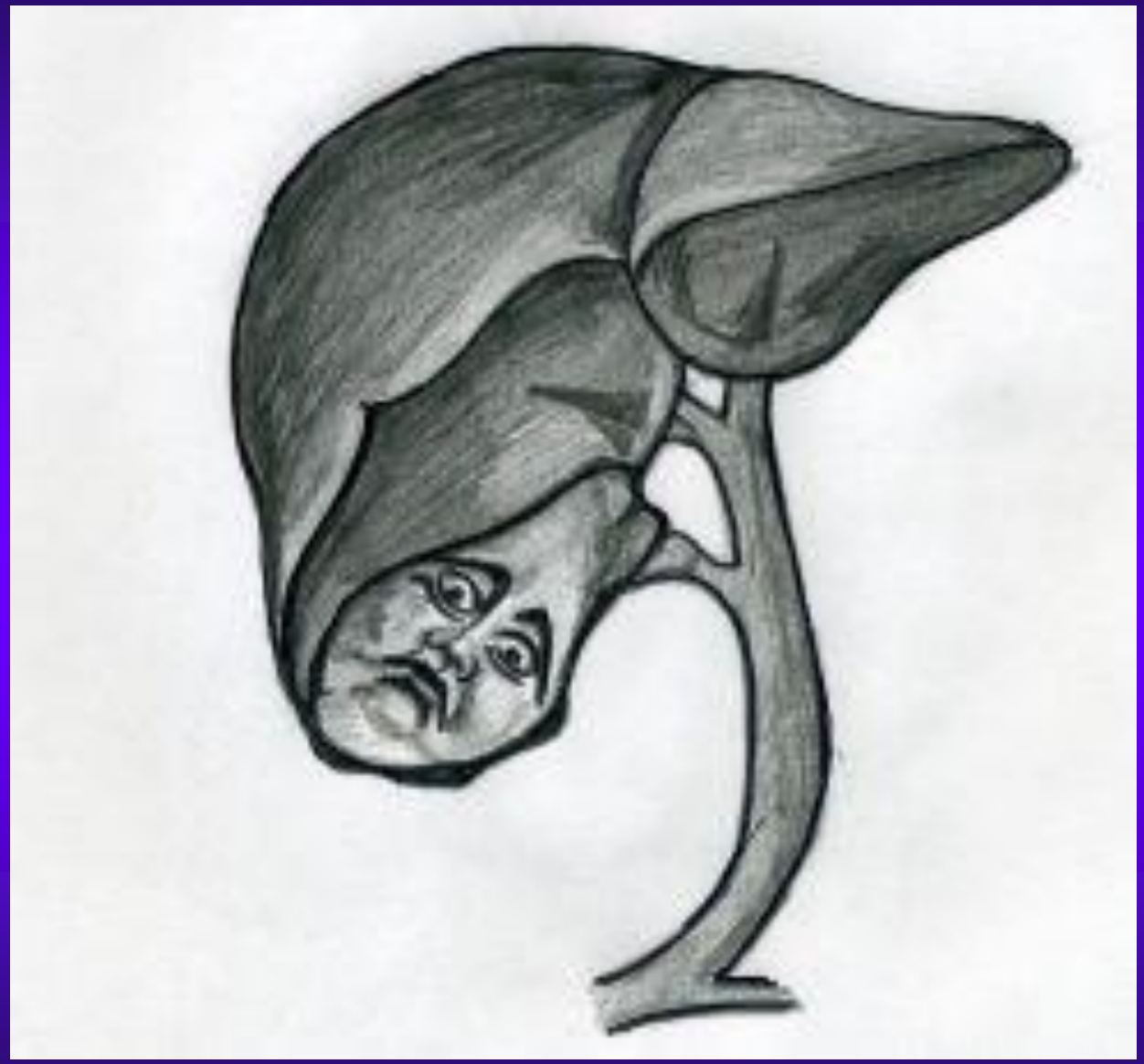
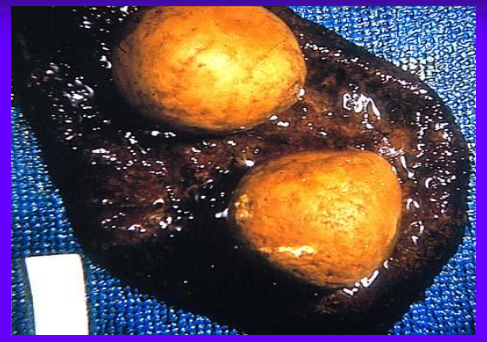
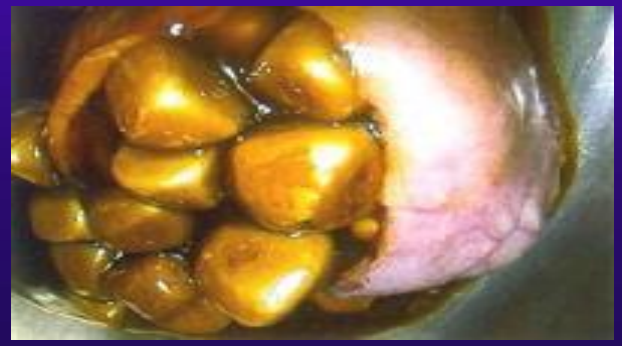
Cholelithiasis

Dr. Abdulsalam Alsharabi

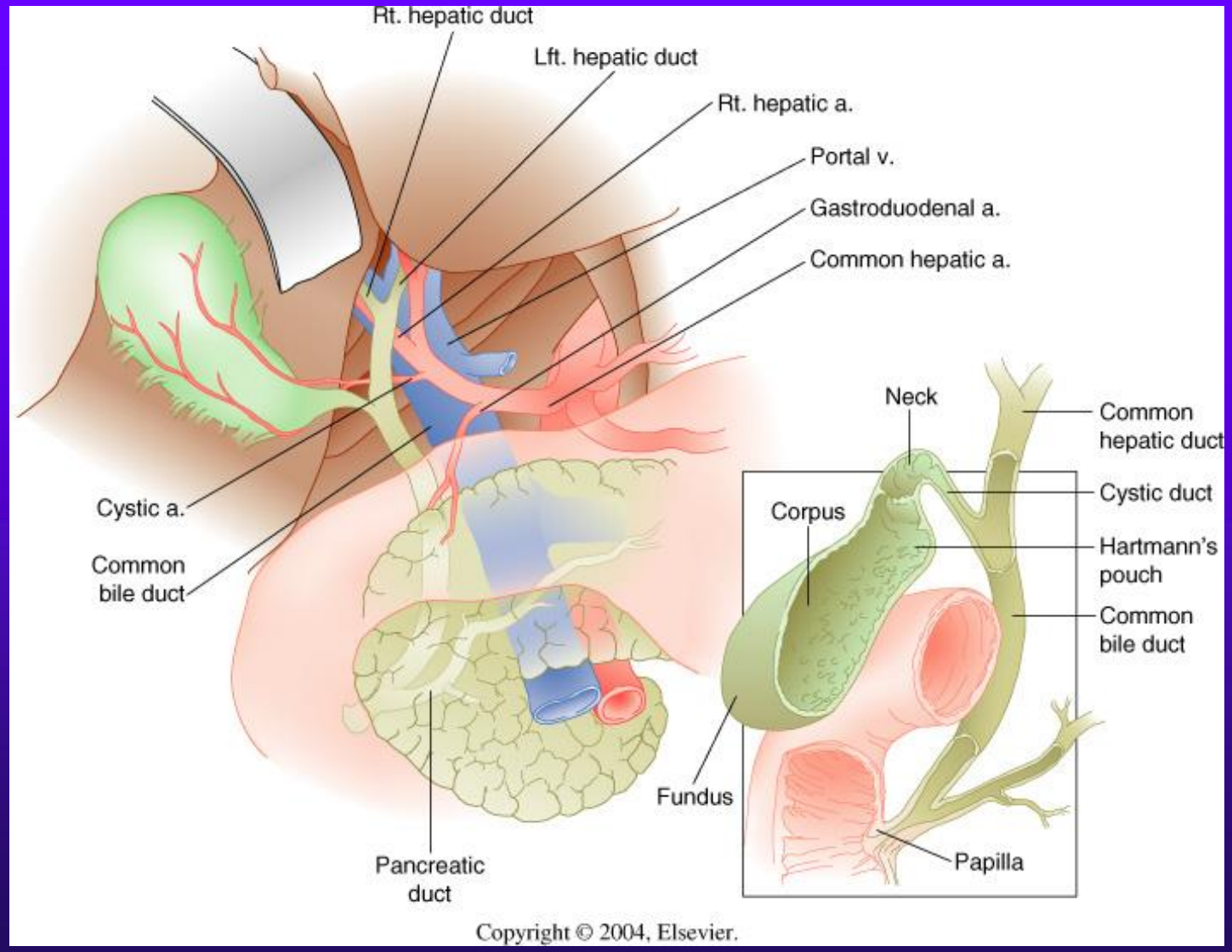


Harvest Time





Anatomy


Rt. hepatic duct
Lft. hepatic duct
Rt. hepatic a.
Portal v.
Gastroduodenal a.
Common hepatic a.
Cystic a.
Common bile duct
Pancreatic duct
Neck
Common hepatic duct
Cystic duct
Corpus
Hartmann's pouch
Common bile duct
Fundus
Papilla
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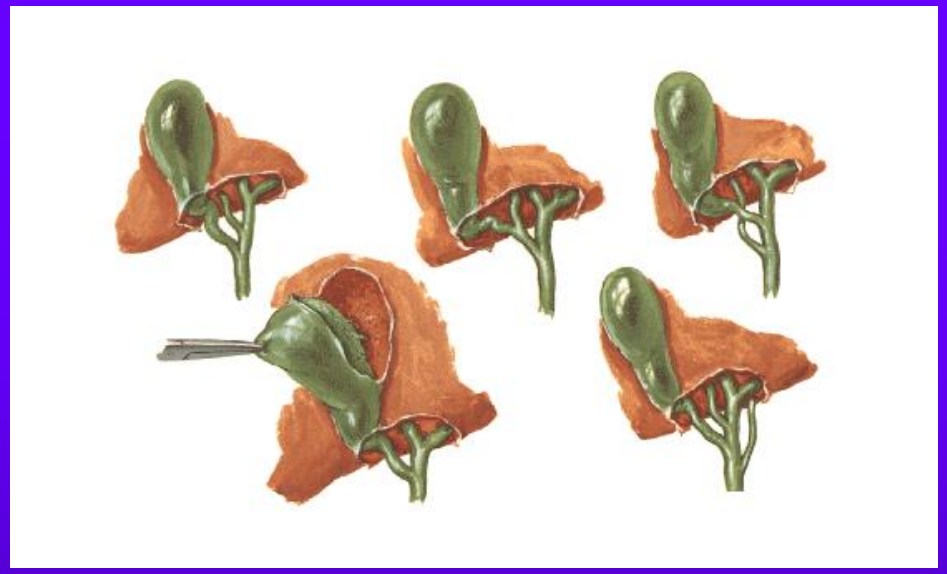
Variations in Bile Ducts



Gallstone Pathogenesis

- Bile contains:
  - Cholesterol
  - Bile salts
  - Phospholipids
  - Bilirubin
- Gallstones are formed when cholesterol or bilirubinate are supersaturated in bile and phospholipids are decreased

Gallstone Pathogenesis

- Stone formation is:
  1. Initiated by cholesterol or bilirubinate super saturation in bile
  2. Continued to crystal nucleation (microlithiais or sludge formation)
  3. And gradually stone growth occur
- Gallstone types
  1. Cholesterol
  2. Pigment
     - Brown
     - Black

Risk Factors for Gallstones

- Obesity
- Rapid weight loss
- Childbearing
- Multiparity
- Female sex
- First-degree relatives
- Drugs: ceftriaxone, postmenopausal estrogens,
- Total parenteral nutrition
- Ethnicity: Native American (Pima Indian), Scandinavian
- Ileal disease, resection or bypass
- Increasing age

Asymptomatic Gallstone

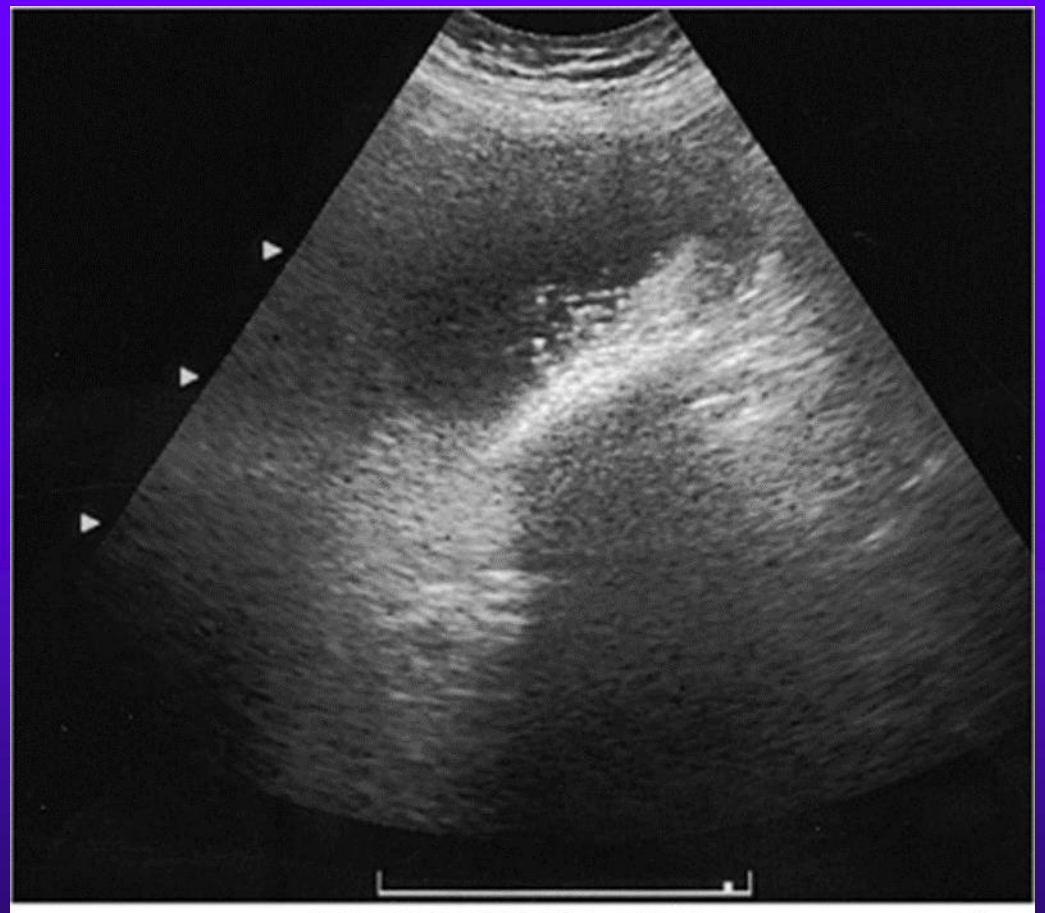
- Incidentally found gallstone in ultrasound exam for other problems
  - Many individuals are concerned about the problem
- Sometimes pt. has vague upper abdominal discomfort and dyspepsia which cannot be explained by a specific disease
  - If other work up are negative may be
- Routine cholecystectomy is not indicated

Definitions

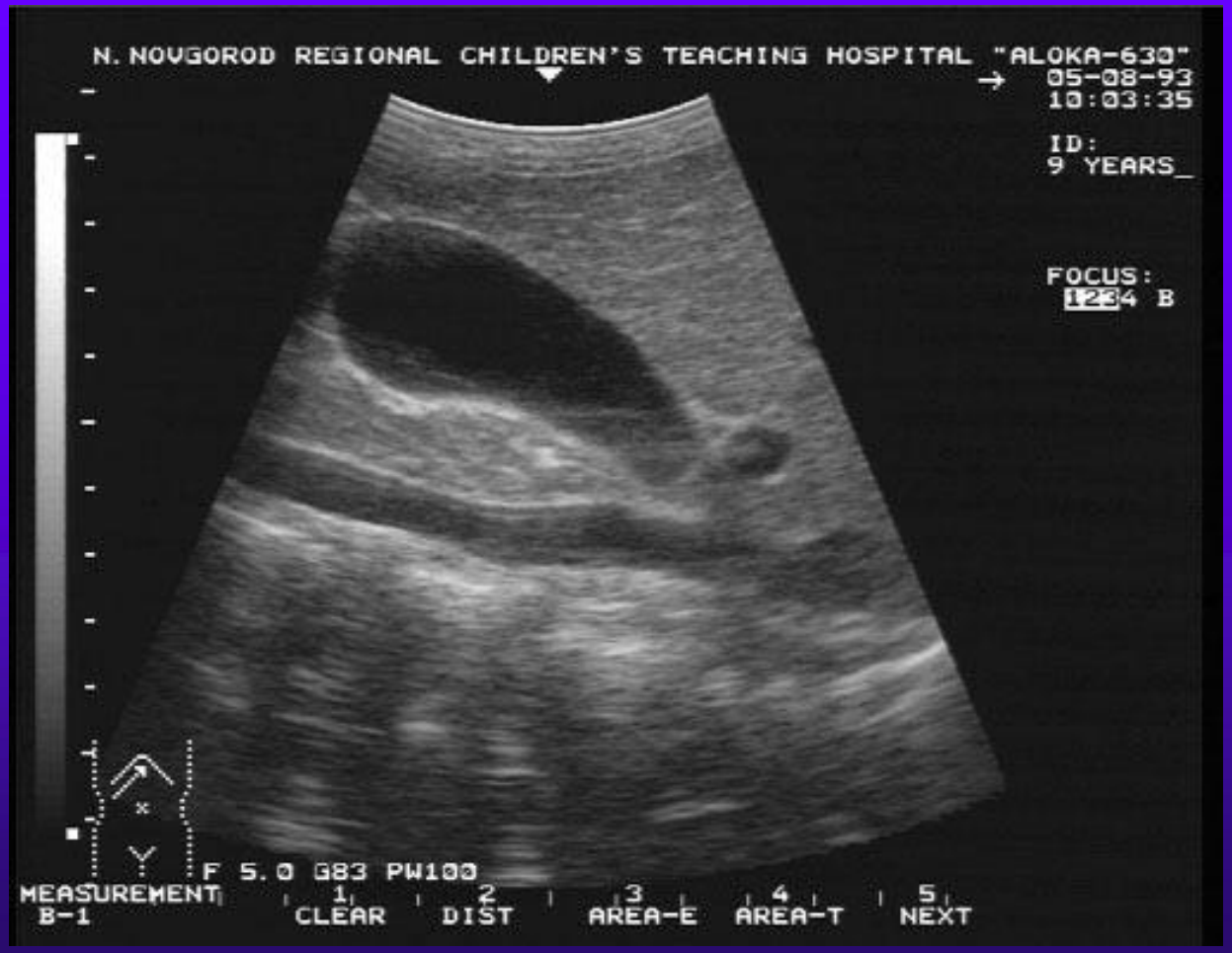
- Biliary colic
  - Wax/waning postprandial epigastric/RUQ pain due to transient cystic duct obstruction by stone
  - No fever, No leukocytosis, Normal LFT

Gall bladder ultrasound

- Shows gallstones
- the acoustic shadow due to absence of reflected sound waves behind the gallstone



Ultrasound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FOCUS:
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B-1
1
CLEAR
2
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AREA-E
4
AREA-T
5
NEXT

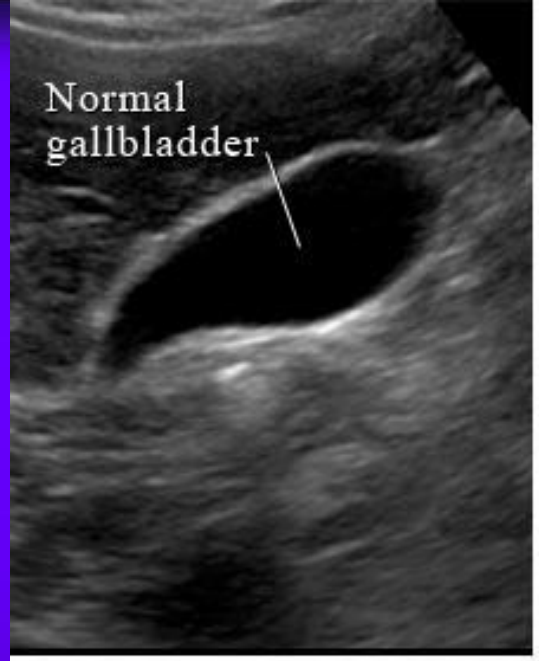


Figure 1

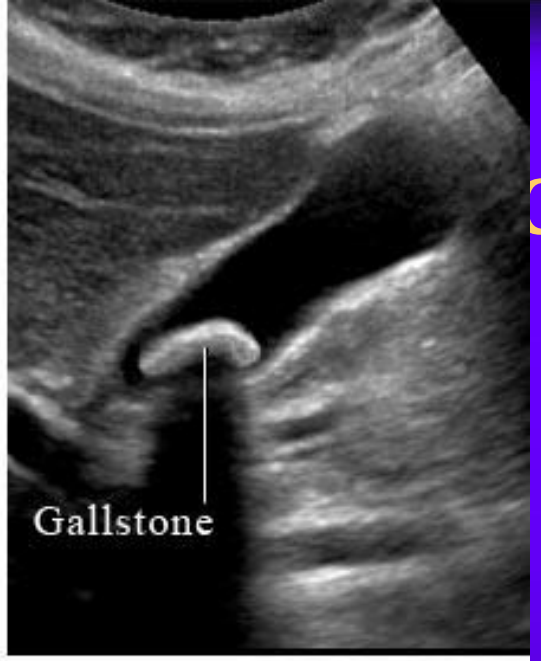
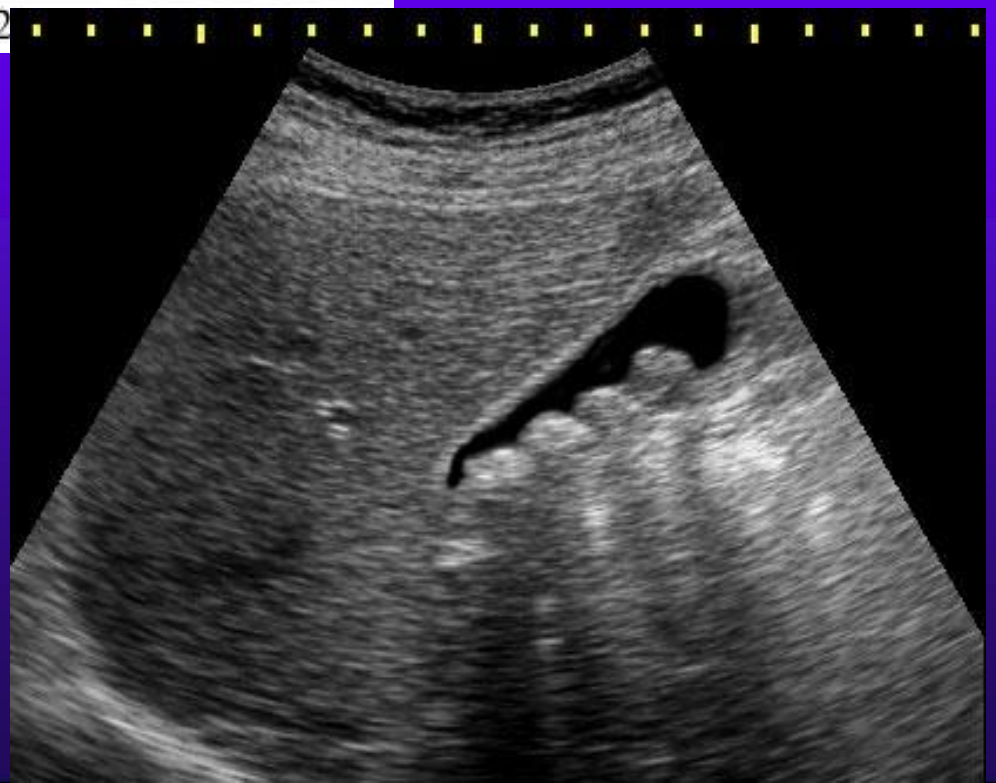
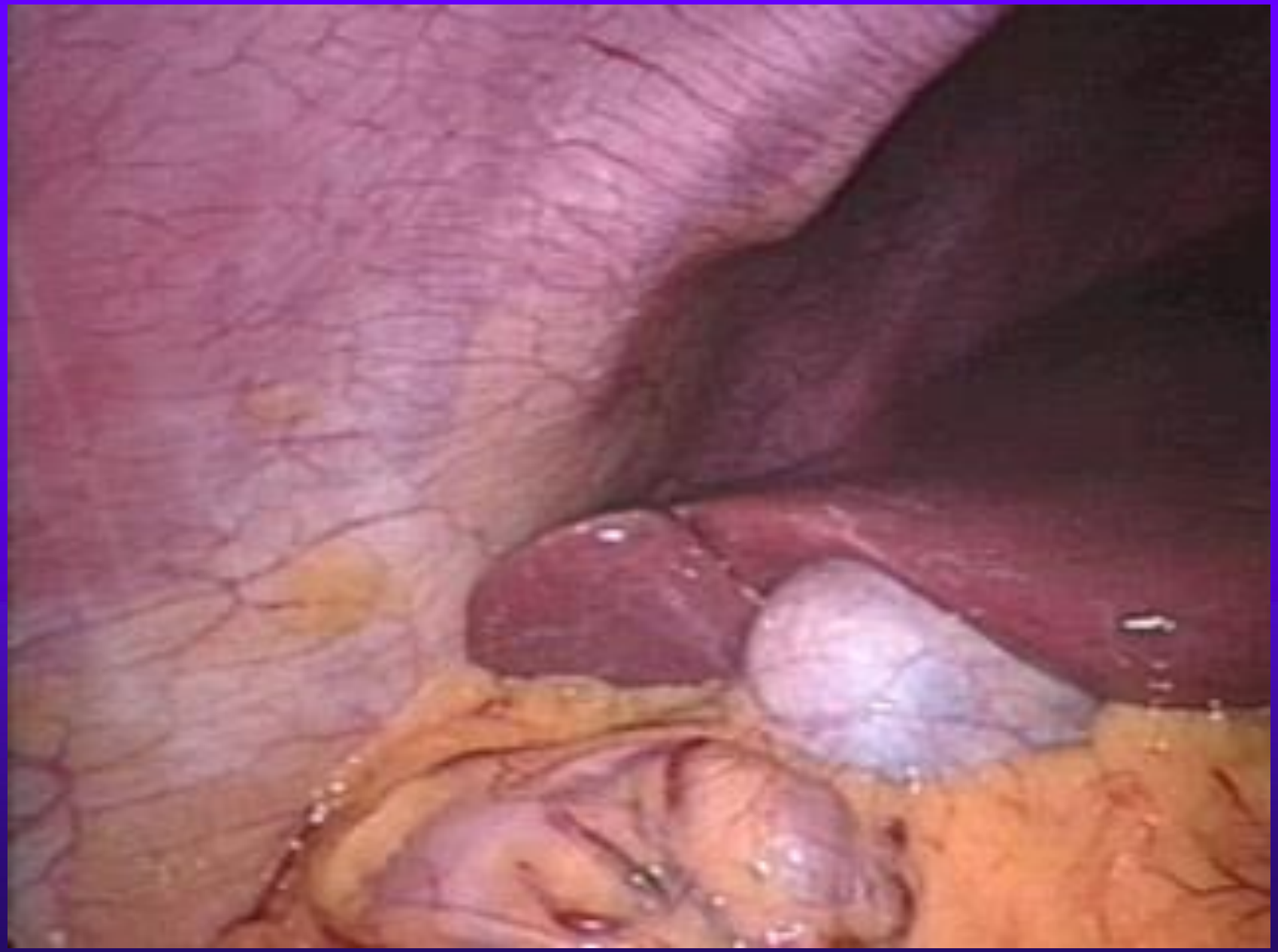
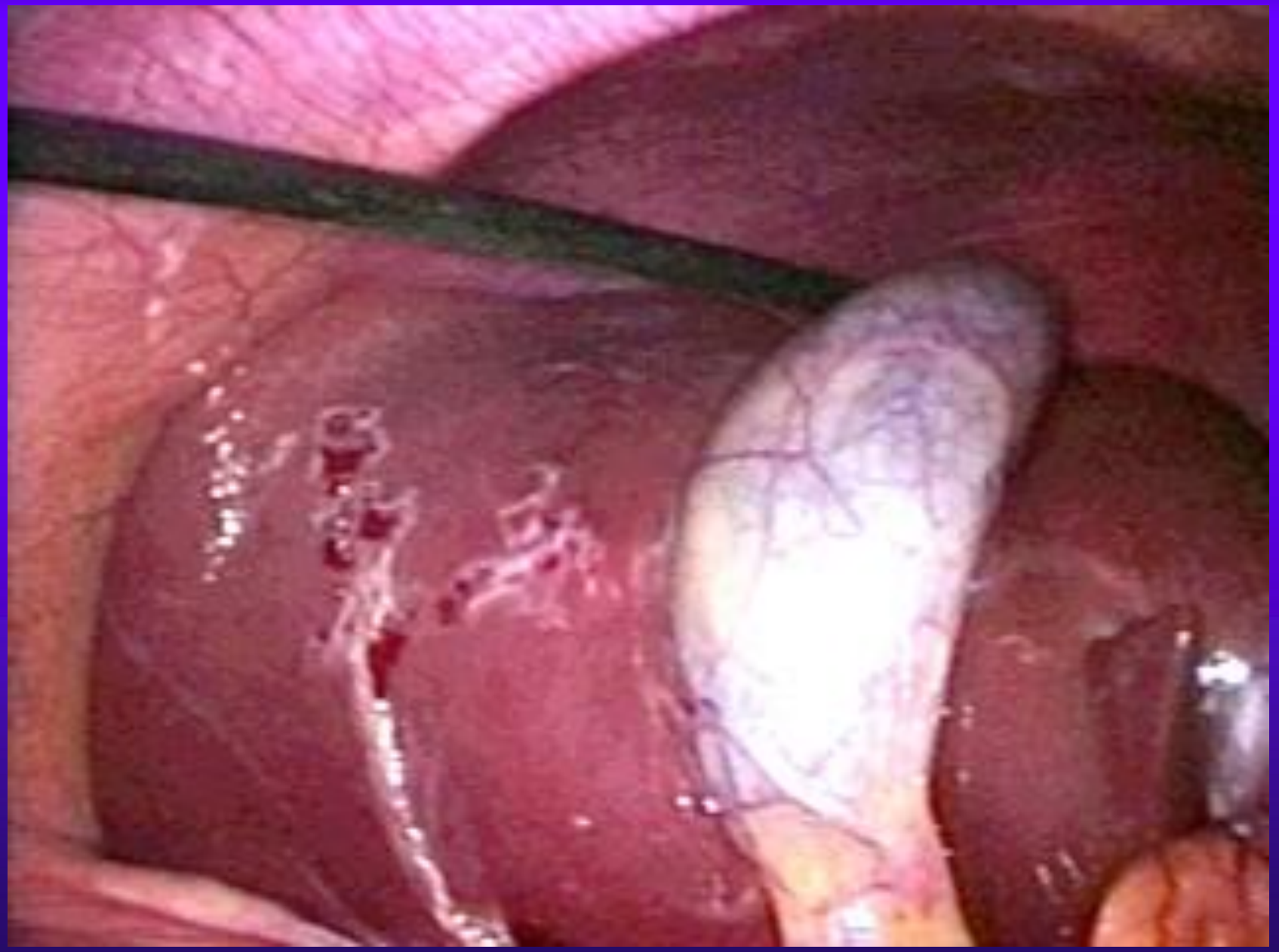
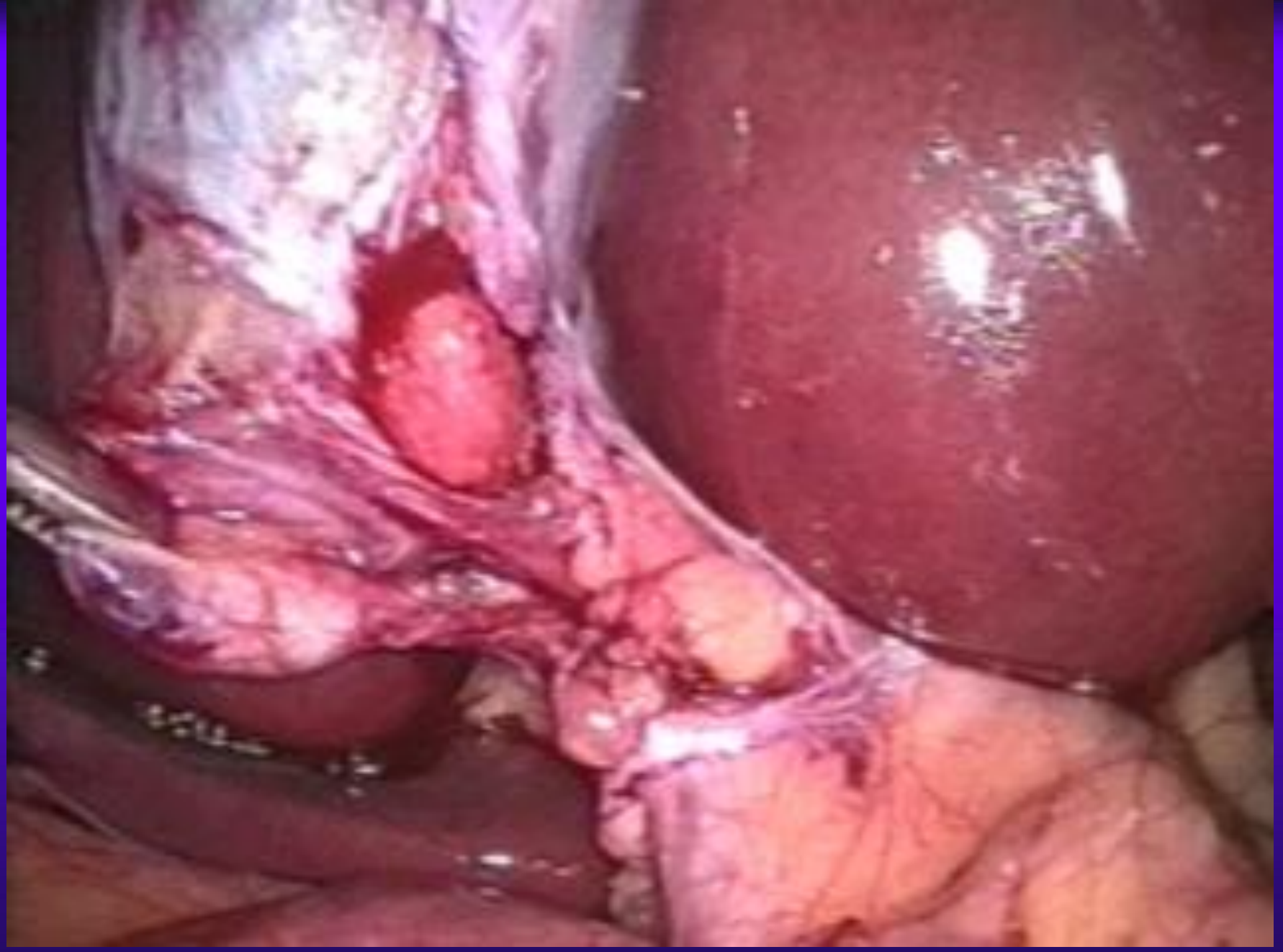


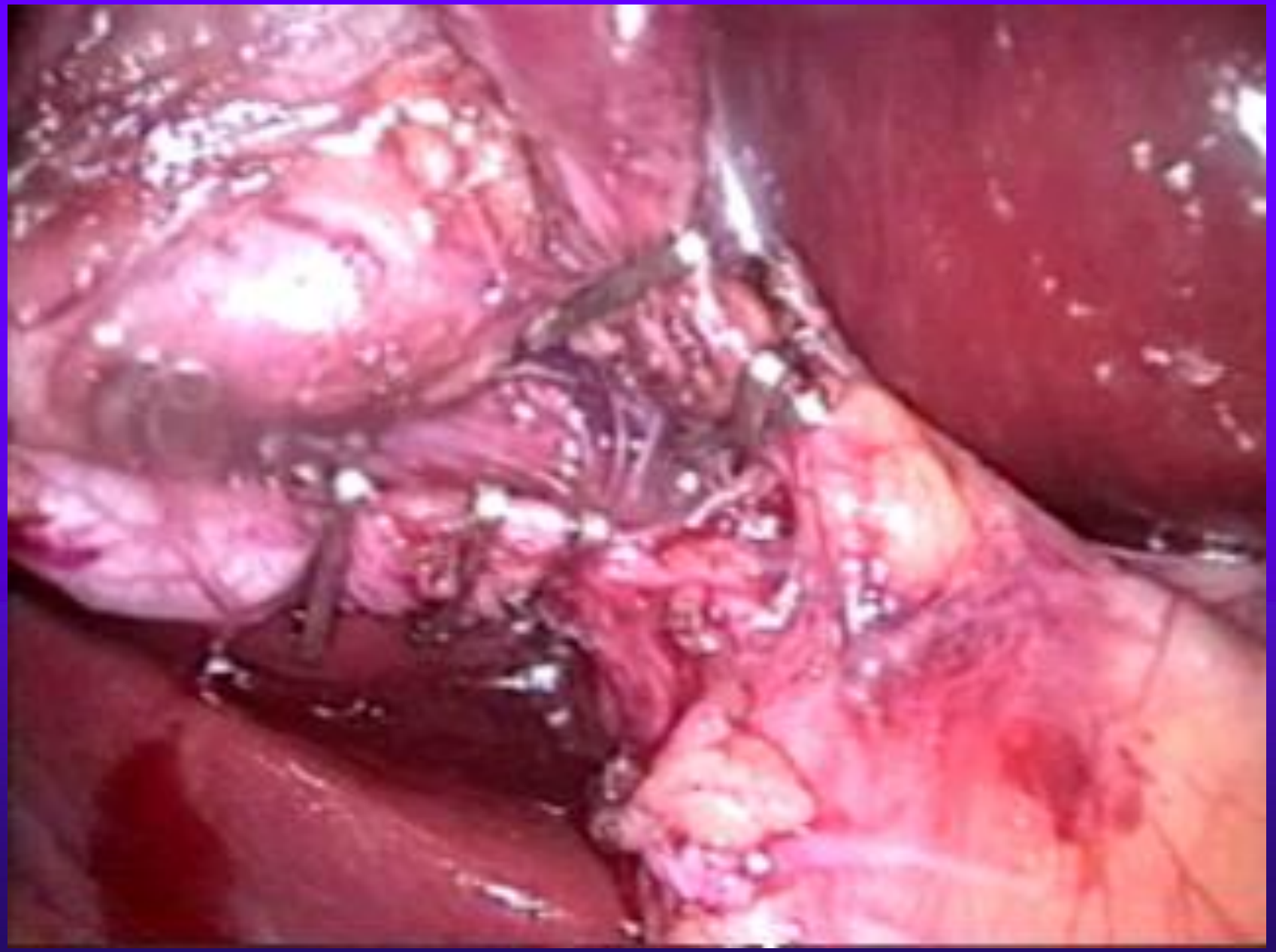
Figure 2











Definitions

- Chronic cholecystitis
  - Recurrent bouts of biliary colic leading to chronic GB wall inflammation/fibrosis.
  - No fever, No leukocytosis, Normal LFT

- Recurrent inflammatory process due to recurrent cystic duct obstruction, 90% of the time due to gallstones
- Overtime, leads to scarring/wall thickening
- Attacks of biliary colic may occur overtime

Differential diagnosis of RUQ pain

- **Biliary disease**
  - Acute or chronic cholecystitis
  - CBD stone
  - cholangitis
- **Inflamed or perforated peptic ulcer**
- **Pancreatitis**
- **Hepatitis**
- Rule out:
  - Appendicitis, renal colic, pneumonia, pleurisy and …

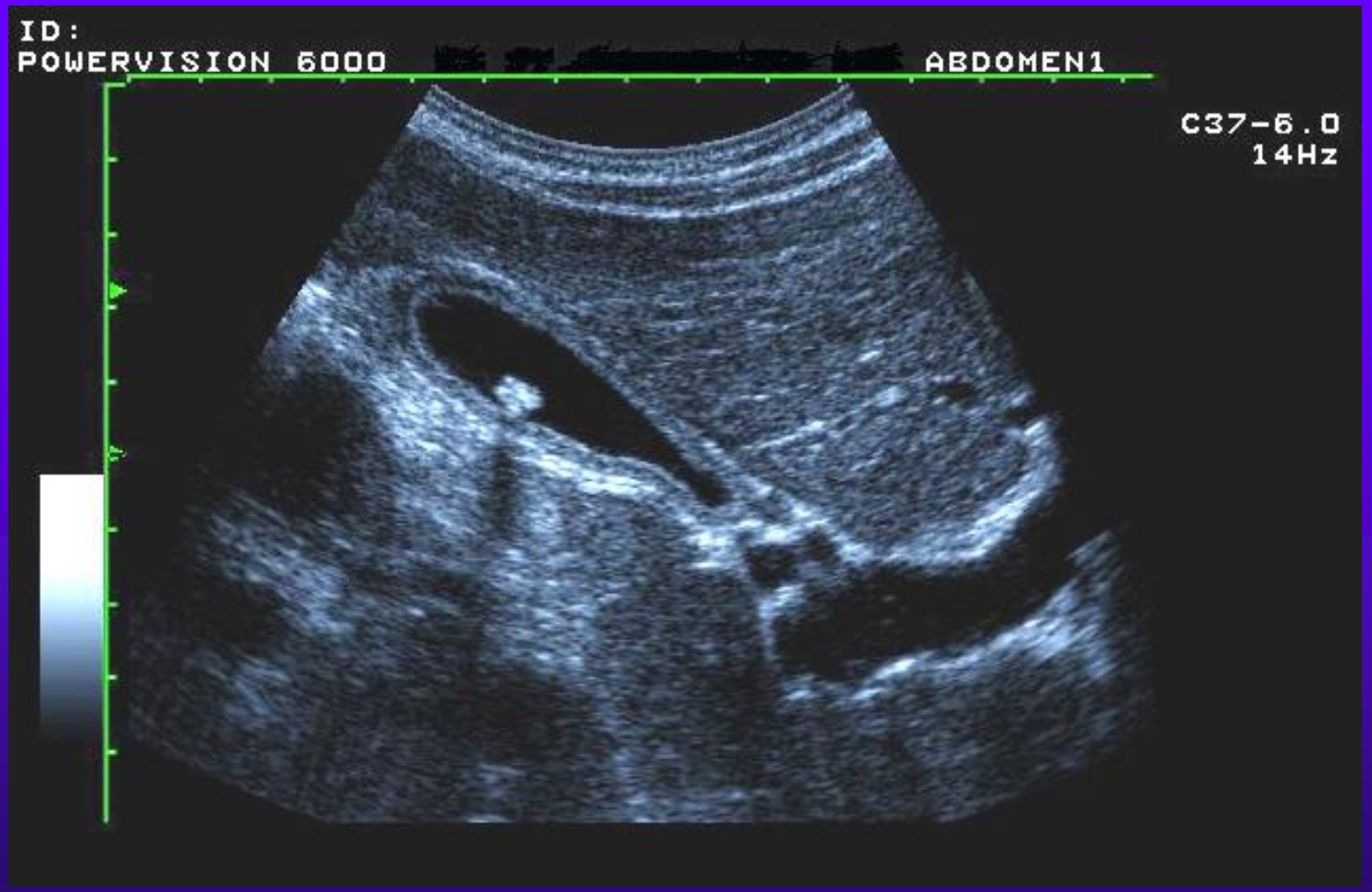
Definitions

- Acute cholecystitis
  - Acute GB distension, wall inflammation & edema due to cystic duct obstruction.
  - RUQ pain (>24hrs) +/- fever, ↑WBC, Normal LFT,
    - Murphy's sign = inspiratory arrest

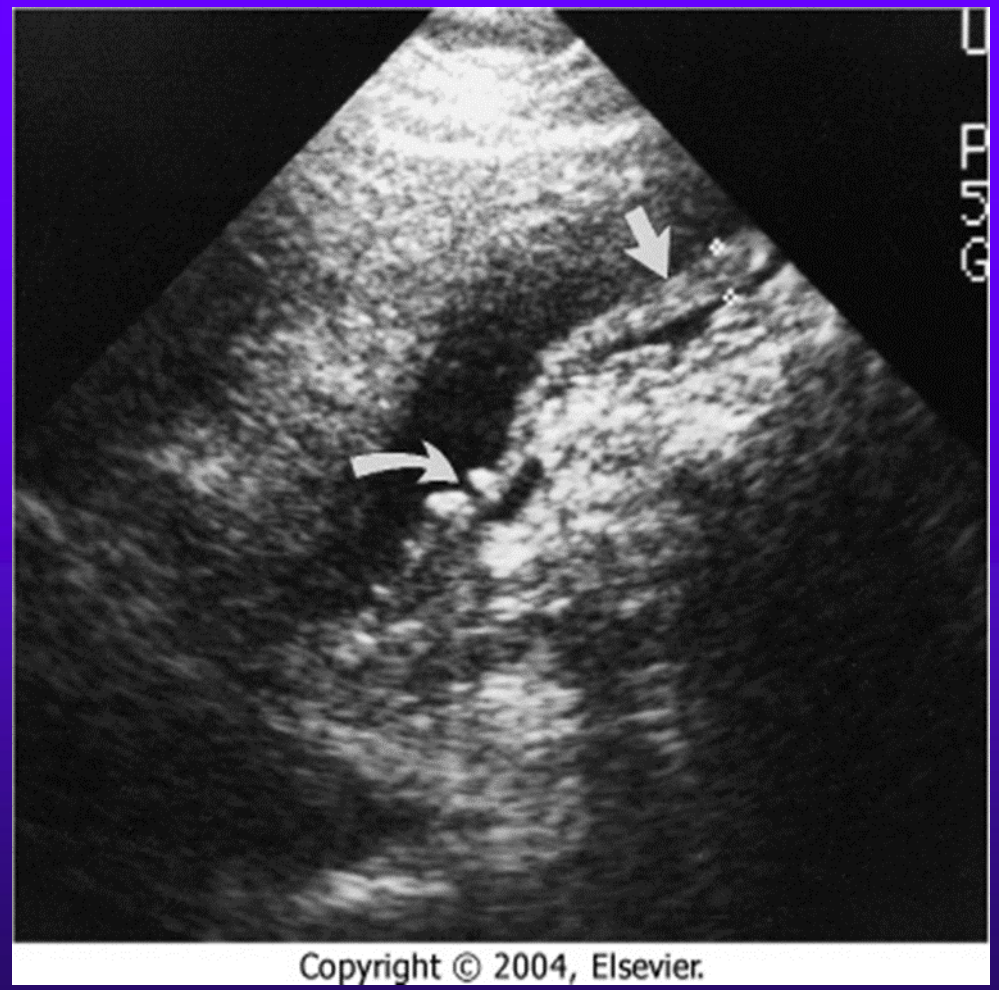
Ultrasound is the first choice for imaging

- Distended gallbladder
- Increased wall thickness (> 4 mm)
- Pericholecystic fluid
- Positive sonographic Murphy's sign (very specific)

Ultrasound

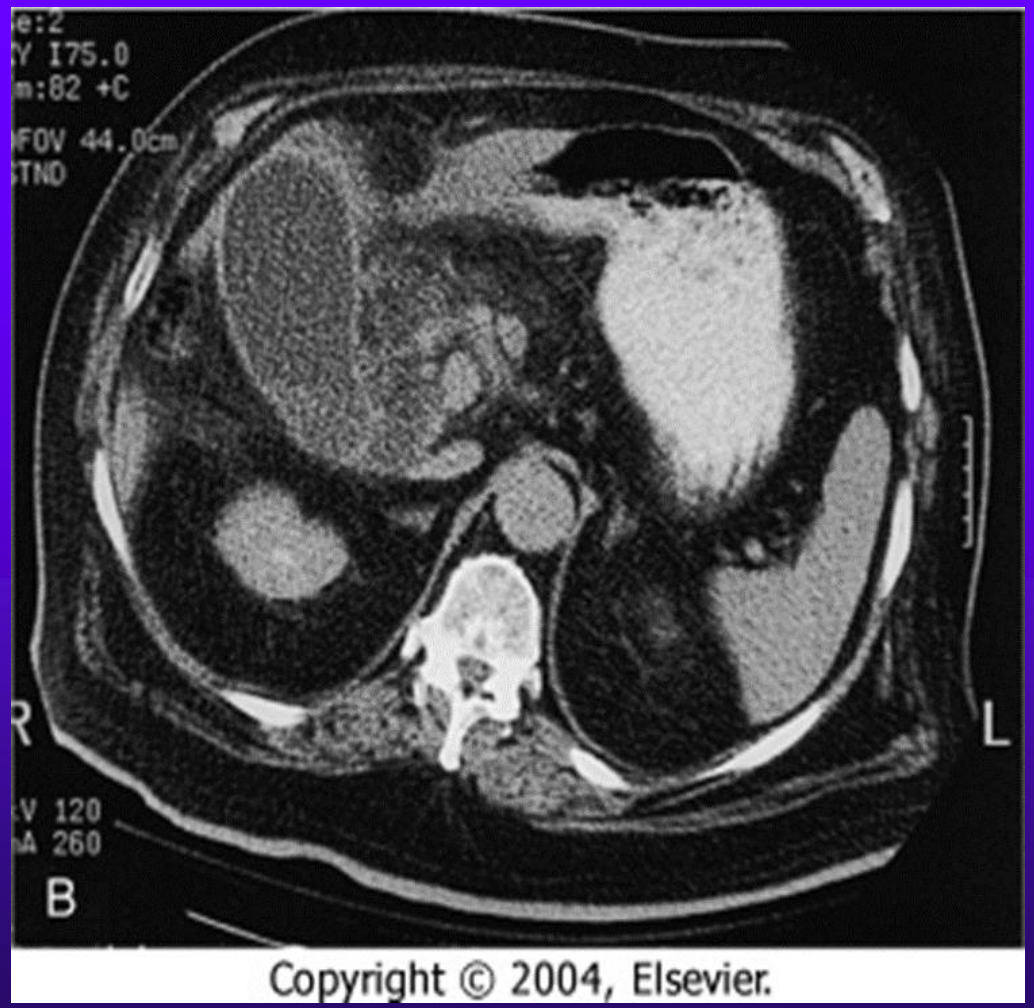


Ultrasound



- Curved arrow
  - Two small stones at GB neck
- Straight arrow
  - Thickened GB wall
- ◀
  - Pericholecystic fluid = dark lining outside the wall

CT scan



- → denotes the GB wall thickening
- ► denotes the fluid around the GB
- GB also appears distended

Complications of acute cholecystitis

- Hydrops
  - Obstruction of cystic duct followed by absorption of pigments and secretion of mucus to the gallbladder *(white bile)*
  - There may be a round tender mass in RUQ

- Urgent Cholecystectomy is indicated

Complications of acute cholecystitis

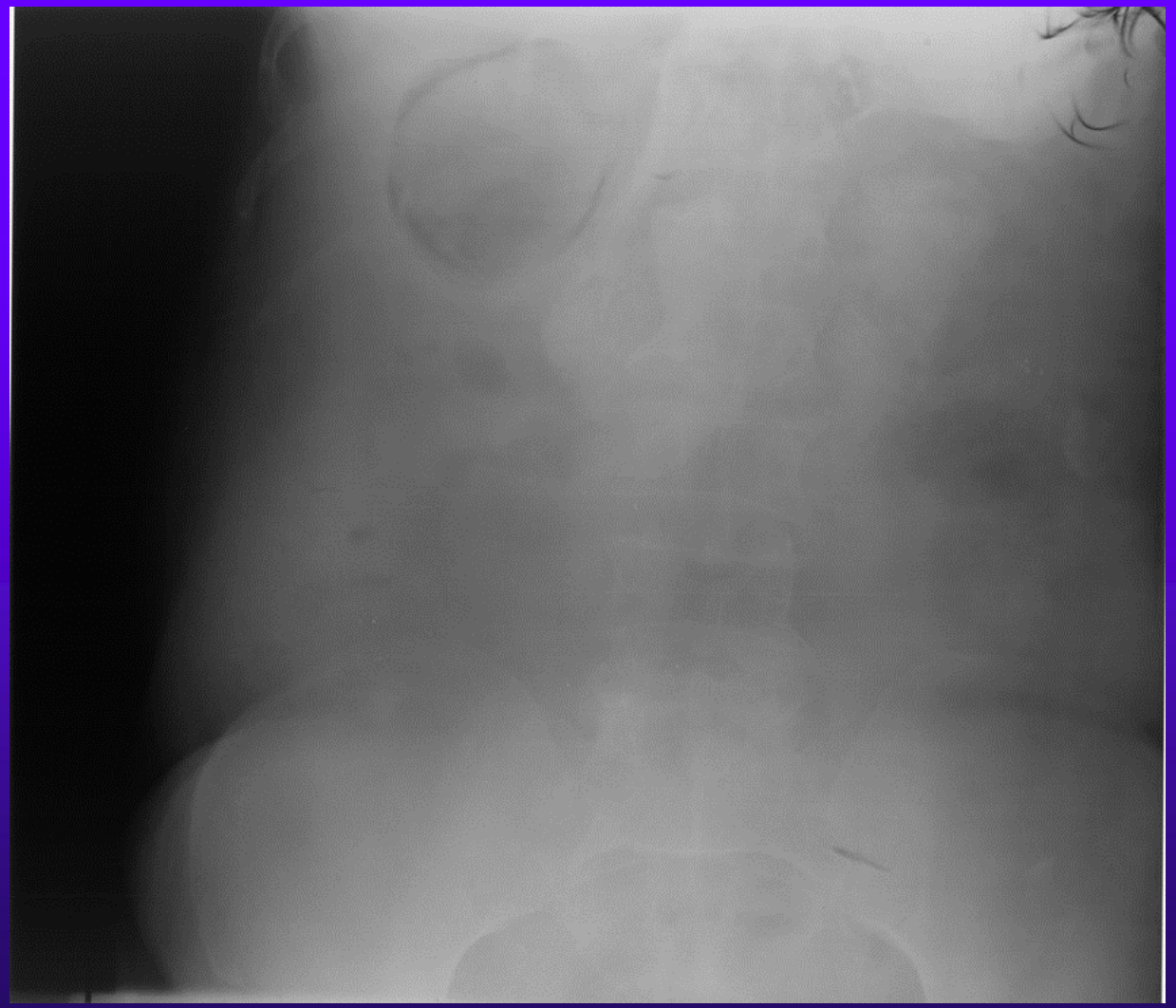
- Empyema of gallbladder
  - Pus-filled GB due to bacterial proliferation in obstructed GB. Usually more toxic with high fever
- Emergent operation is needed

Complications of acute cholecystitis

- Emphysematous cholecystitis
  - More commonly in men and diabetics.

    Severe RUQ pain, generalized sepsis.
  - Imaging shows air in GB wall or lumen
- Emergent cholecystectomy is needed

Emphysematous cholecystitis



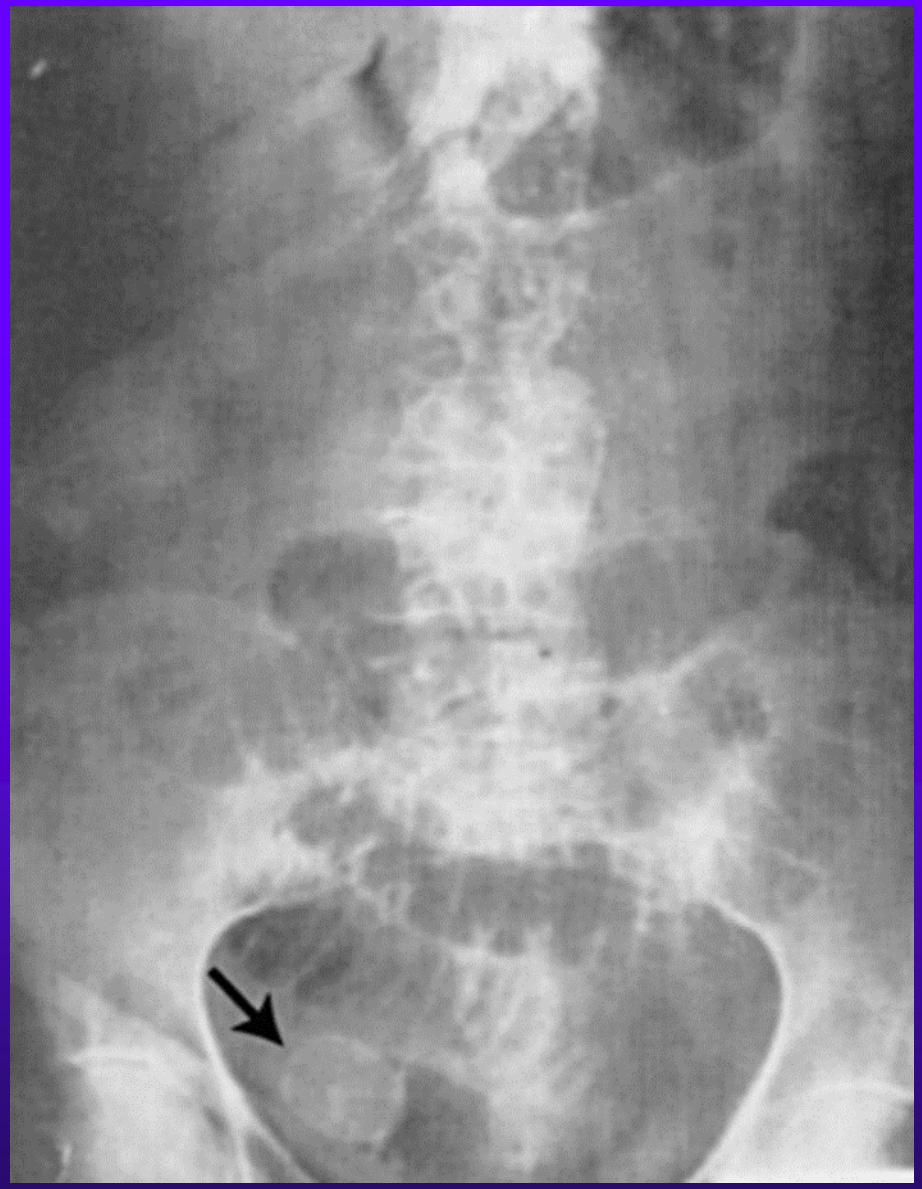
Complications of acute cholecystitis

- Perforated gallbladder
  - Pericholecystic abscess (up to 10% of acute cholecystitis)
    - Percutaneous drainage in acute phase
  - Biliary peritonitis due to free perforation
- Emergent Laparotomy

Complications of acute cholecystitis

- Chronic perforation into adjacent viscus (cholecystoenteric fistula)
  - Air is seen in the biliary tree
  - The stone can cause small bowel obstruction if large enough (**gallstone ileus**)
- Laparotomy is needed for extraction of stone, cholecystectomy and closure of fistula

Gallstone Ileus



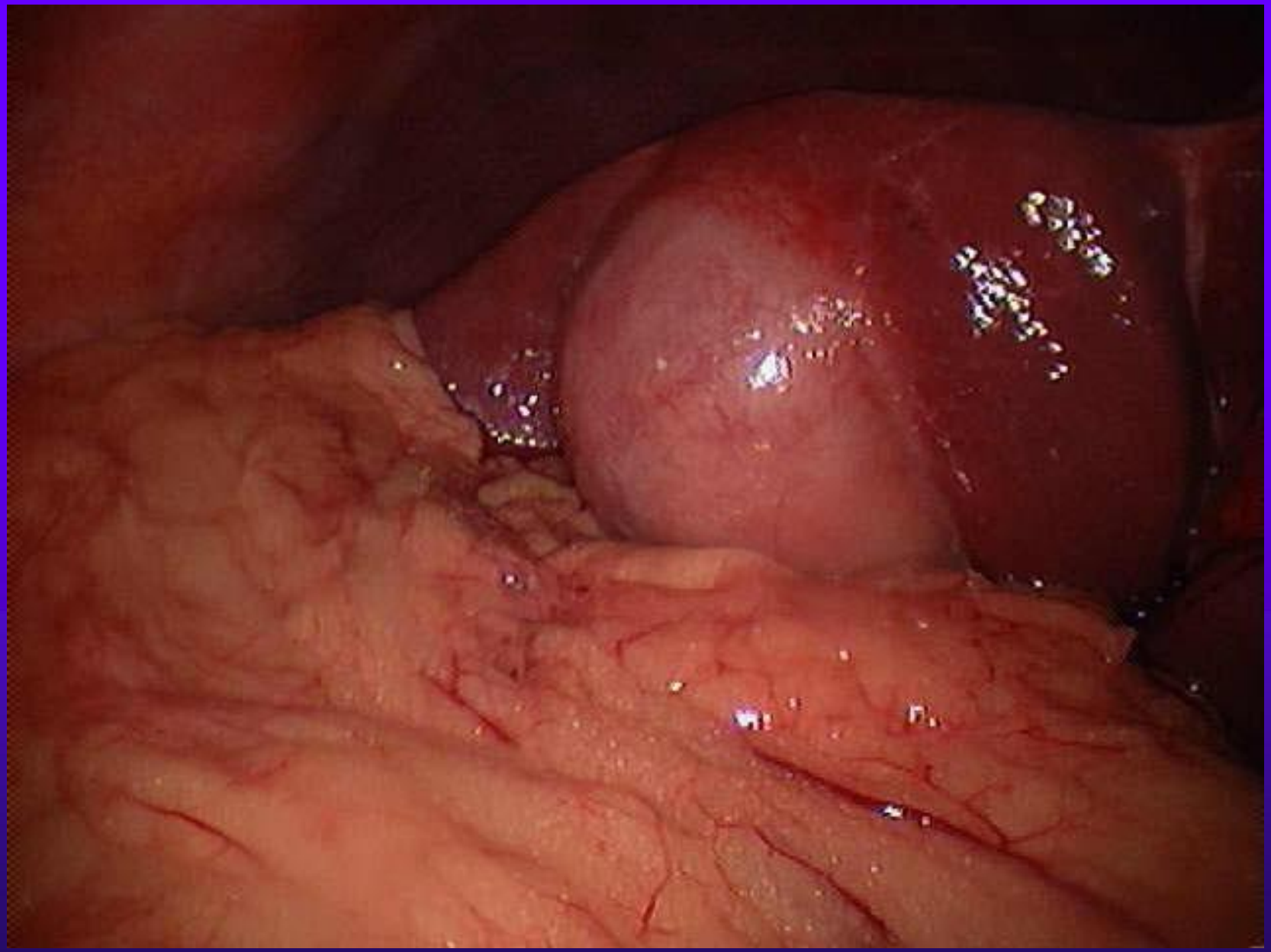
Definitions

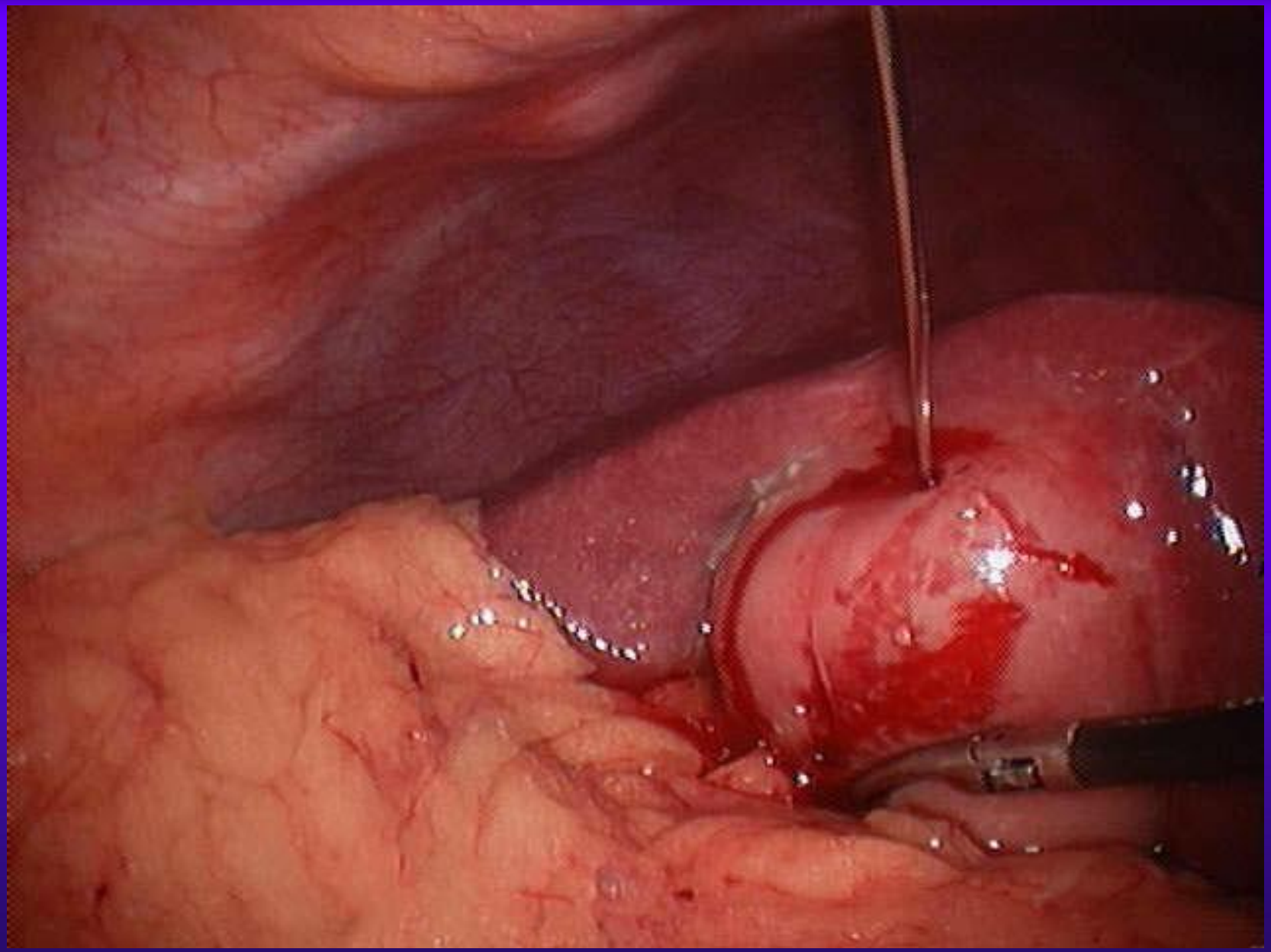
Acalculous cholecystitis

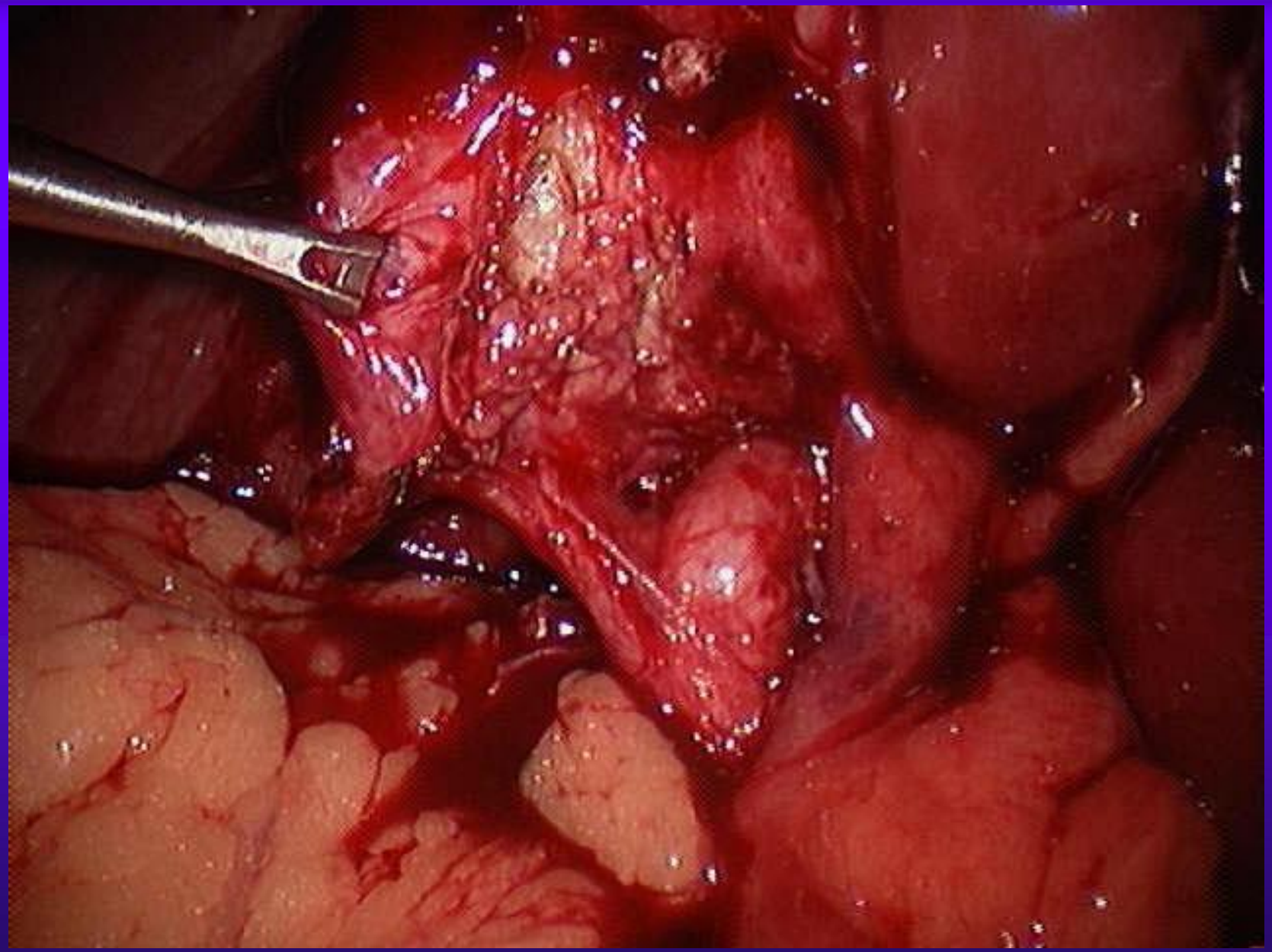
- A form of acute cholecystitis
- GB inflammation due to biliary stasis(5% of time) and not stones(95%).
- Often seen in critically ill patients

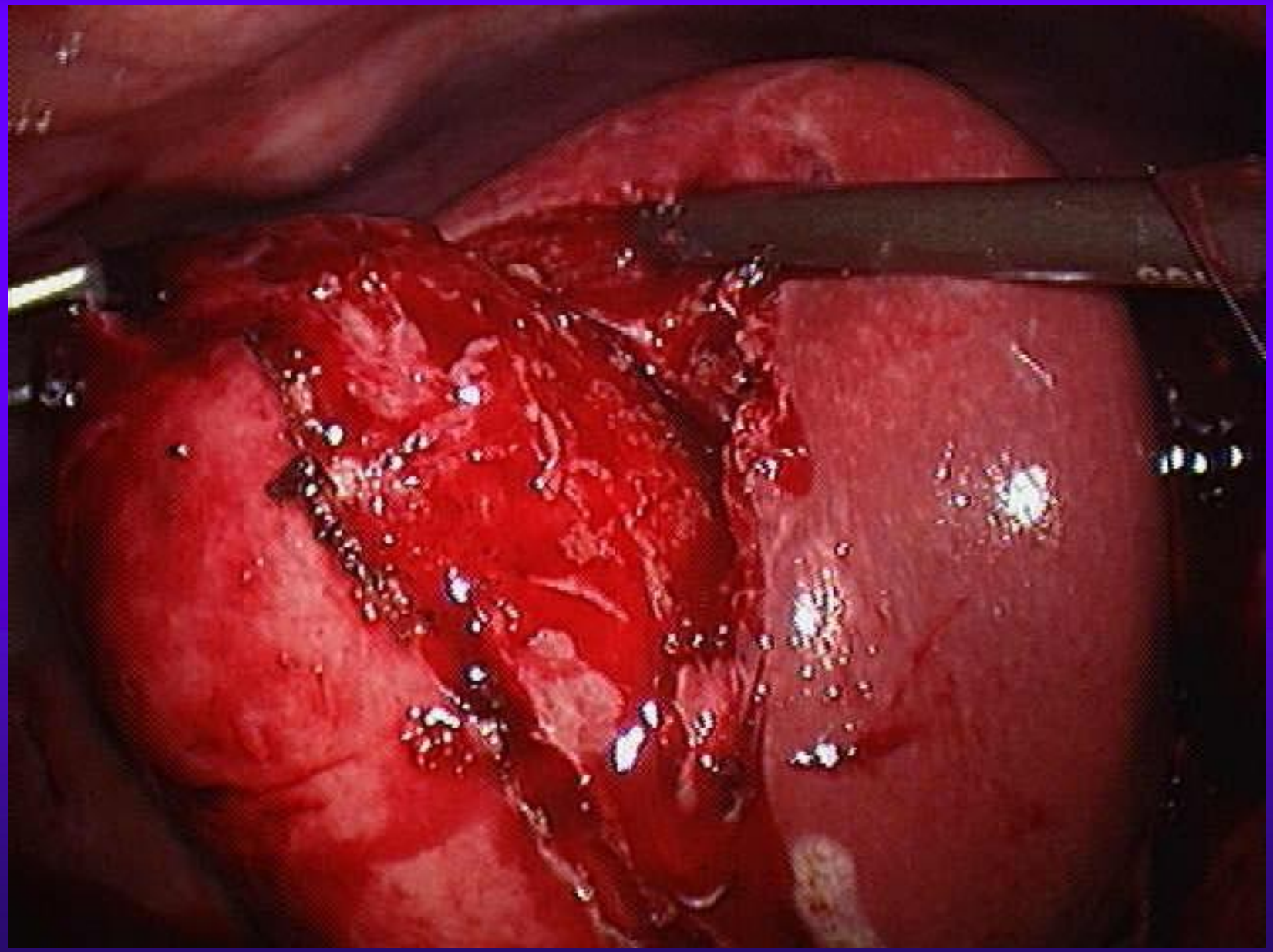
Acute acalculous cholecystitis

- 5-10% of cases of acute cholecystitis
- Seen in critically ill pts or prolonged TPN
- More likely to progress to gangrene, empyema & perforation due to ischemia
- Caused by gallbladder stasis from lack of enteral stimulation by cholecystokinin
- Emergent operation is needed

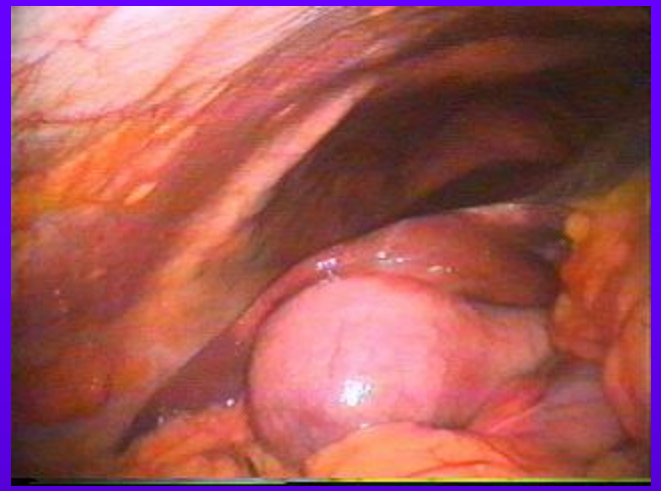


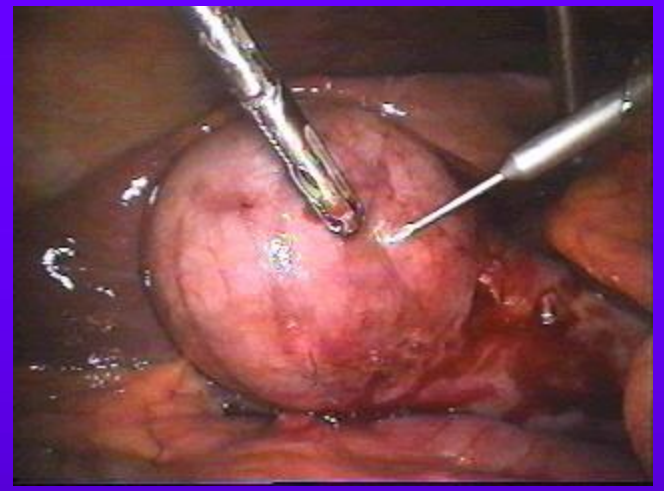


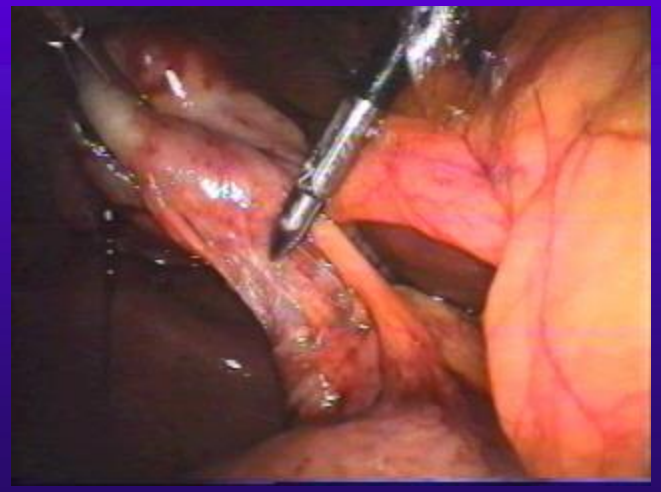


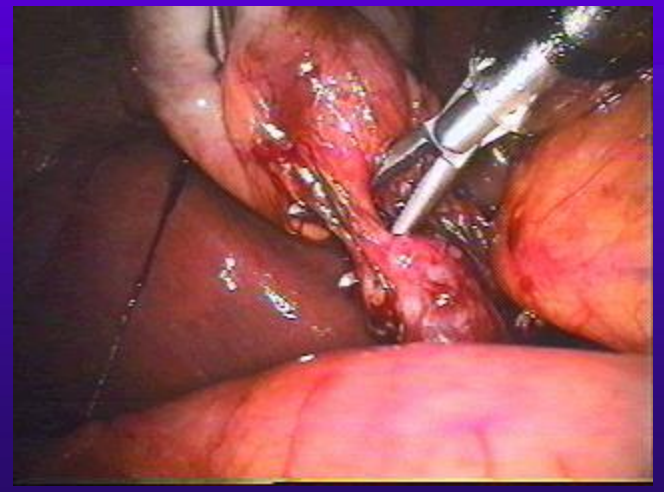


Laparoscopic Cholecystectomy

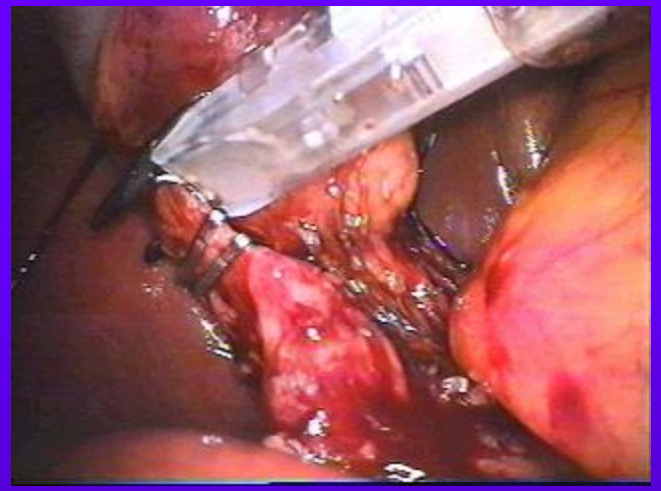


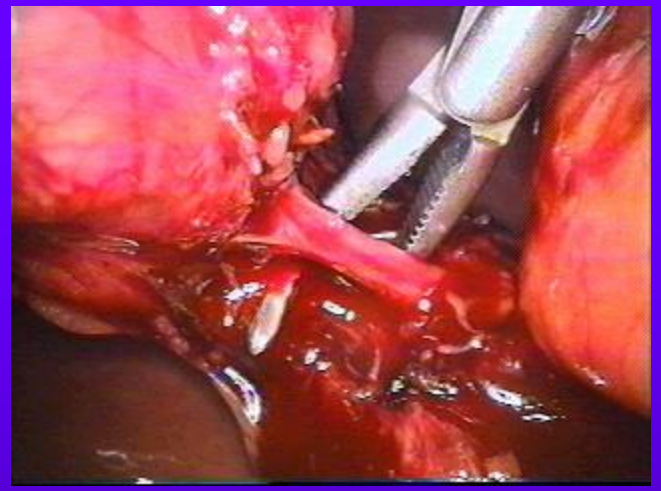


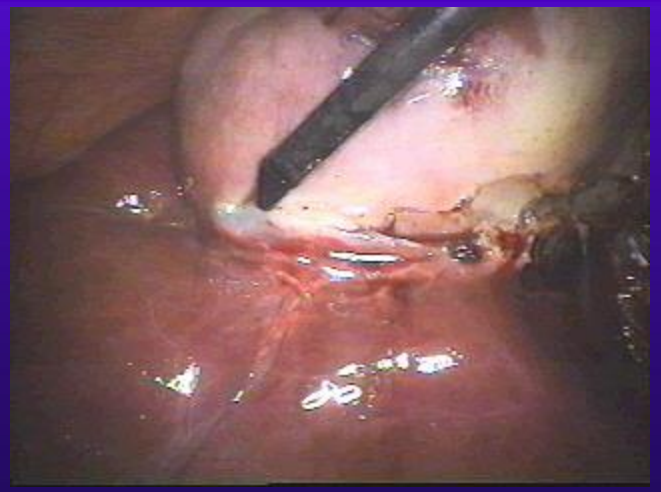


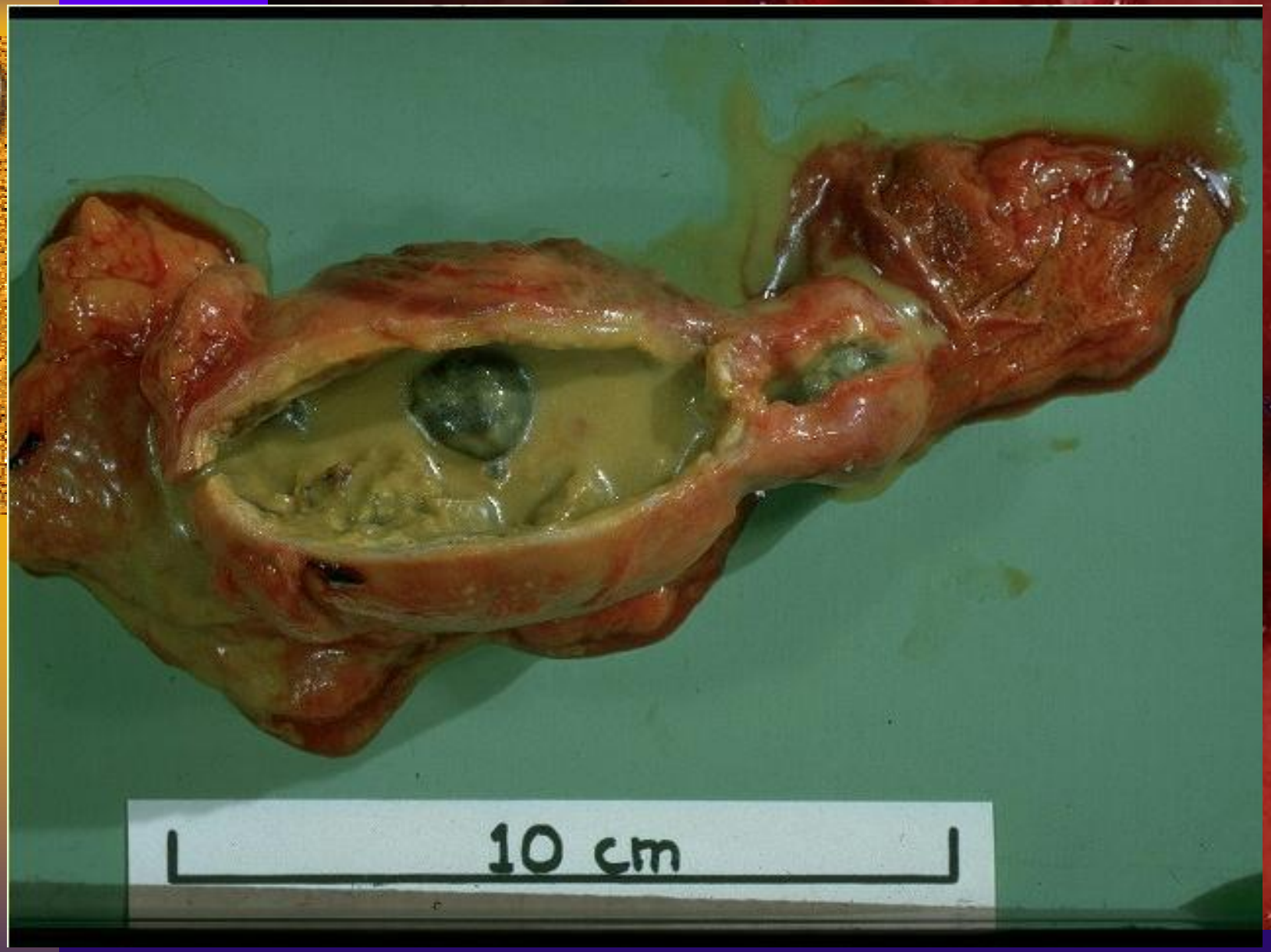


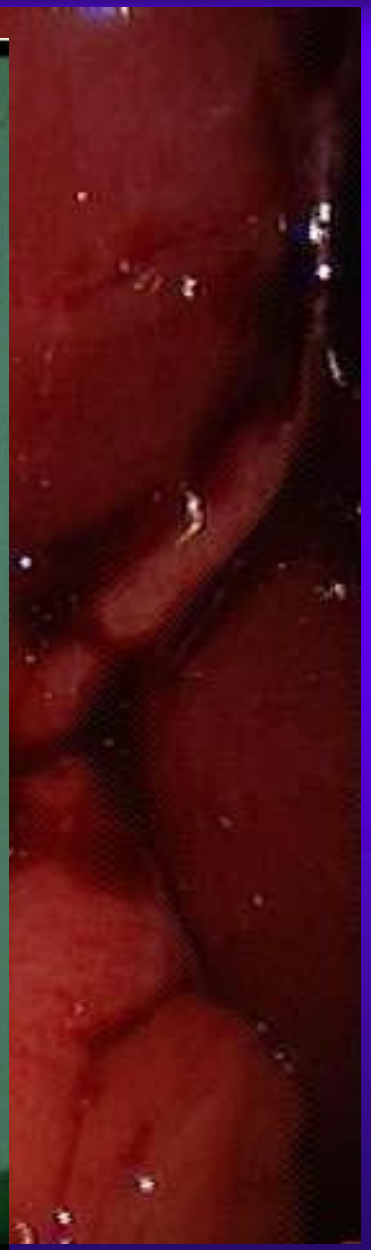
Laparoscopic Cholecystectomy

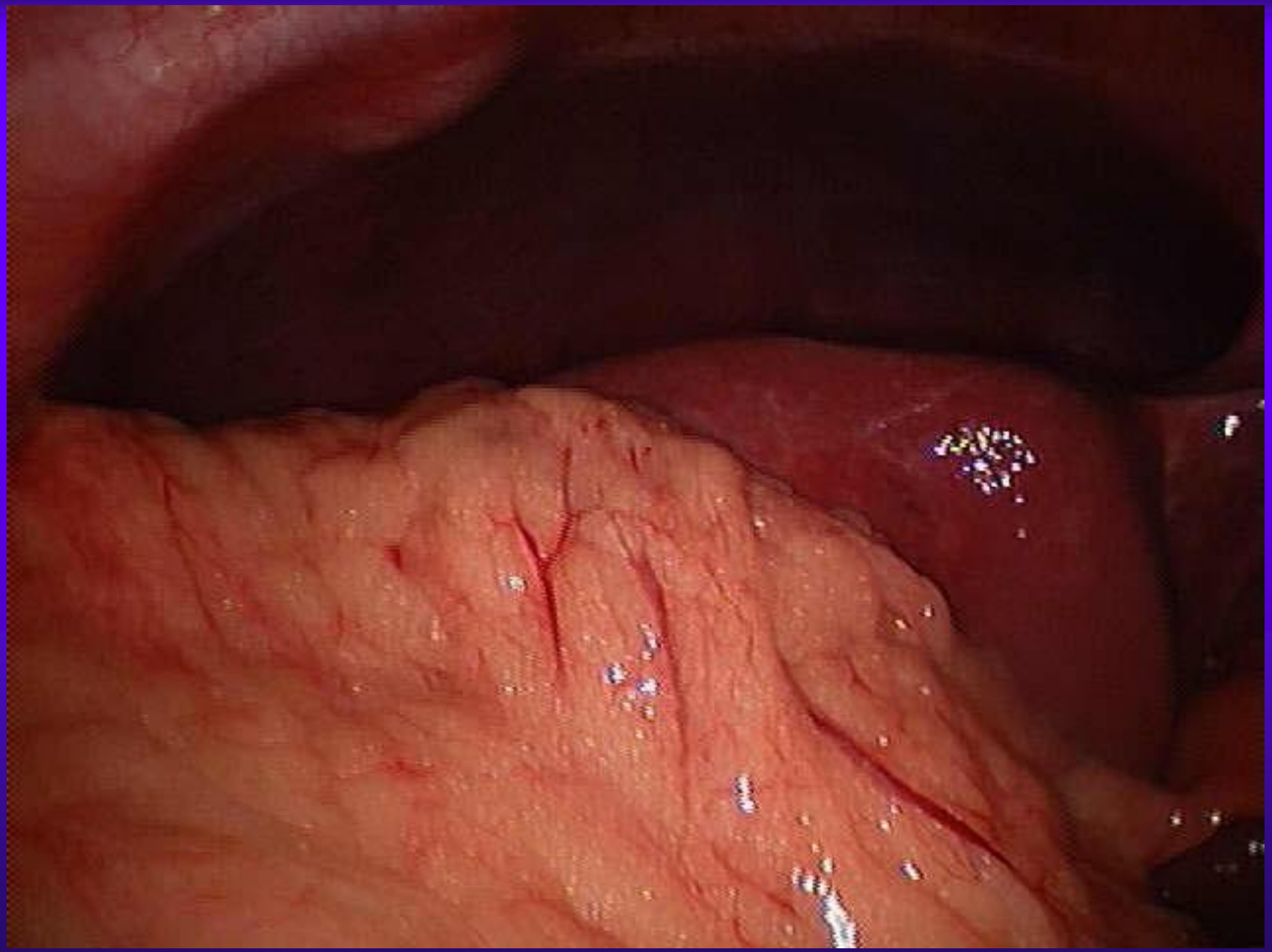


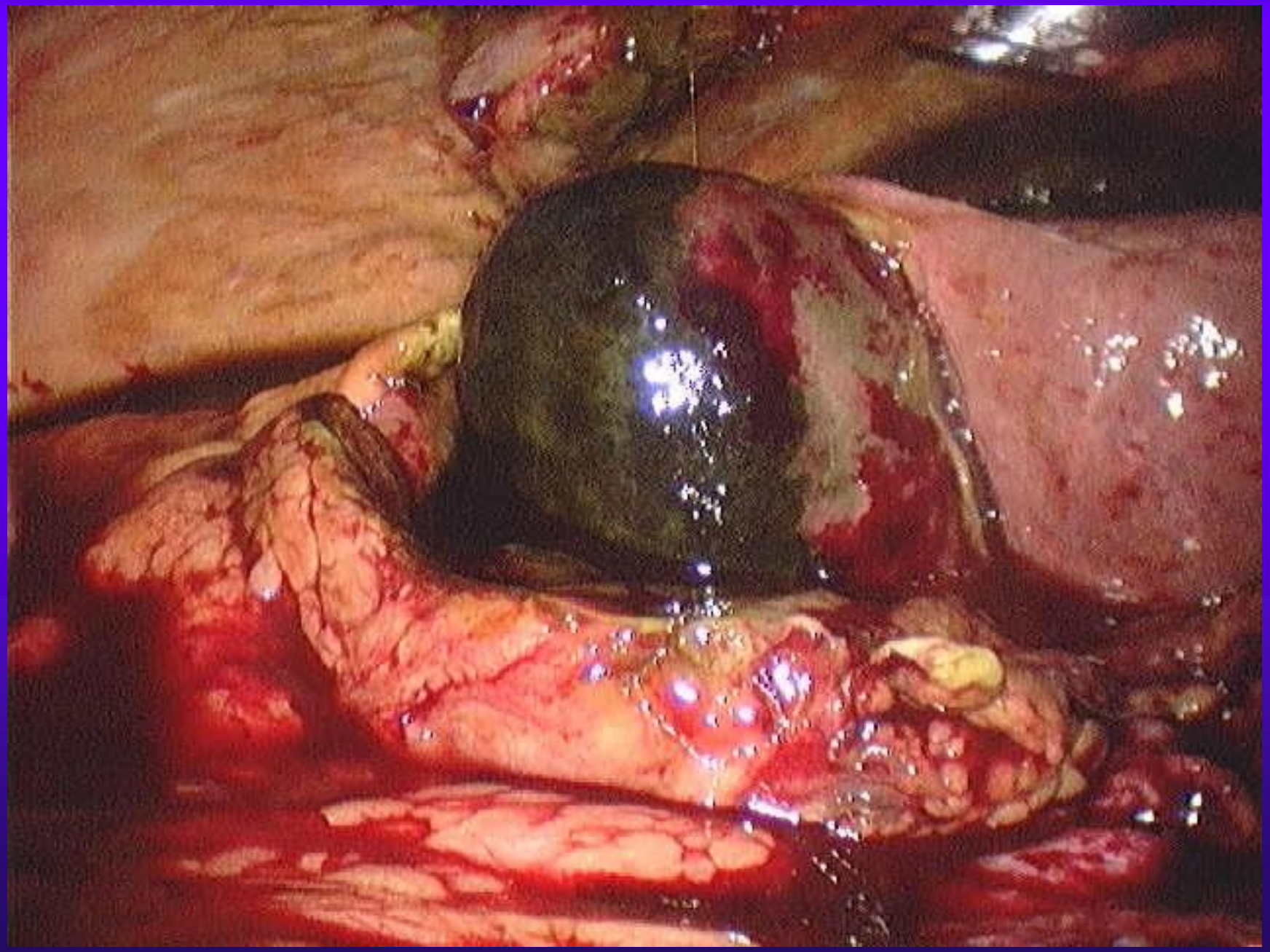





10 cm







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

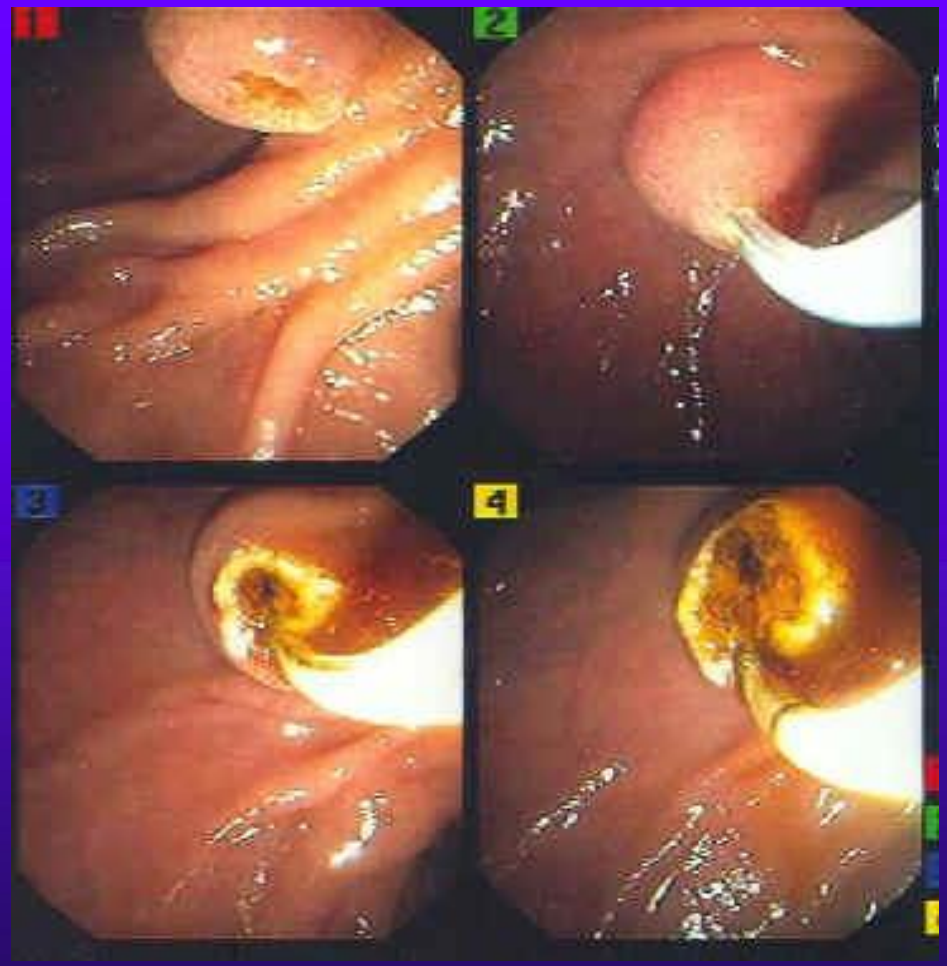
ERCP

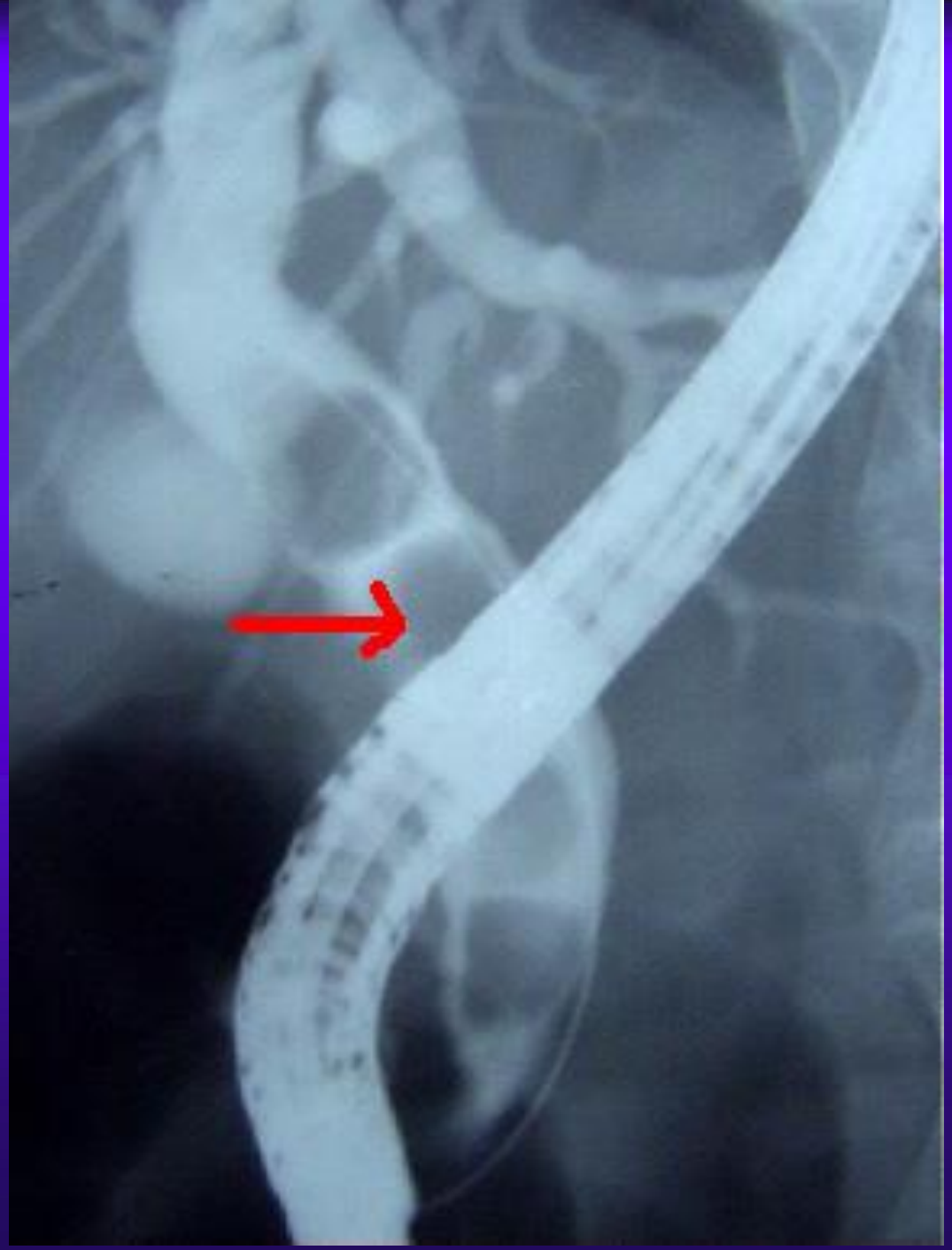
- If confirmed stone in CBD on USS or MRCP proceed to ERCP which will confirm this (diagnostic) and allow extraction of stones and sphincterotomy (therepeutic)

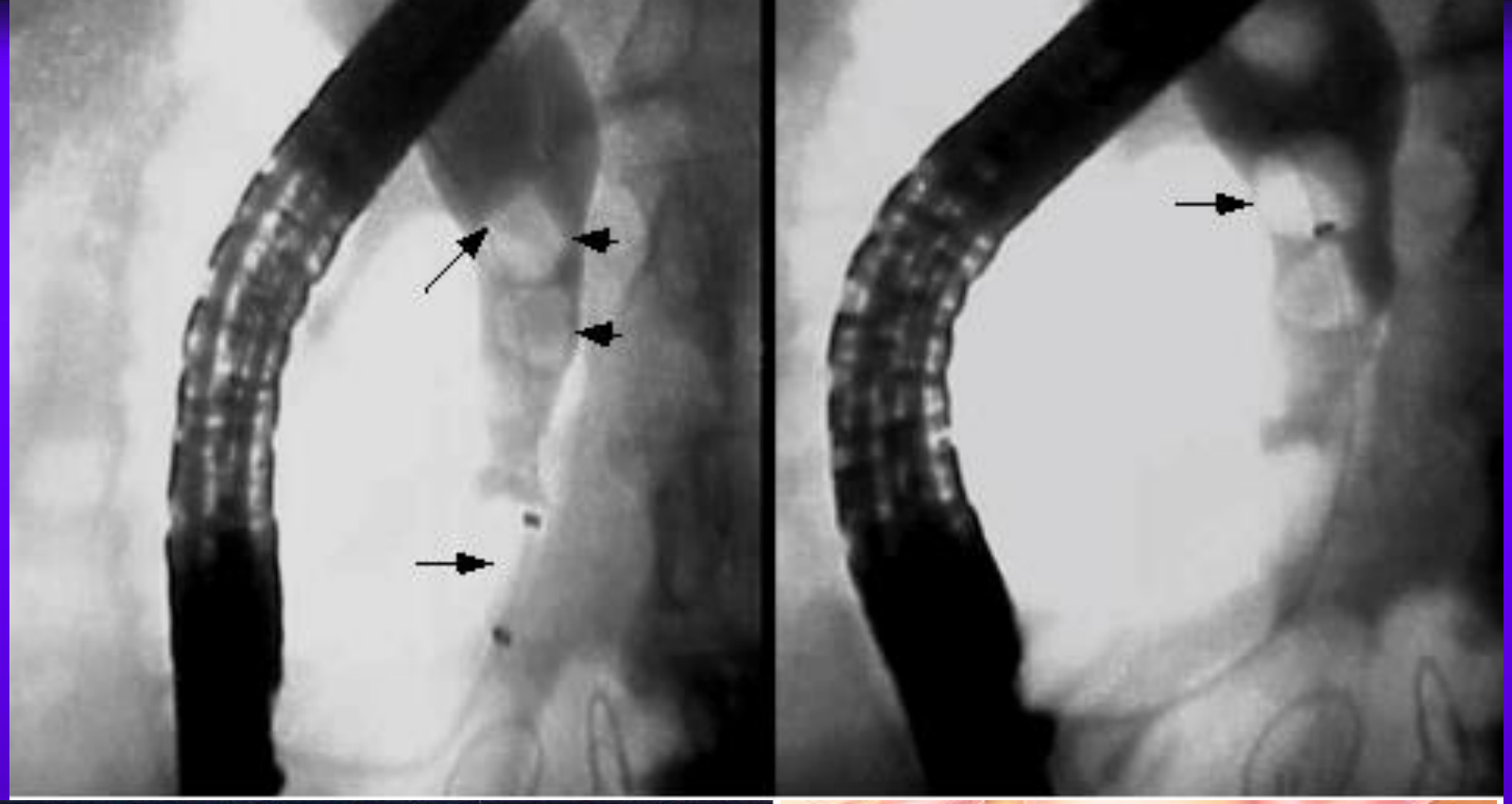
Treatment

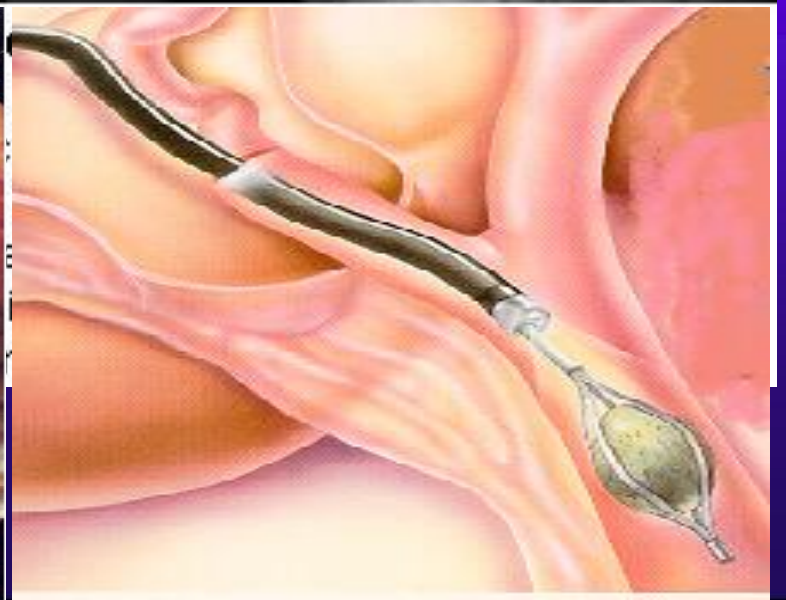
- Must unobstruct biliary tree with ERCP to prevent progression to ascending cholangitis
- Whilst awaiting ERCP monitor for signs of sepsis suggestive of cholangitis

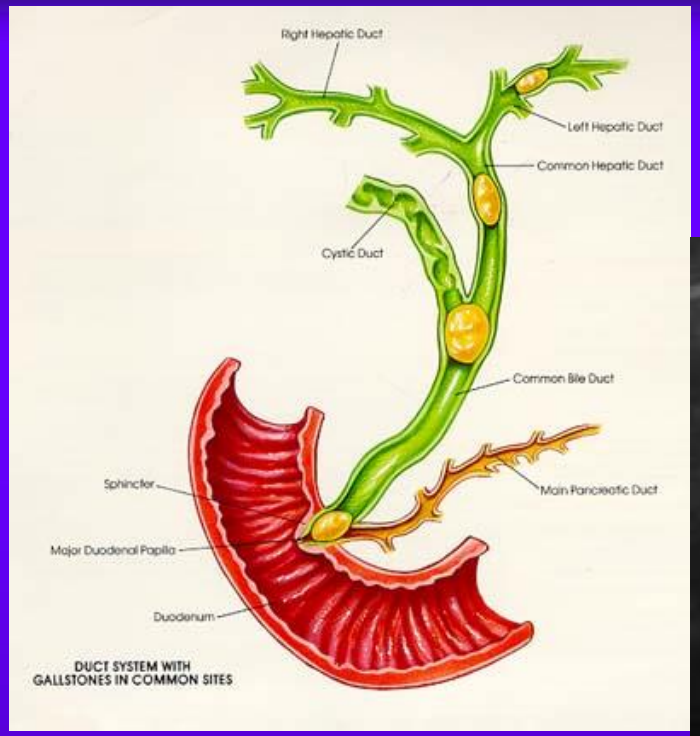
ERCP



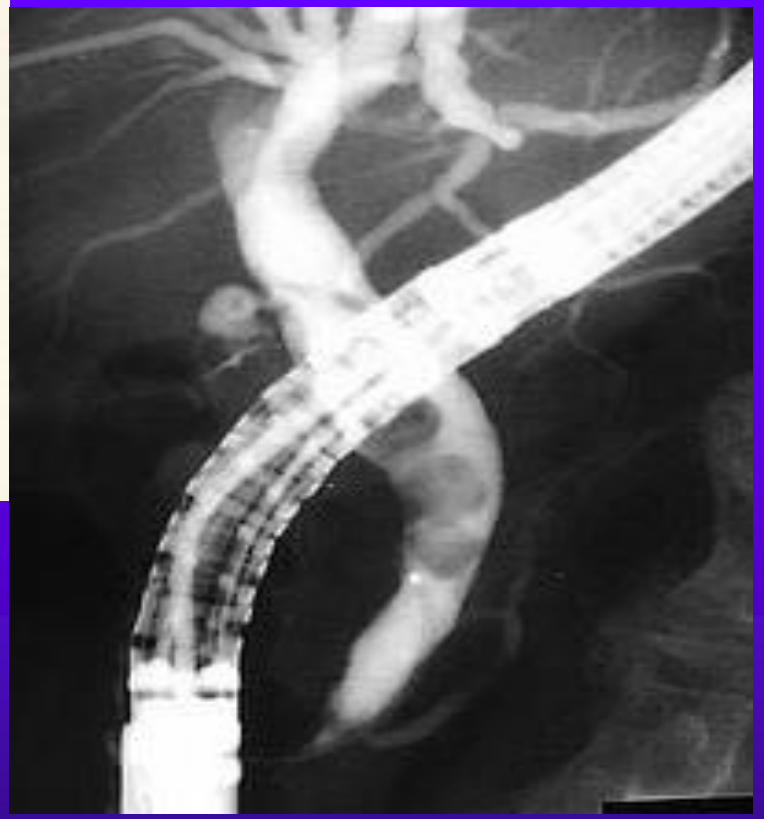


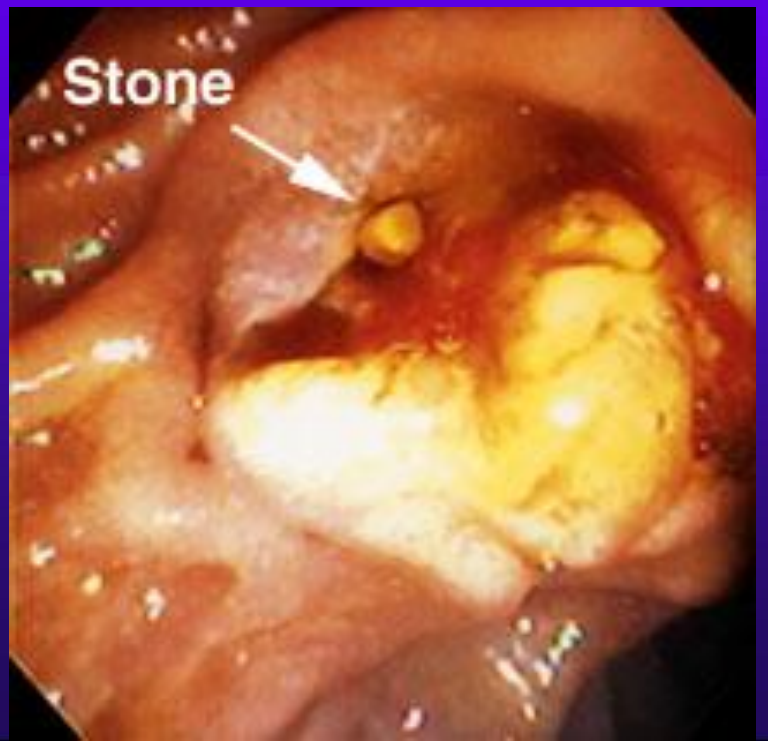






DUCT SYSTEM WITH
GALLSTONES IN COMMON SITES



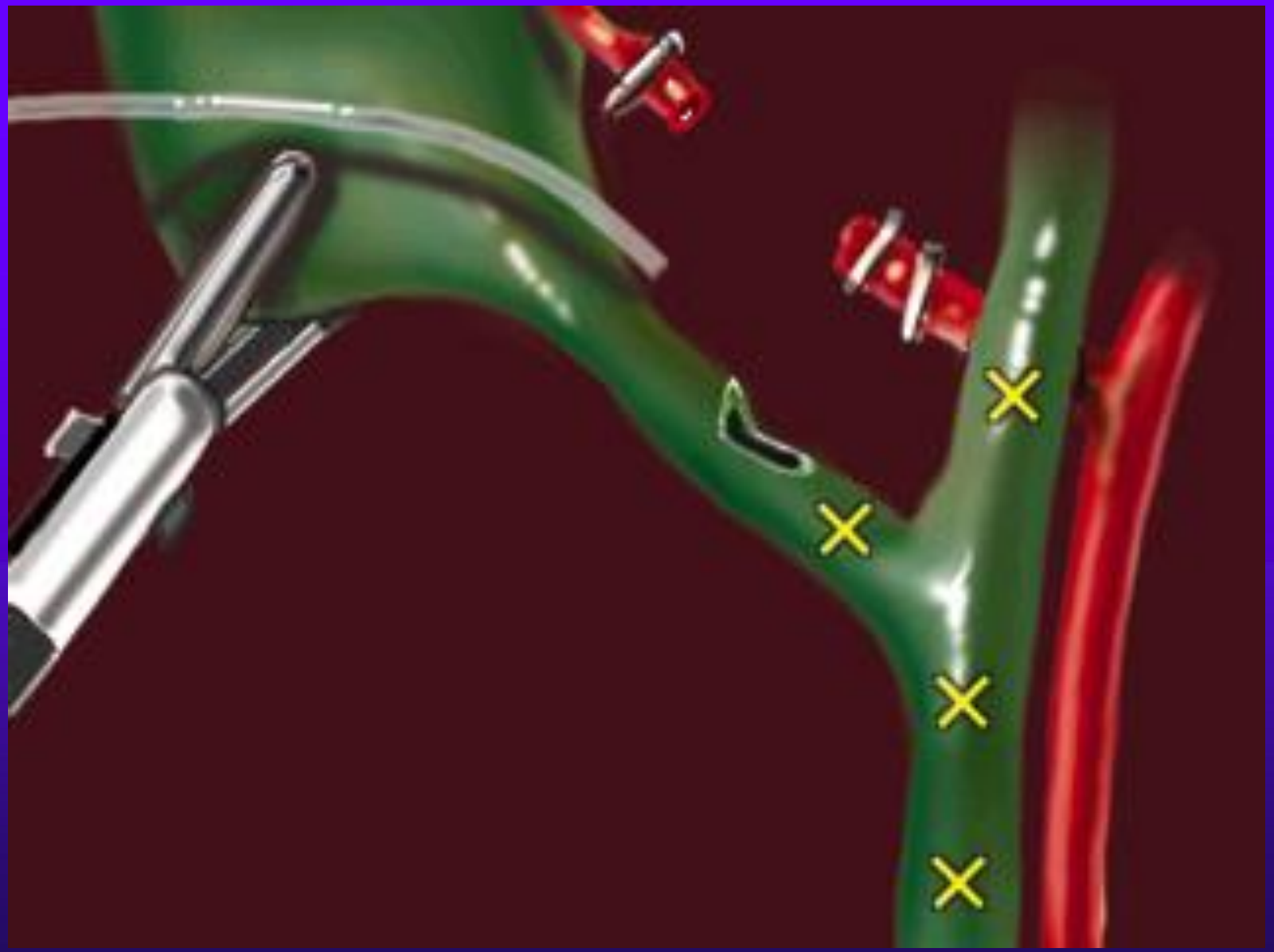


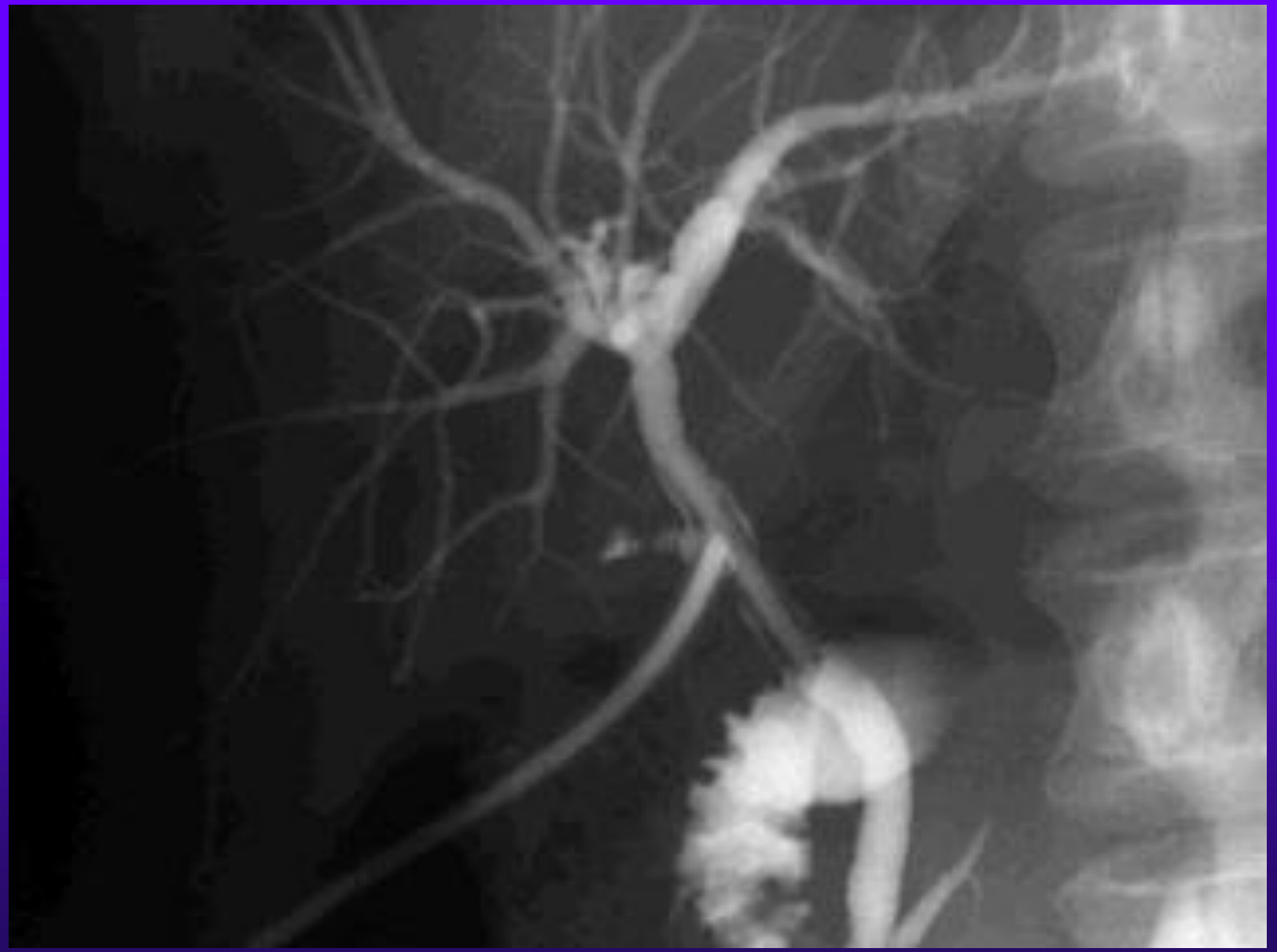
STONE EXTRACTION BY BASKET

STONE EXTRACTION BY BALLON

Cholangitis

- Medical management (successful in 85% of cases):
  - NPO
  - IV Fluids
  - IV AB.
- Emergent decompression if medical treatment fails
  1. ERCP
  2. Percutaneous transhepatic drainage (PTC)
  3. Emergent laparotomy





Complication	History	Examination	Blood tests
Biliary Colic	- Intermittent RUQ/epigastric pain (minutes/hours) into back or right shoulder - N&V	-Tender RUQ -No peritonism -Murphy's - -Apyrexial, HR and BP (N)	-WCC (N) CRP (N) - LFT (N)
Acute Cholecystitis	-Constant RUQ pain into back or right shoulder -N&V -Feverish	-Tender RUQ -Periotnism RUQ (guarding/rebound) -Murphy's + -Pyrexia, HR (↑)	-WCC and CRP (↑) -LFT (N or mildly (↑)
Empyema	-Constant RUQ pain into back or right shoulder -N&V -Feverish	-Tender RUQ -Peritonism RUQ -Murphy's + -Pyrexia, HR (↑), BP (⟷ or ↓) -More septic than acute cholecystitis	-WCC and CRP (↑) -LFT (N or mildly (↑)
Obstructive Jaundice	-Yellow discolouration -Pale stool, dark urine -painless or assocaited with mild RUQ pain	-Jaundiced -Non-tender or minimally tender RUQ -No peritonism -Murphy's - -Apyrexial, HR and BP (N)	-WCC and CRP (N) -LFT: obstructive pattern bili (↑), ALP (↑), GGT (↑), ALT/AST (⟷) -INR (⟷ or ↑)
Ascending Cholangitis	Becks triad -RUQ pain (constant) -Jaundice -Rigors	-Jaundiced -Tender RUQ -Peritonism RUQ -Spiking high pyrexia (38-39) -HR (↑), BP (⟷ or ↓) -Can develop septic shock	-WCC and CRP (↑) -LFT : obstructive pattern bili (↑), ALP (↑), GGT (↑), ALT/AST (⟷) -INR (⟷ or ↑)
Acute Pancreatitis	-Severe upper abdominal pain (constant) into back -Profuse vomiting	-Tender upper abdomen -Upper abdominal or generalised peritonism -Usually apyrexial, HR (↑), BP (⟷ or ↓)	-WCC and CRP (↑) -LFT: (N) if passed stone or obstructive pattern ifstone still in CBD -**Amylase (↑)** -INR/APTT (N) or (↑) if DIC
Gallstone Ileus	- 4 cardinal features of SBO	-distended tympanic abdomen -hyperactive/tinkling bowel sounds	