

# ULTRASOUND OF LIVER AND GALL STONE

(LECTURE 2)

Radiology



# Objectives:

- ▶ Introduction to US.
- ▶ Indications of liver and gall bladder US.
- ▶ Normal anatomy and radiological appearance.
- ▶ Pathology of liver and gall bladder.
- ▶ Common pathological cases.

The image features two large, thick black L-shaped corner brackets. One is positioned in the top-left corner, and the other is in the bottom-right corner. They are oriented towards each other, framing the central text.

# INTRODUCTION TO US

# Definition:

- ▶ a diagnostic technique in which ULTRA=high-frequency sound waves penetrate the body, bounce around, and produce multiple echoes; these echo patterns can be viewed as an image on a computer screen.
- ▶ Frequency ranges used in medical Ultrasound imaging are 2 - 20 MHz

# US machine



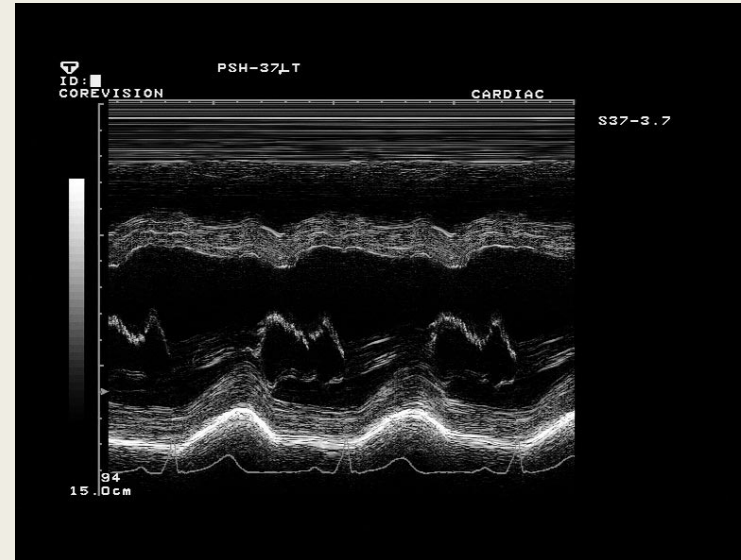
MACHINE



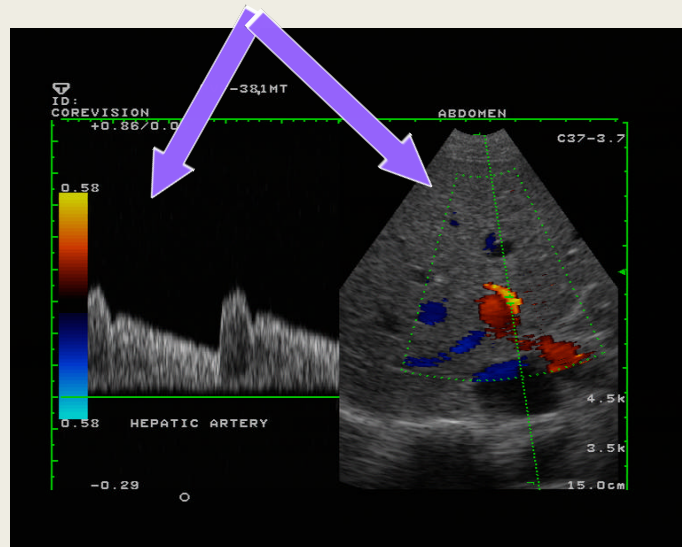
# B- MODE.



# M- MODE.



# DUPLEX



# COLOR DOPPLER



# Advantages of US

- ▶ noninvasive
- ▶ inexpensive.
- ▶ Easy and available.
- ▶ Safe and non-ionizing.

# Disadvantages of US

- ▶ Inability to penetrate gas or bone.
- ▶ Operator dependant.
- ▶ Less sensitive in some situations.



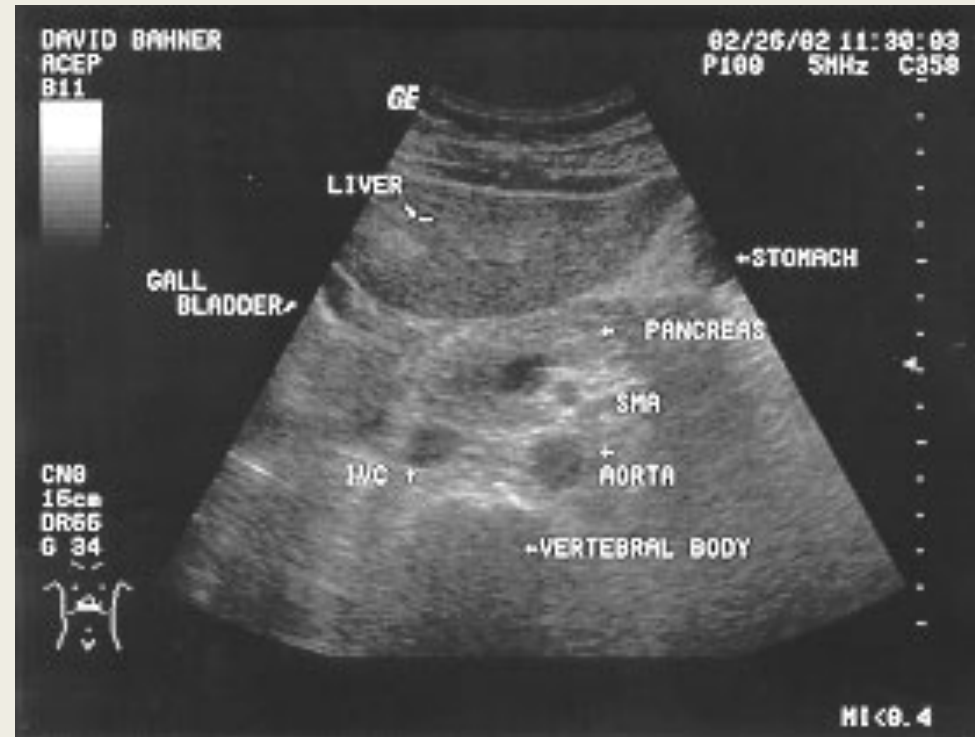
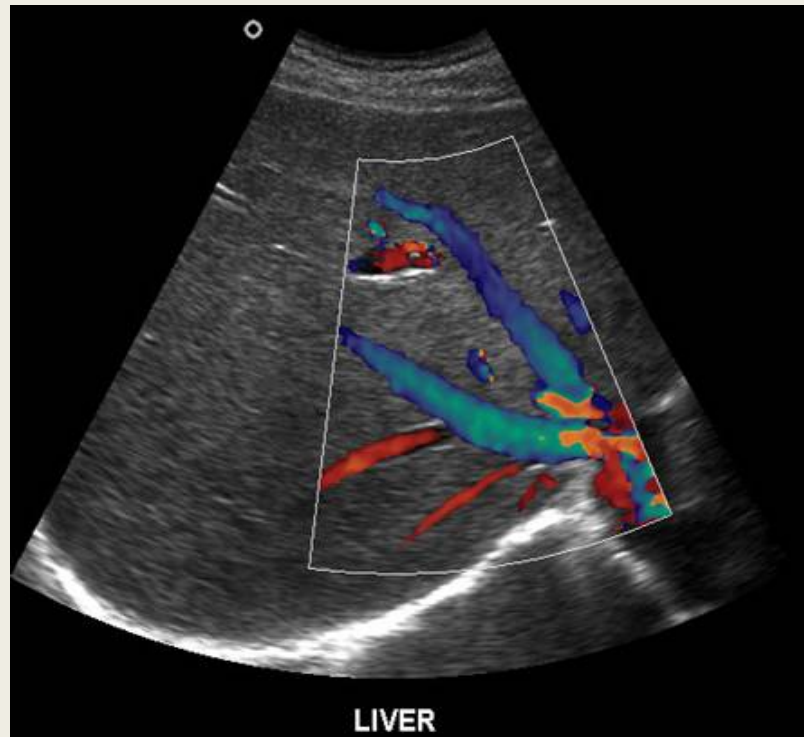
# Indications of liver and gall bladder US

- ▶ Right upper quadrant pain.
- ▶ Jaundice.
- ▶ High liver function test.
- ▶ Fever work up.
- ▶ Screening for metastasis.

# Normal anatomy and radiological appearance



# Cont.



# Pathology of the liver:

- ▶ Size.
- ▶ Diffuse liver disease.
- ▶ Focal liver disease.
- ▶ Hepatic vascularity.
- ▶ Biliary system obstruction/pathology.

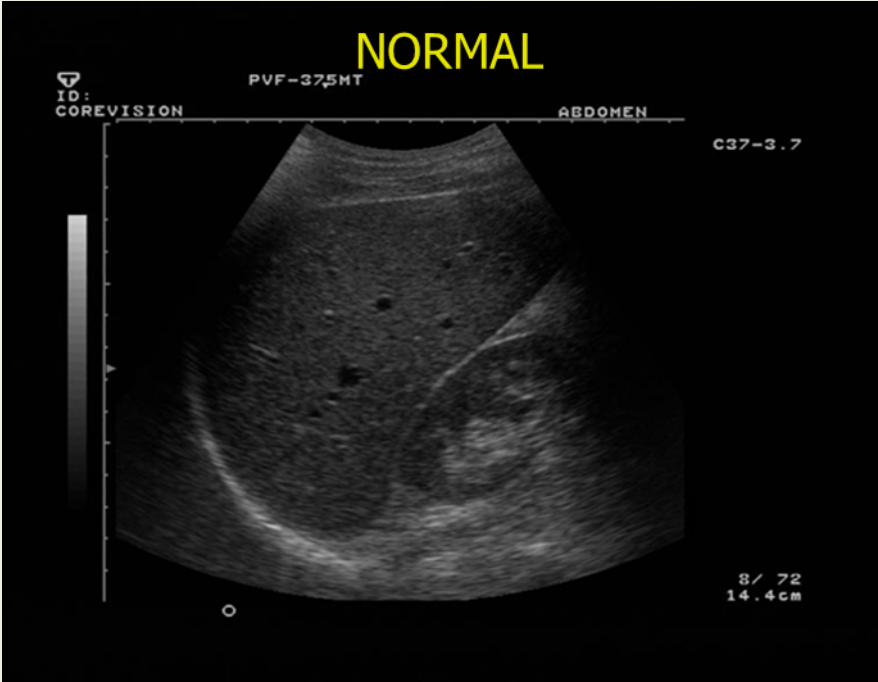
# Size abnormality

- ▶ Normal liver size:



- Myeloproliferative disorder eg. Polycythaemia rubra vera.

# Cont.

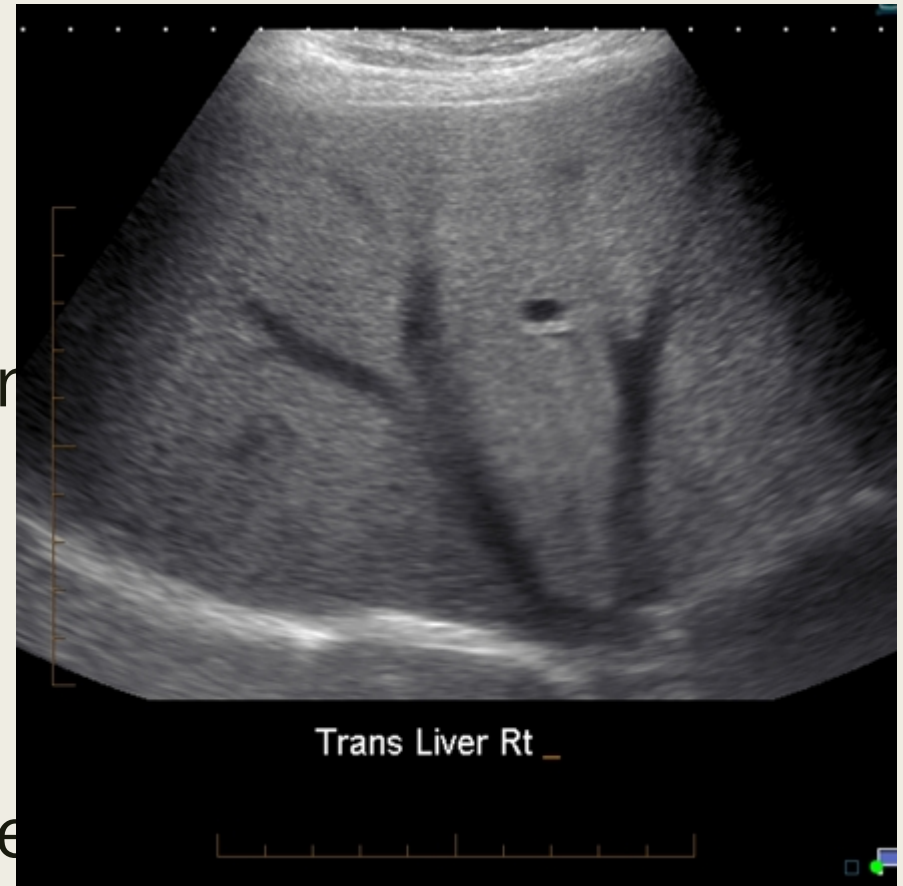


▶ +/- focal lesion.



# Diffuse abnormality

- ▶ Diffuse increase parenchymal echogenicity  
(whiter than normal)
- ▶ Diffuse fatty infiltration
- ▶ Other infiltrative:
  - Malignant
  - Infectious
  - Glycogen storage disease

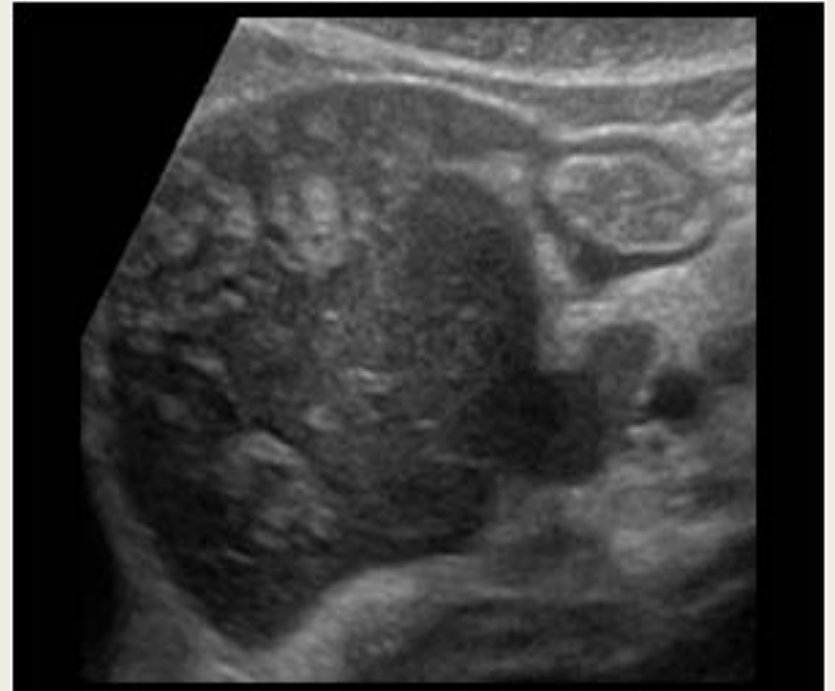


# Cont.

- ▶ Diffuse decrease in parenchymal echogenicity.

(darker than normal)

- ▶ Acute hepatitis.
- ▶ Other:
- ▶ Malignant infiltration.





# Focal liver lesions

- ❑ Benign tumor:

- ▶ Hemangioma.

- ❑ Malignant tumor:

- ▶ Primary eg. Hepatocellular carcinoma.

- ▶ Secondary metastasis eg. Colon breast.

- ❑ Infective:

- ▶ Abscess

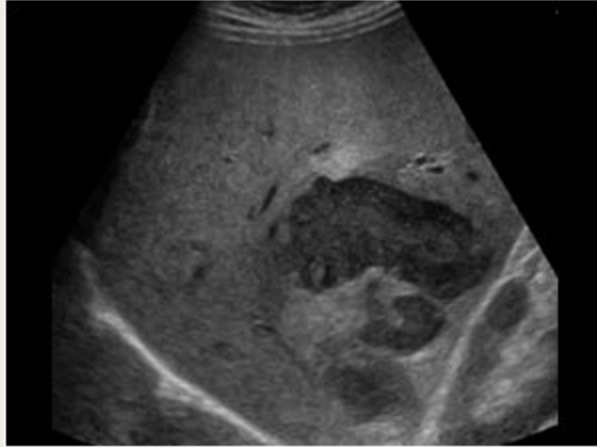
- ▶ hydated cyst.

- ❑ Congenital:

- ▶ Hepatic cyst.

# Cont.

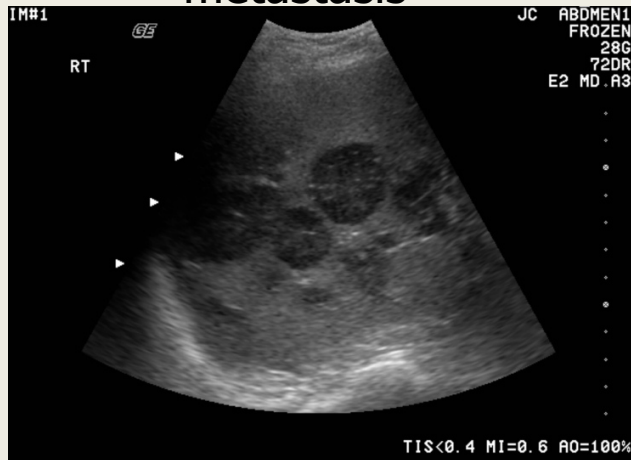
Liver abscess



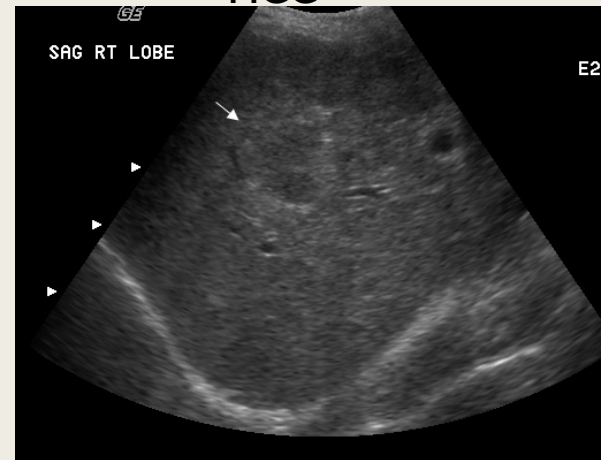
hemangiomas



metastasis



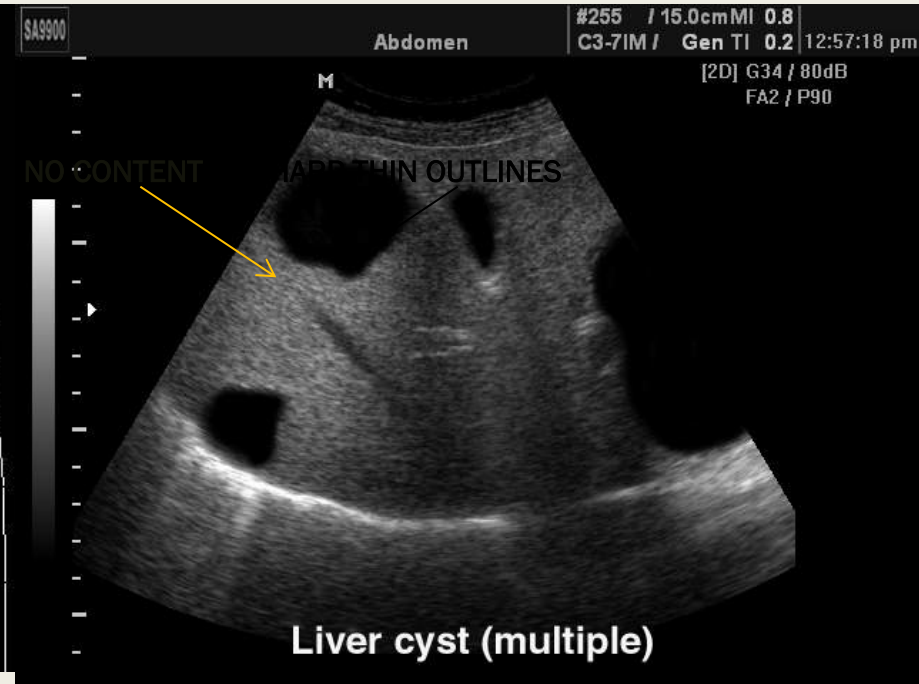
HCC



# Cont.



Hydatid cyst



# Vascular abnormality

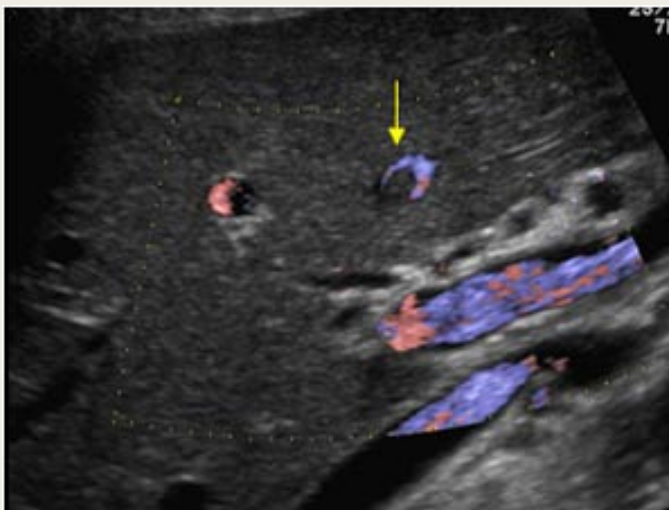
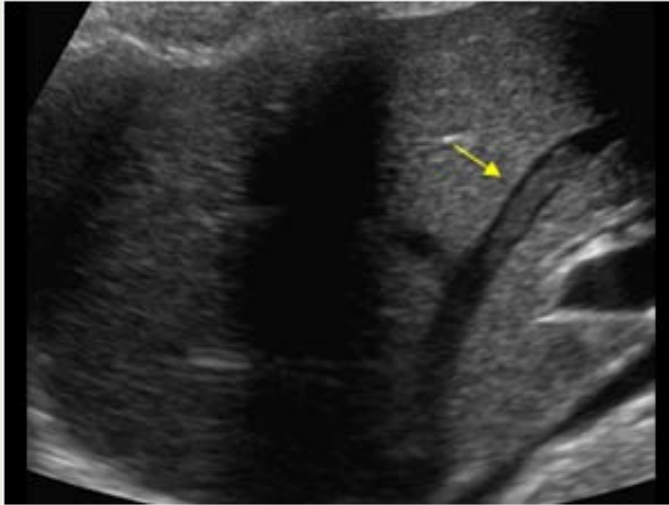
## ❑ Portal venous system:

- ▶ thrombosis.
- ▶ Portal hypertension.

## ❑ Hepatic venous system:

- ▶ Thrombosis
- ▶ (Budd Chiari syndrome).

# Cont.



Hepatic vein thrombosis



PV thrombosis

# Biliary abnormality

- ▶ Intra-hepatic biliary radicals.

Less than 3mm

- ▶ Extra-hepatic “CBD”

Less than 8mm

- ▶ Causes of dilatation & obstruction:

- o Intra-luminal:

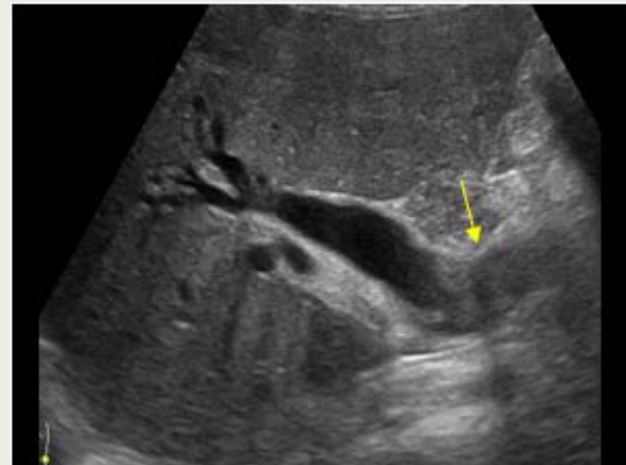
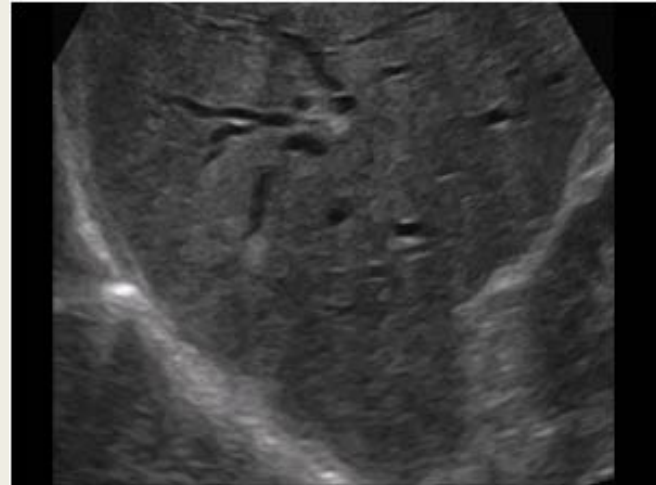
- ✓ Stone & mass.

- o Mural:

- ✓ stricture (benign & malignant)

- o Extrinsic:

- ✓ Compression mass & Lymph node

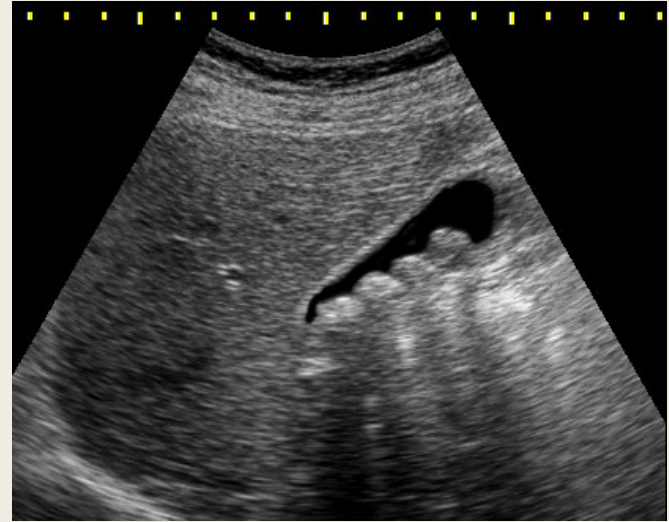


# Pathology of gall bladder

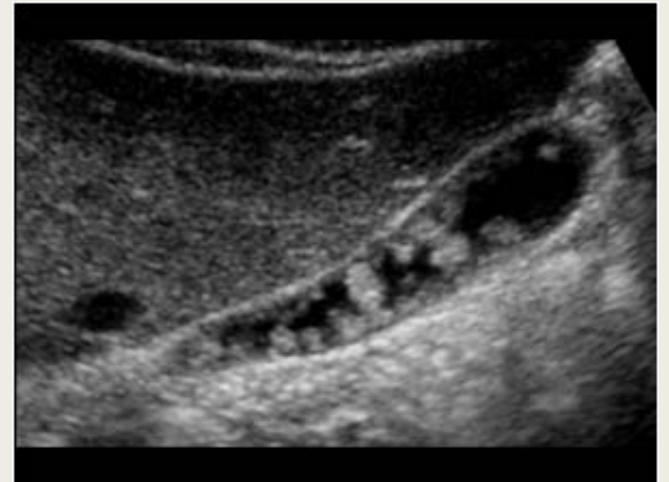
- ▶ Intra-luminal pathology.
- ▶ Mural pathology.

# Intra-luminal pathology

▶ Gall stone:  
Acoustic shadowing



▶ Polyps  
No acoustic shadowing.





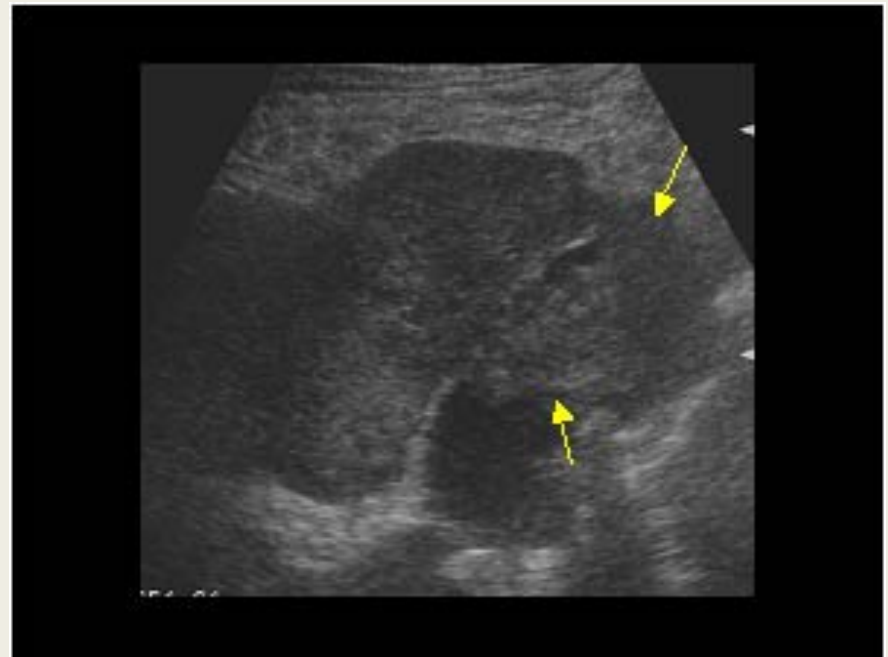
# Cont.

## ▶ Intraluminal:

Mass lesion

+/- invasion

Gall bladder carcinoma.



# Mural pathology

□ Mural thickening:

➤ Primary:

Cholecystitis.

➤ Secondary:

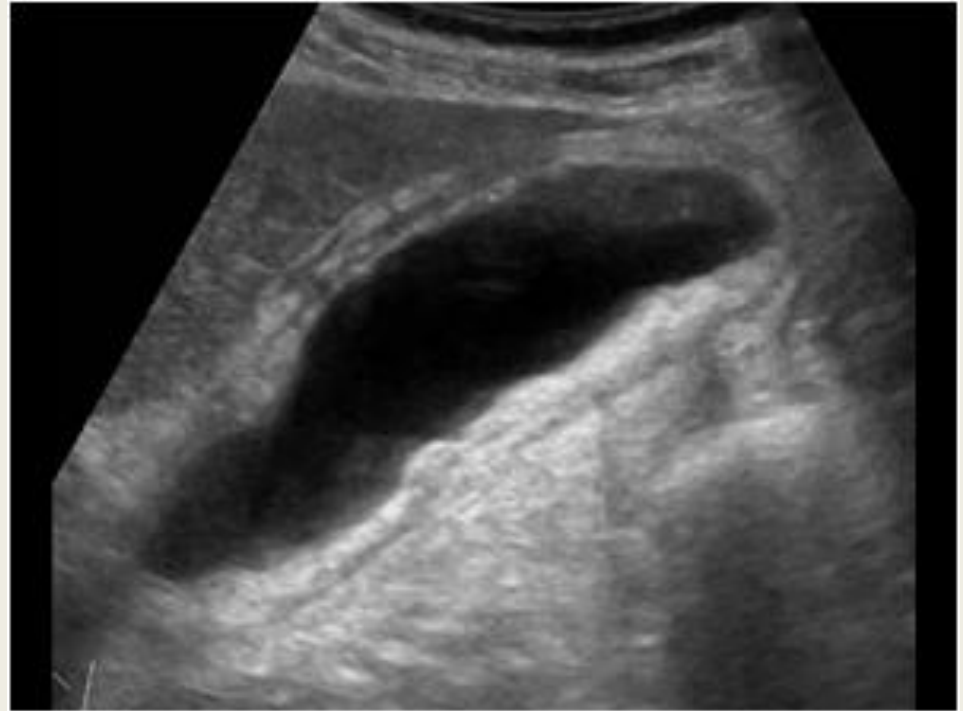
✓ Cardiac failure.


✓ Cirrhosis.

✓ ascites

✓ Hypoalbuminaemia

✓ Renal failure.



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# COMMON PATHOLOGICAL CASES

# Case one

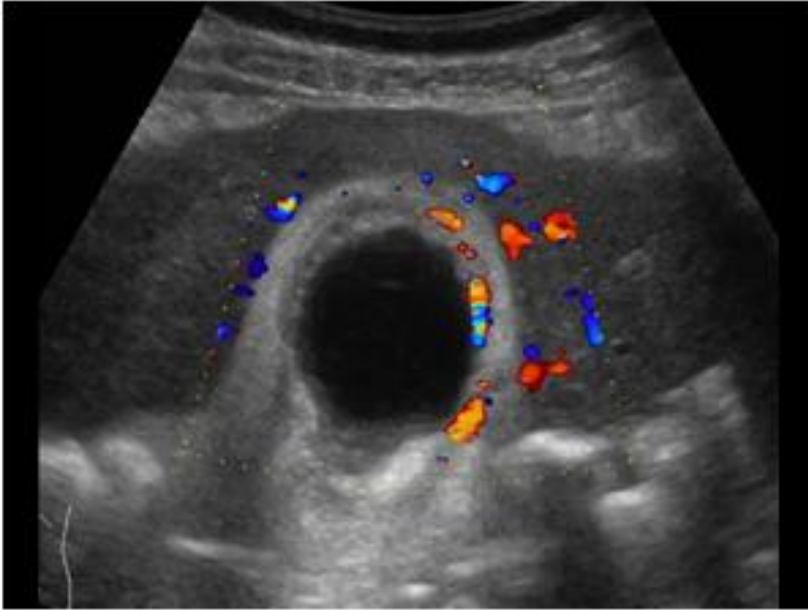
- ▶ Middle age women presented to ED with fever, RUQ pain
- ▶ On exam

She looks ill, febrile and on pain

Abdomen: RUQ tenderness

- ▶ Lab high LFTs & WBC.

# Cont.

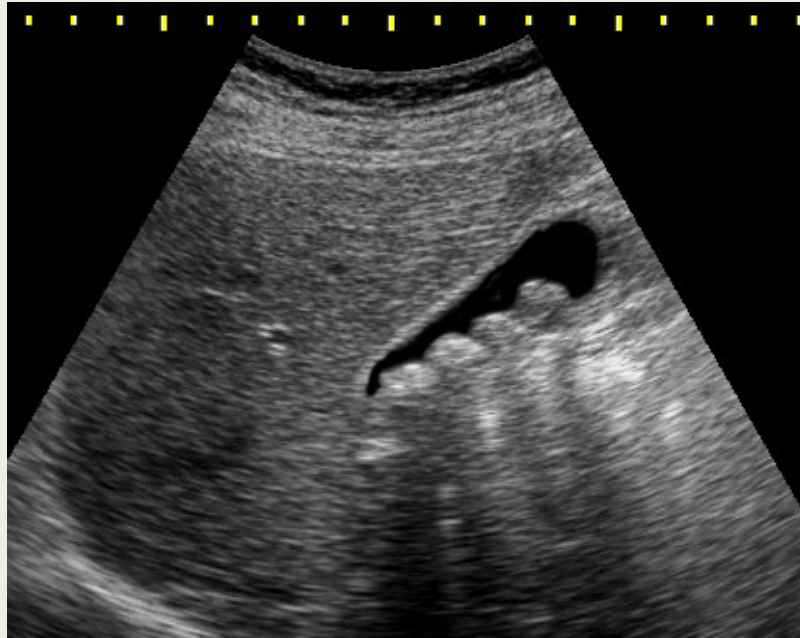


- ▶ Thickening of GB wall  $>3\text{mm}$ .
- ▶ Distended GB
- ▶ Pericholecystic fluid.
- ▶ Hyperemia.
- ▶ Gall stone
- ▶ Acute calcular cholecystitis.

# Case two

- ▶ Middle age women presented to surgical out patient clinic with 2 years history of recurrent RUQ pain mild to moderate in severity radiated to the right shoulder aggravated by fatty meal.
- ▶ On exam:  
obese lady well not distressed, febrile or jaundiced.
- ▶ Lab LFTs normal.

# Cont.



- ▶ Multiple oval shaped echogenic structures seen within GB causing acoustic shadowing
- ▶ GB stones

# Case three

- ▶ Middle age man presented to ER with severe RUQ pain and yellowish discoloration of skin and sclera.

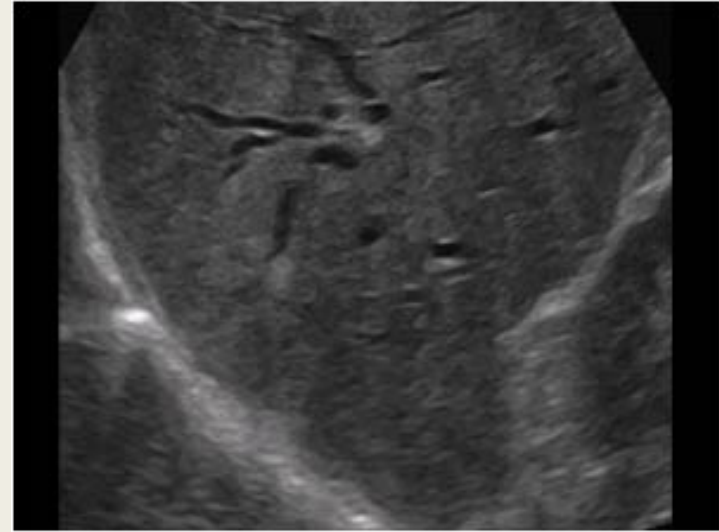
- ▶ On exam:

he looks ill, jaundiced and on pain but not febrile

- ▶ Lab high LFTs.



# Cont.



- ▶ Dilated intra-hepatic and extra-hepatic biliary system
- ▶ Echogenic structure seen within CBD
- ▶ CBD stone causing biliary obstruction.

# Case four

- ▶ Old man recently discovered to have colonic cancer presented to primary health care clinic with vague upper abdominal pain

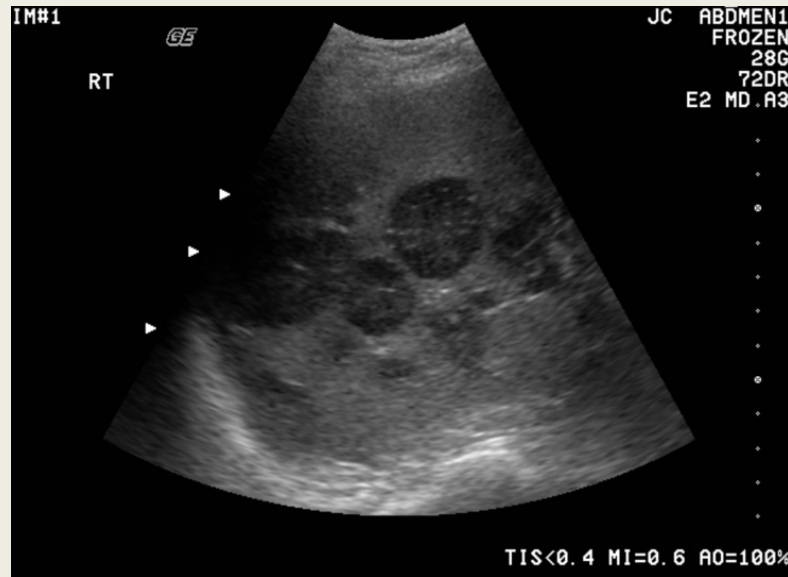
- ▶ On exam:

he was thin, ill not febrile or jaundiced.

Mild abdominal tenderness enlarged liver with irregular outline.

- ▶ Lab mildly elevated LFTs.

# Cont.



- ▶ Multiple hypoechoic focal hepatic lesions
- ▶ Metastatic liver lesions.

# Case five

▶ Middle age man known case of HCV+ for 10 years presented to GI out patient clinic with history of weight loss, indigestion and mild abdominal pain. No fever.

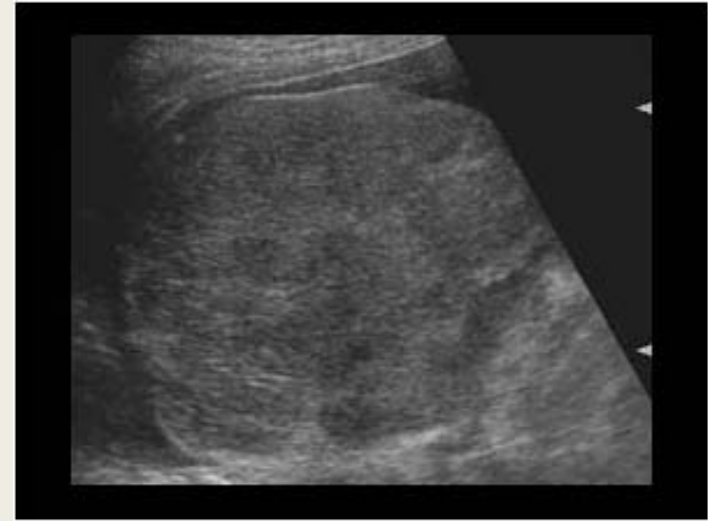
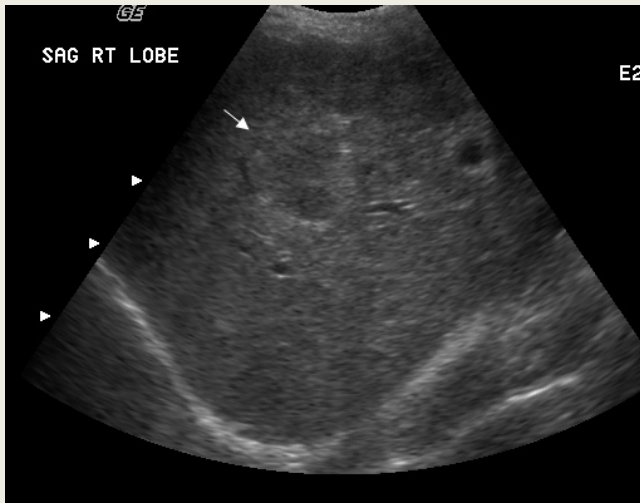
▶ On exam:

he was ill, slim ,mildly jaundice not febrile.

Abdomen: bulging flanks, dilated tortuous vessels around umbilicus. Mild diffuse abdominal tenderness.

▶ Lab high LFTs.

# Cont.

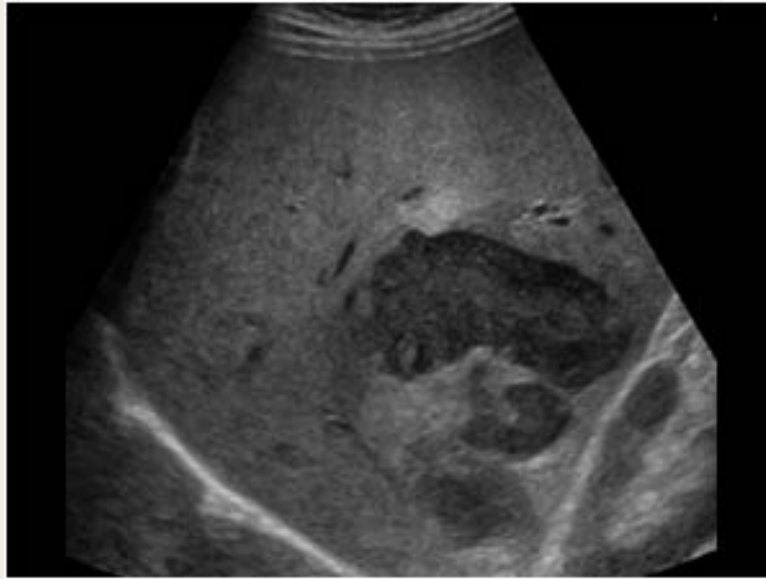


- ▶ Shrunken liver with irregular outline.
- ▶ Heterogeneous appearance.
- ▶ Focal hypoechoic lesion.
  
- ▶ Cirrhotic liver with HCC.

# Case six

- ▶ Young man known IV drug addict presented to ER with high fever, chills, upper abdominal pain and vomiting
- ▶ On exam:
- ▶ He looks very ill, febrile and on pain.
- ▶ Abdomen: RUQ tenderness.
- ▶ Lab high LFTs & WBC.

# Cont.



- ▶ Focal hypoechoic liver lesion with ill defined outline.
- ▶ Liver abscess.



thank you

Radiology:  
The Eye of  
Medicine