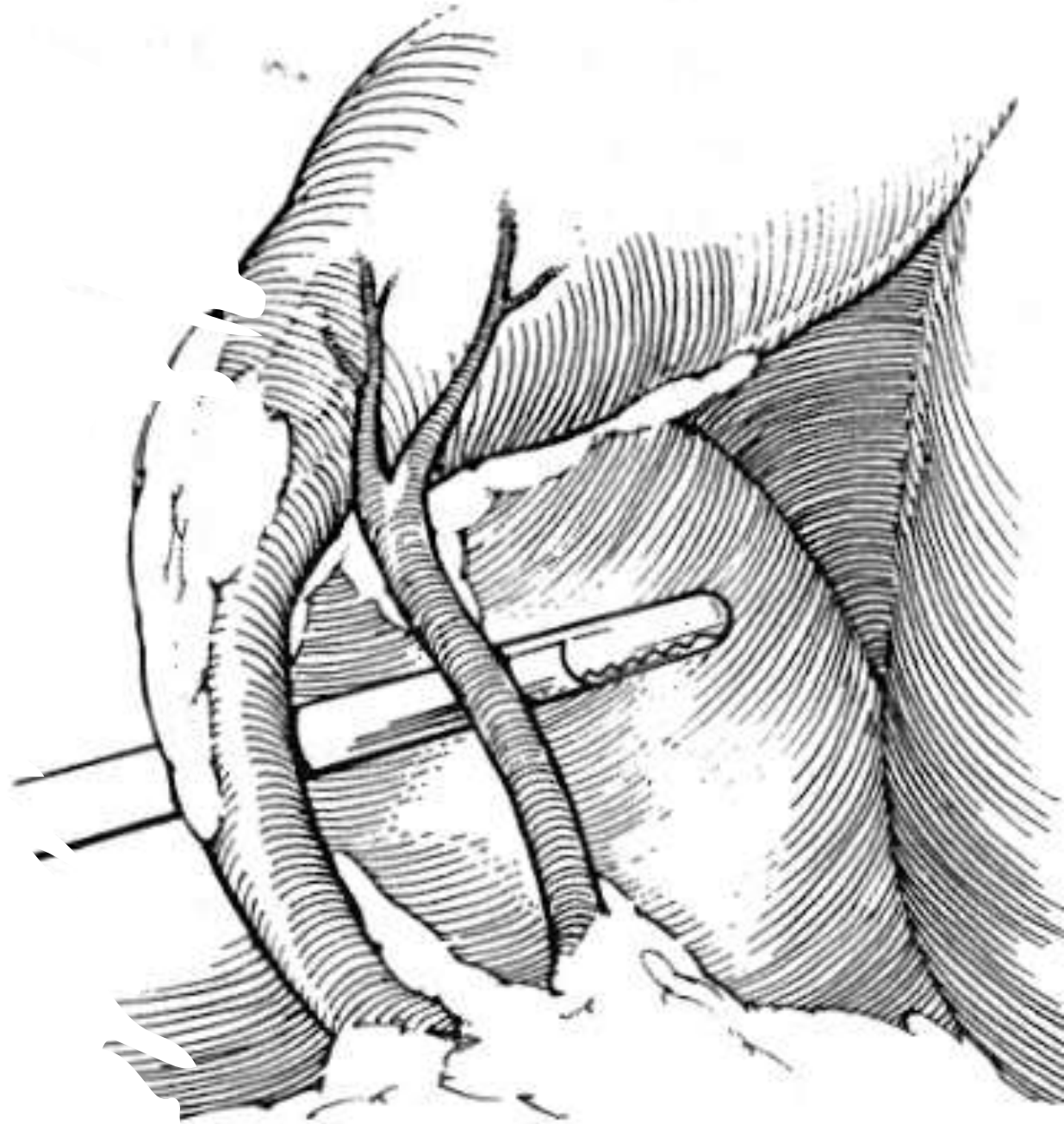
Bile duct injury (the most serious complication , incidence is 1/200 in western countries).

Injury of other intraabdominal organs

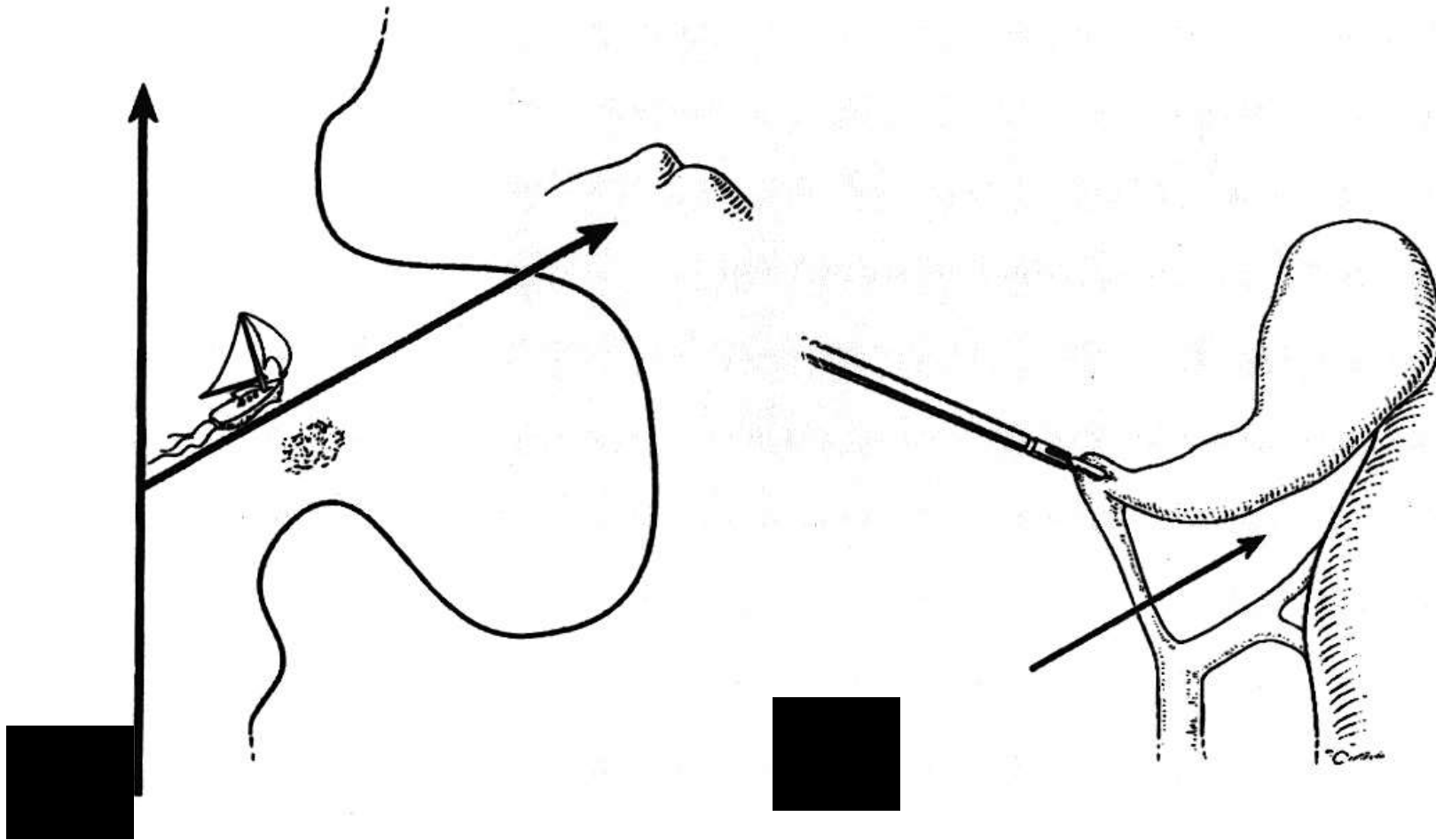
**The critical
view of safety "calot's
triangle"**

**Essential to
avoid bile duct
injury**

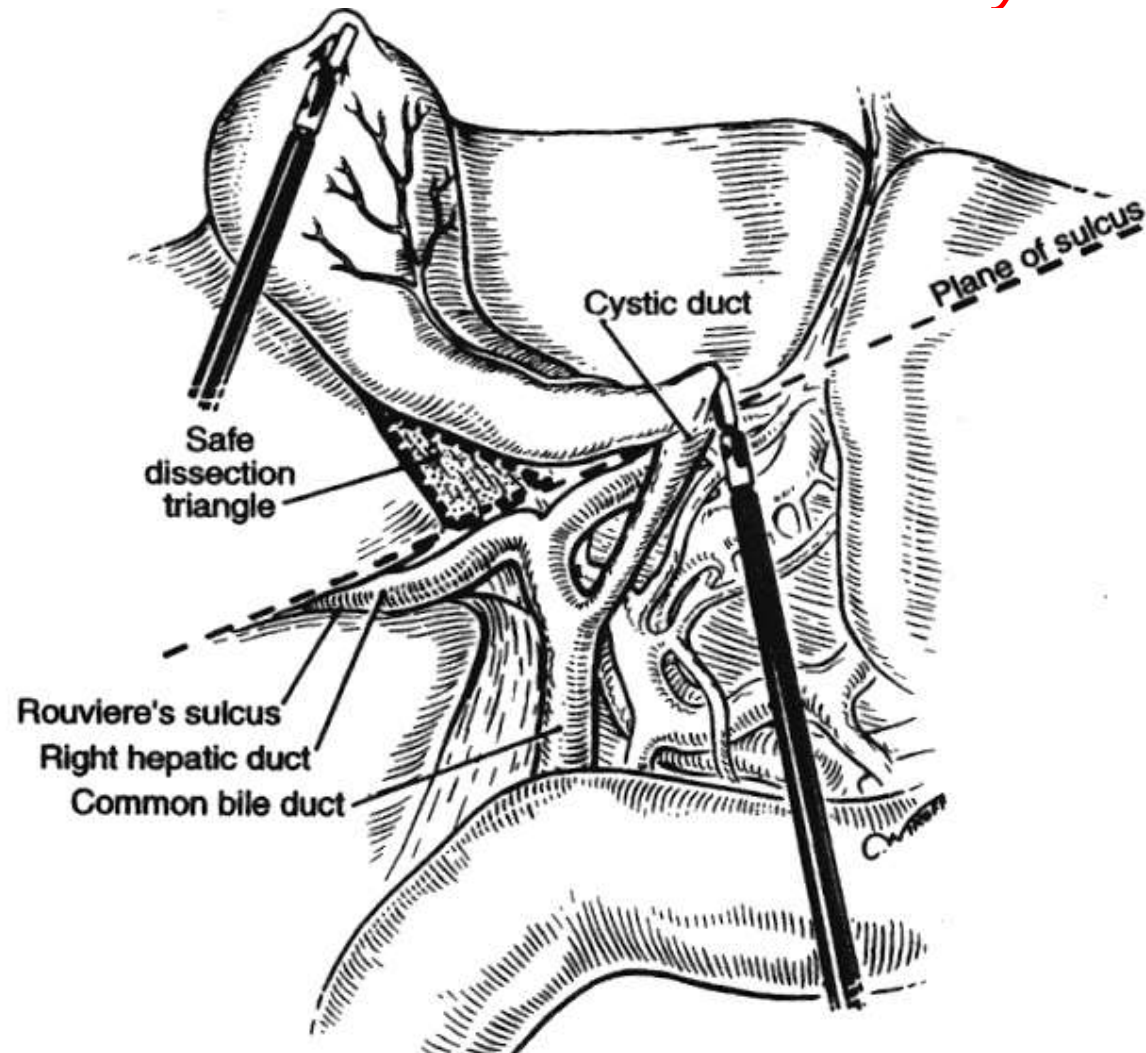
*Strasberg et al. J Am Coll Surg
1995; 180: 101-25*



The clearing bearing principle



**Rouvière's sulcus
and the safe dissection plane**
Always stay above



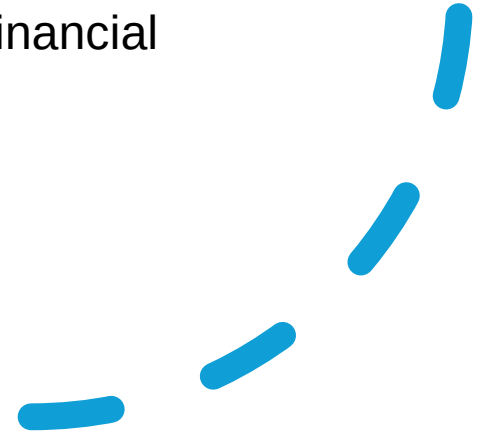
TB Hugh et al. Br J Surg 1997; 84: 1253-4

Causes of laparoscopic bile duct injuries

- misidentification of bile ducts as cystic duct
- failure to secure cystic duct stump
- too deep dissection plane in GB bed
- injudicious use of thermal energy / clips
- tenting injury of CBD
- improper techniques of CBD exploration

When bile duct injury occurs

- The treatment depends on the entity of the injury
- Simple closure of a minor lateral injury
- Endoscopic stenting
- T- Tube insertion
- Hepatico-jejunostomy
- It has substantial long term clinical, QOL and financial consequences
-



Summary

- Gallstones are common.
- Most remain asymptomatic.
- Major complications arise from biliary obstruction.
- Acute cholecystitis is the most common complication.
- Cholangitis and gallstone pancreatitis are potentially life-threatening.
- Ultrasound is the first-line investigation.

Summary

- Laparoscopic cholecystectomy is the definitive treatment.
- It is a simple procedure but can carry substantial risks
- Bile duct injury is a series potential complication

Surgery
is Art

Thank you

