Workshop

Abdominal and Renal Ultrasound in the Emergency Department

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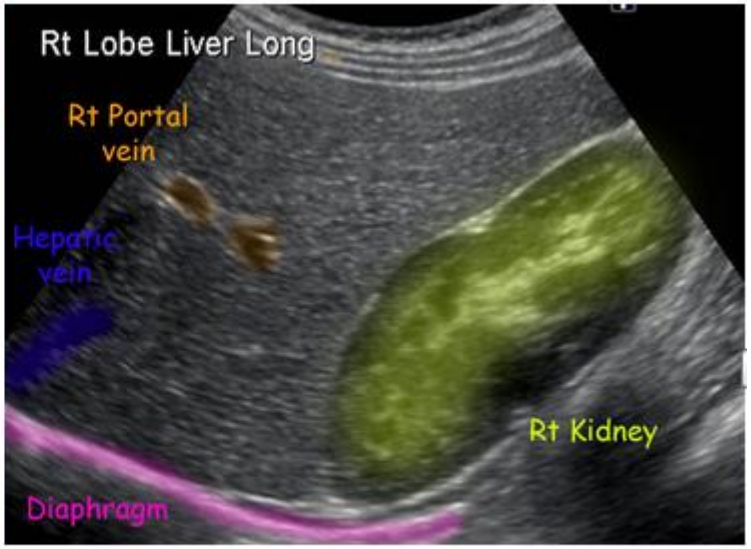
Liver USG

- Medium echotexture with smooth capsule
- Hepatic vein are anechoic tubular structure
- Main portal vein and portal triad are surrouding echogenic fat
- End stage liver cirrhosis
  - Small liver with nodular surface
  - Heterogenously increase echotexture

Scanning Technique

- full sweep
- deep inspirations : fully visualize the superior borders
- Look in transverse up
  - left lobe from a Subcostal approach
  - right lobe subcostally or Intercostally
- Look For:
  - Homogeneous VS Attenuative (normal VS fatty)
  - Smooth VS coarse echotexture

Parasagittal Scan Plane



The Liver and Rt Kidney are visualised in this view.

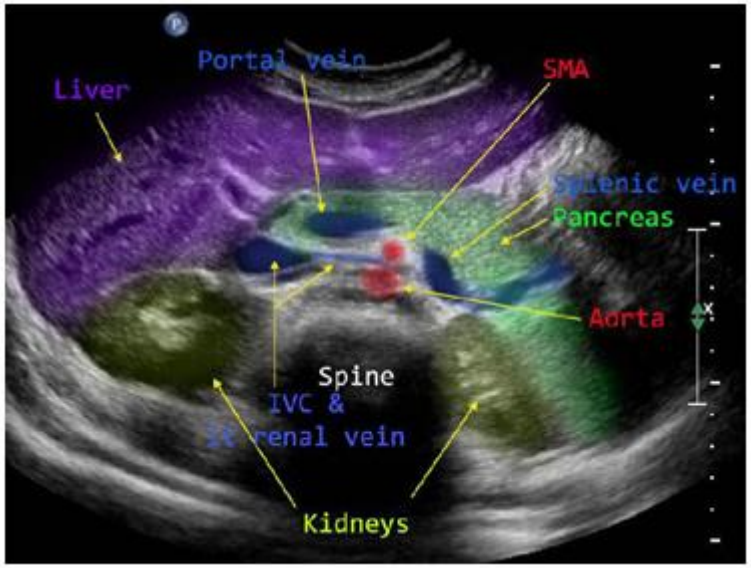
Intercostal Scan Plane

The Middle and Rt Hepatic Vein are visualised in this view.

Subcostal Scan Plane. The probe is angled cephalad under the ribs to avoid any bowel or ribs shadowing over the liver.

Rt Portal Vein is shown coursing transversely in this view

The probe is in the epigastric region just below the sternum. The probe may need to be angled towards the left side to see the most medial edge of the left lobe.



Normal Anatomy seen in the Transverse View of the Left Lobe.

Cine clip of left lobe liver, sagittal plane

Common Pathology

Fatty liver / Liver cysts / Haemangioma / Abscess / HCC

- liver echogenicity exceeds that of renal cortex and spleen
- loss of definition of the diaphragm, and poor delineation of the intrahepatic

Common Pathology

Fatty liver / Liver cysts / Haemangioma / Abscess / HCC

- round or ovoid anechoic lesion (may be lobulated)
- well-marginated with a thin wall and a clearly defined back wall

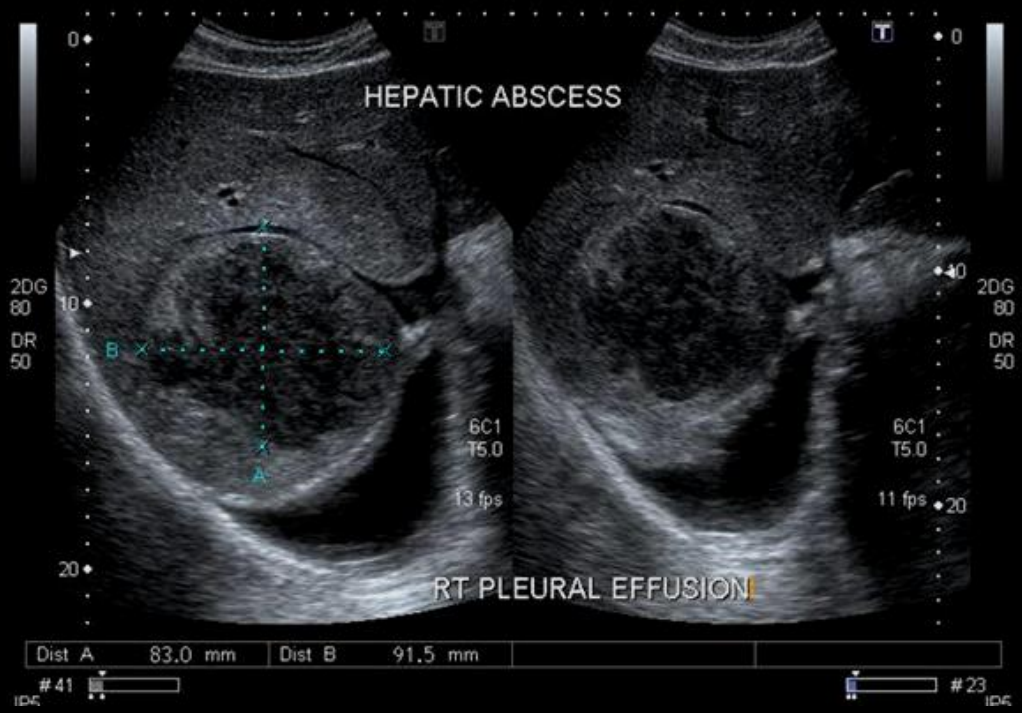
Common Pathology

Fatty liver / Liver cysts / Haemangioma / Abscess / HCC

- typically well defined hyperechoic lesions
- colour Doppler : may show peripheral feeding vessels

Common Pathology

Fatty liver / Liver cysts / Haemangioma / Abscess / HCC



- Typically poorly demarcated with a variable appearance, ranging from : hypoechoic , hyperechoic or Gas bubbles
- Colour Doppler will demonstrate absence of central perfusion

Common Pathology

Fatty liver / Liver cysts / Haemangioma / Abscess / HCC

- Typically poorly demarcated with a variable appearance, ranging from : hypoechoic , hyperechoic or Gas bubbles
- Colour Doppler will demonstrate absence of central perfusion

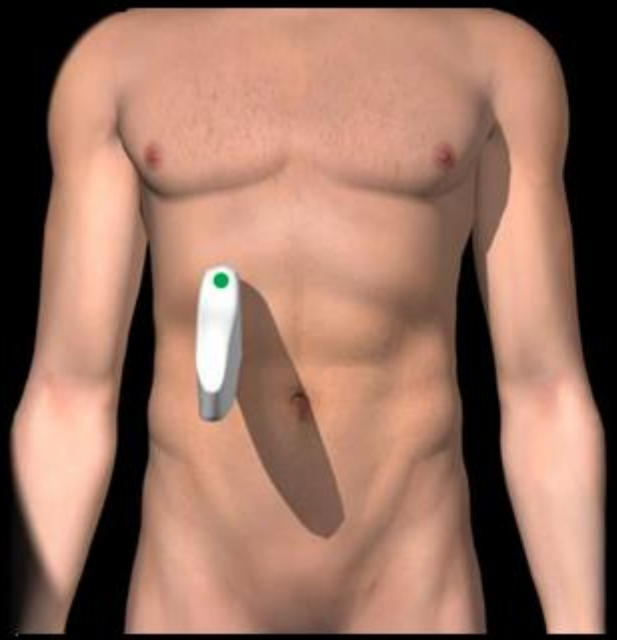
Cine clip of hypoechoic liver abscesses.

Common Pathology

Fatty liver / Liver cysts / Haemangioma / Abscess / HCC

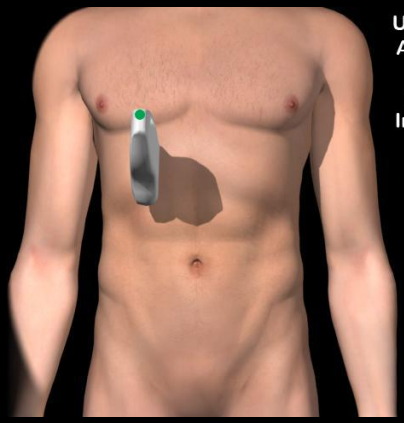
- small focal HCC : hypoechoic compared with normal liver
- Larger : heterogeneous due to fibrosis, fatty change, necrosis and calcification
- Diffuse HCC may be difficult to identify or distinguish from background cirrhosis

The Gall bladder ultrasound



Gallbladder localization : Long axis

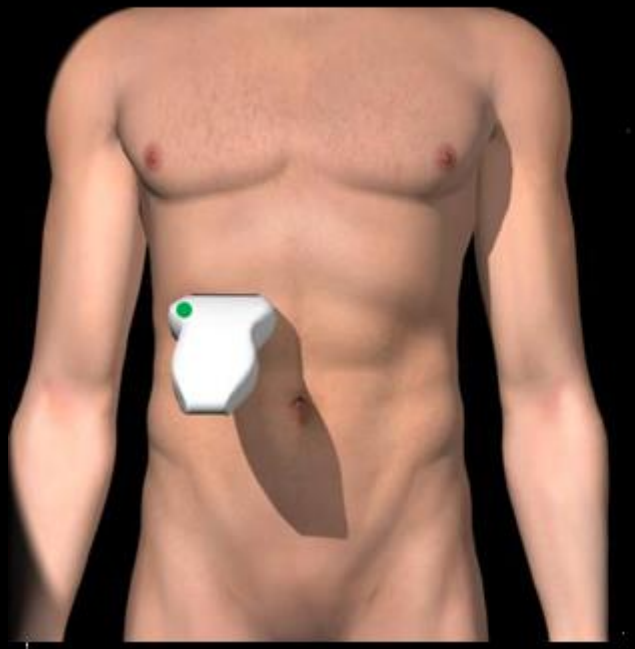
- Start with probe indicator at 12:00 directed towards patient's right shoulder
- Sweep from midline to right lateral immediately below right costal margin
- Images may improve with a held deep inspiration



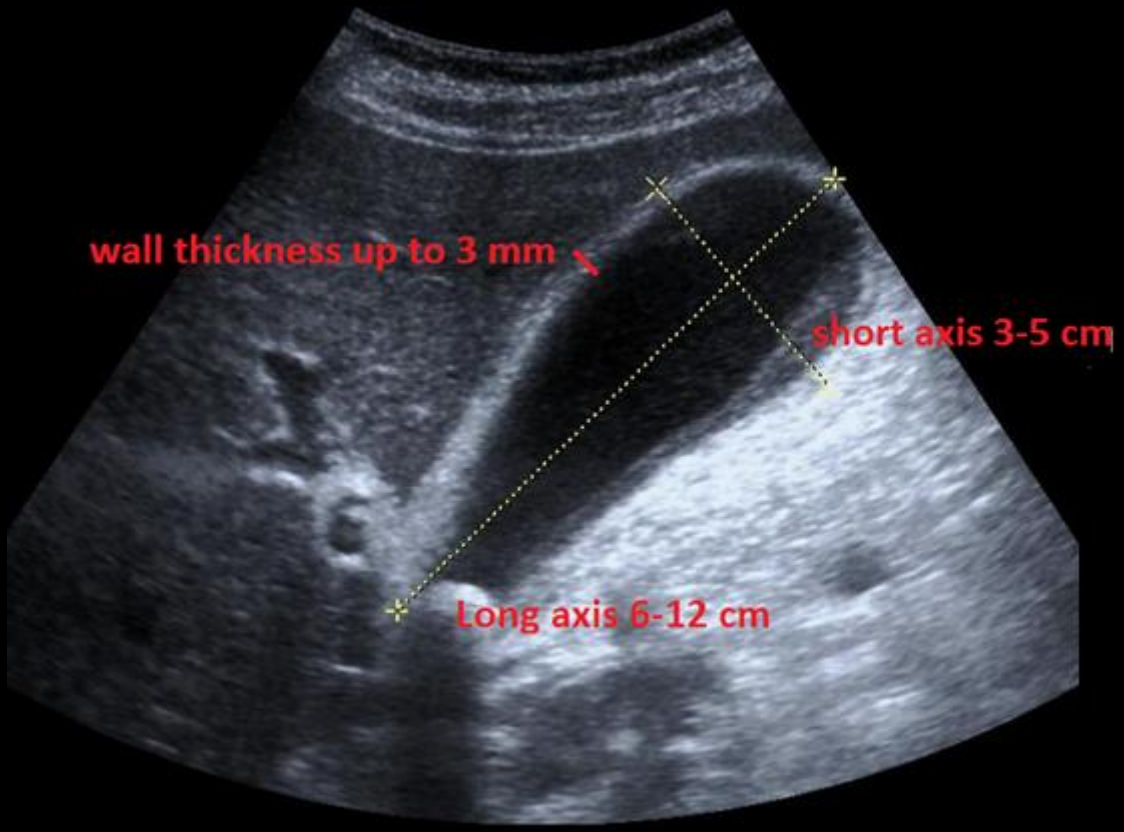
Scanning Technique

Gallbladder localization: Short axis or transverse approach

- Start with probe indicator at 9:00 directed towards patient's right shoulder
- Gradually tilt probe through an arch from head to foot



The normal GB



Long axis 6-12 cm , short

axis 3-5 cm

Contracted < 5 cm

Wall thickness 3 mm

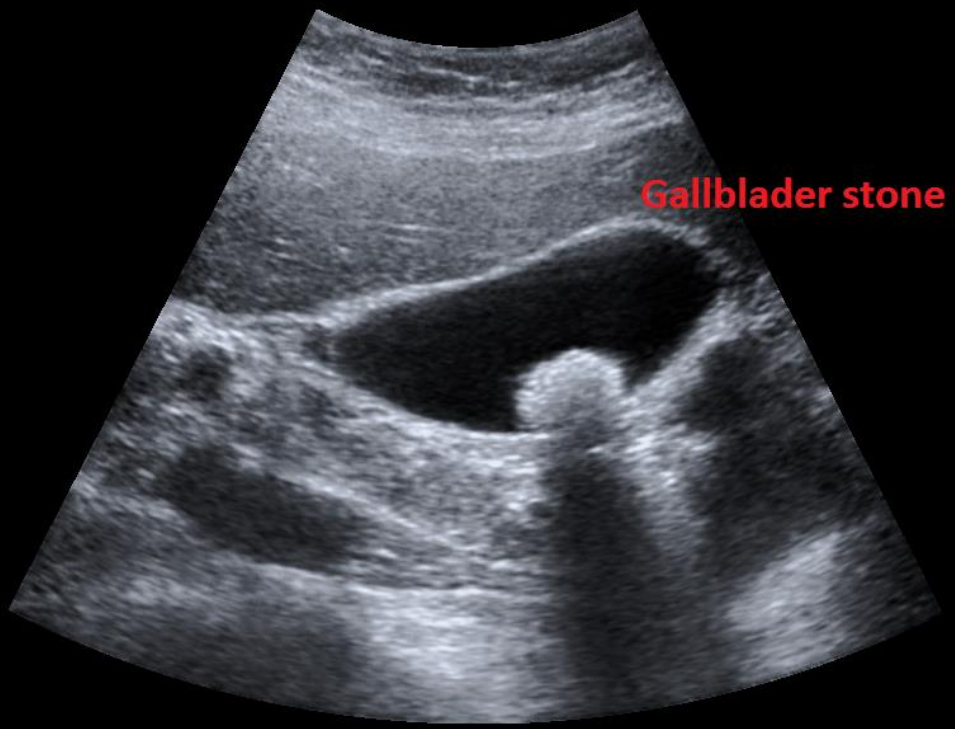
Distended > 12 cm c NPO

Common Pathology of GB

- Wall thickness
  - Measured in the side in contact with the liver, Normally up to 3 mm
  - 3-5 mm >>> suspect thick wall
  - More than 5 mm >>> It is a thick wall gall bladder which is seen in **Cholecystitis (acute-chronic), Ascites, Hepatitis (viral)**
- Contents
  - Stones
  - Mud (infected bile)
  - Thick bile
  - Parasite
  - Cancer & polyps

Common Pathology of GB

Gall bladder stone



- echogenic and when >3 mm result in shadowing
- mobile and will move when patient changes position (contrast with immobile polyps)

Common Pathology of GB

Gall bladder stone

- echogenic and when >3 mm result in shadowing
- mobile and will move when patient changes position (contrast with immobile polyps)

Cine clip of gallbladder with shadowing stones

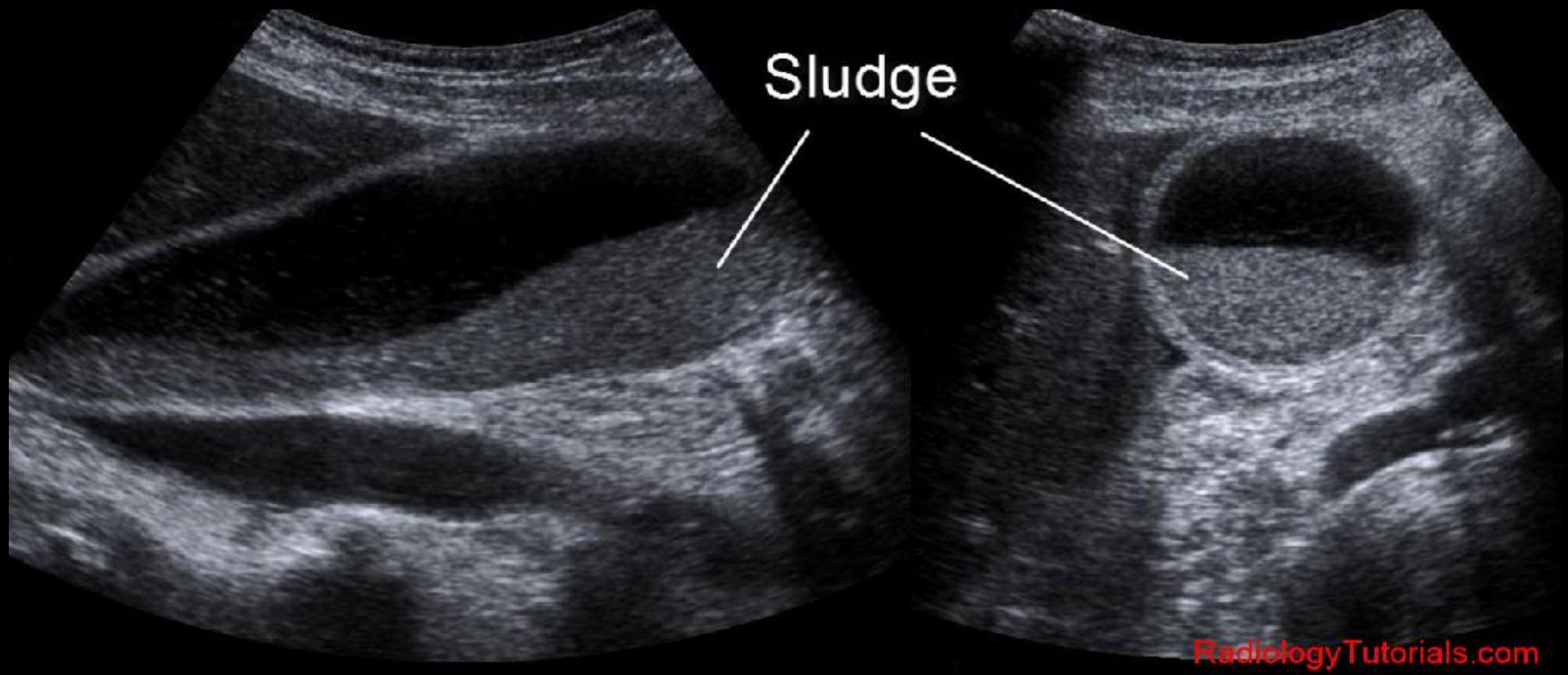
Common Pathology of GB

Acute cholecystitis

- most sensitive cholelithiasis + sonographic Murphy sign
- GB wall thickening (>3 mm) and pericholecystic fluid are secondary findings
- less specific findings : gallbladder distension and sludge

Common Pathology of GB

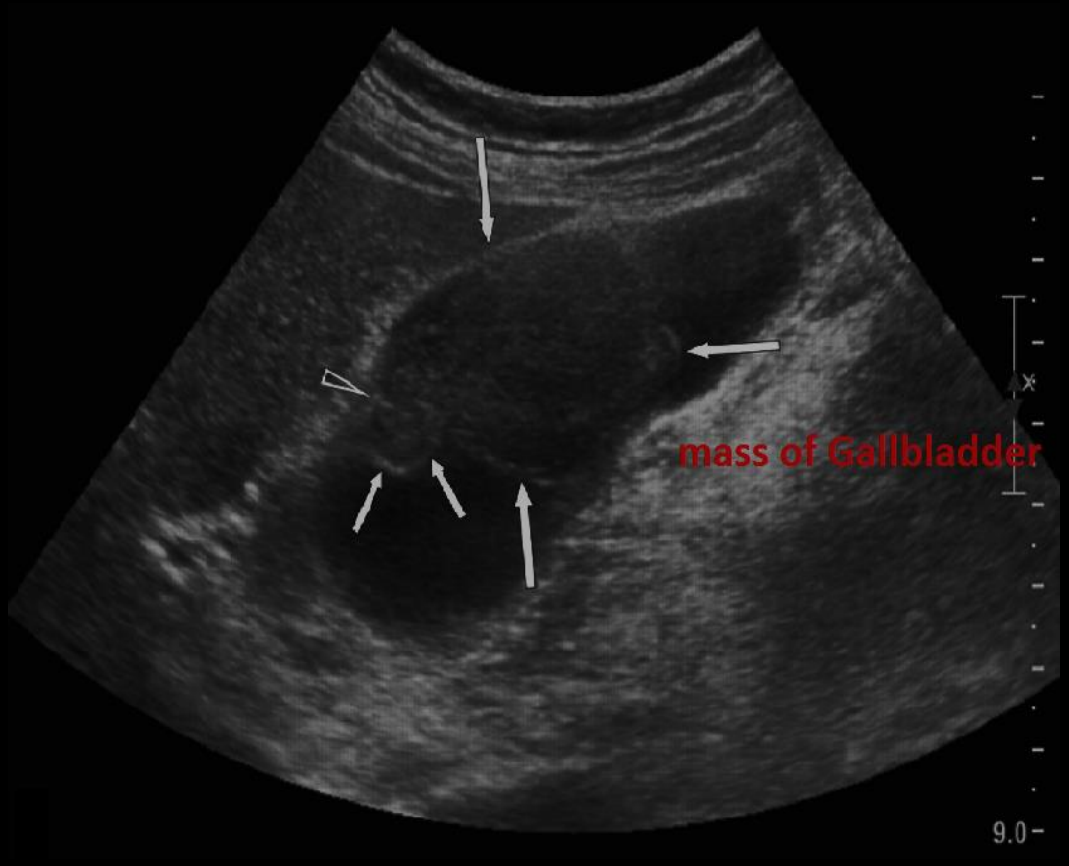
Gall bladder sludge



- Change with changing position with or without presence of stones

Common Pathology of GB

mass of Gall bladder



- Polypoidal or heterogeneous mass

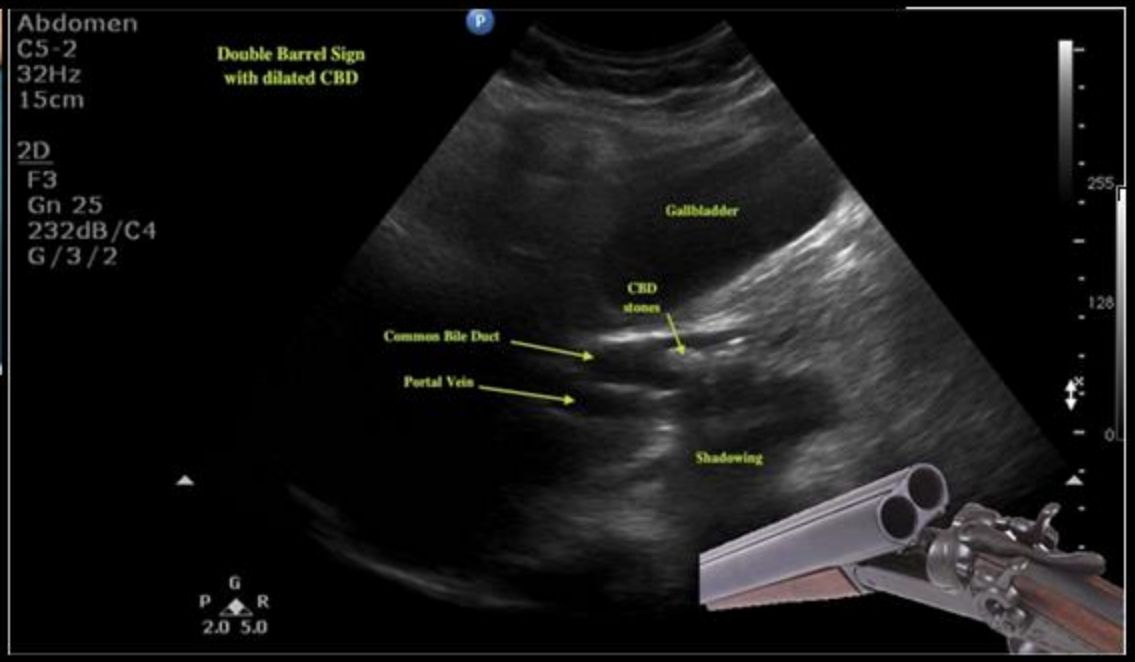
Ultrasound based diagnosis of jaundice

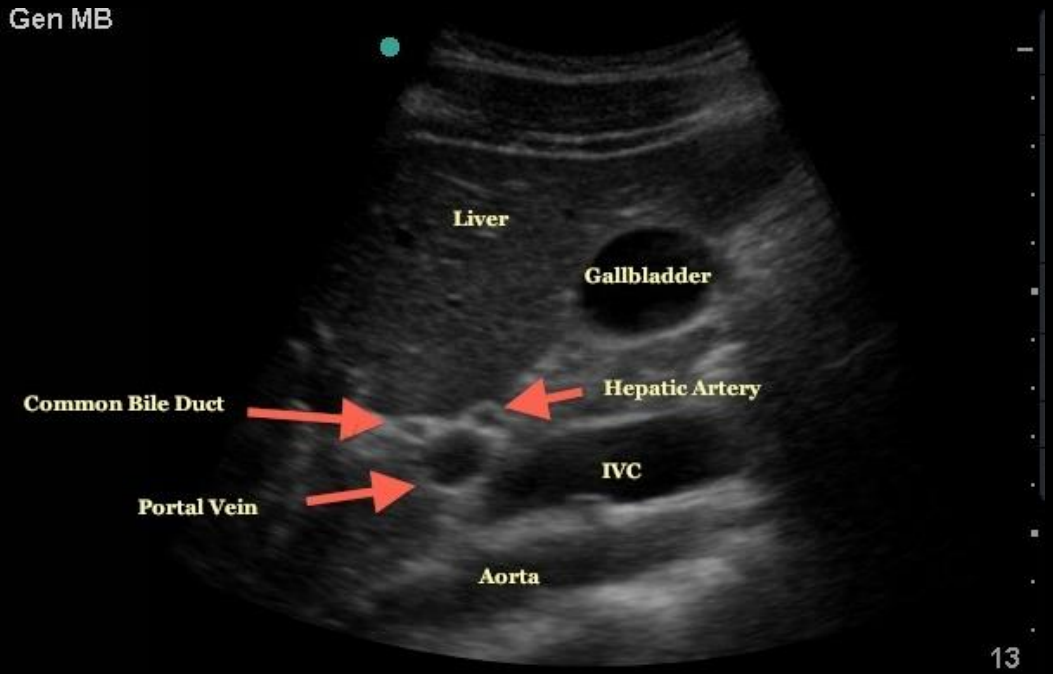
Ultrasound based diagnosis of jaundice

- no duct dilatation either in the liver or in the extrahepatic bile ducts→ medical jaundice eg. viral hepatitis, drug induced cholestasis or hepatitis, metabolic disorders, autoimmune hepatitis and so on
- Intrahepatic ducts dilated but extrahepatic duct is collapsed and non-dilated → cause of obstruction is at the hilus of the liver eg. CHCA , primary sclerosing cholangitis and gall bladder cancer

Ultrasound based diagnosis of jaundice

- Intrahepatic and extrahepatic duct dilated→ obstruction must be at the lower end of the common bile duct eg. ductal gall stones and pancreatic cancer
- Image “Mickey” then turn the probe 90 degrees so the portal vein and CBD are seen in long axis
- CBD just superior to the portal vein (normal CBD is 4 mm)

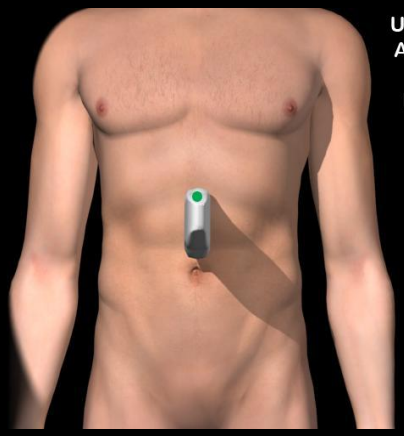




If CBD markedly dilated the same size as the portal vein- giving the appearance of a “double barrel shotgun”

Ultrasound in Abdominal Aortic Aneurysm

- Reduced image quality in some pts
  - Obese patients
  - Increased intestinal gas
- Curve linear Transducer (3.5 MHz)
  - Indicator to 9:00 (patient's right) , depth to Vertebrae
- short axis in AP diameter (outer to outer wall)
- diameter >3 cm → aneurysm, >5.5 cm meets criteria for repair, >7-8 cm →high risk of rupture



Ultrasound
Abdominal
Aorta
Long Axis

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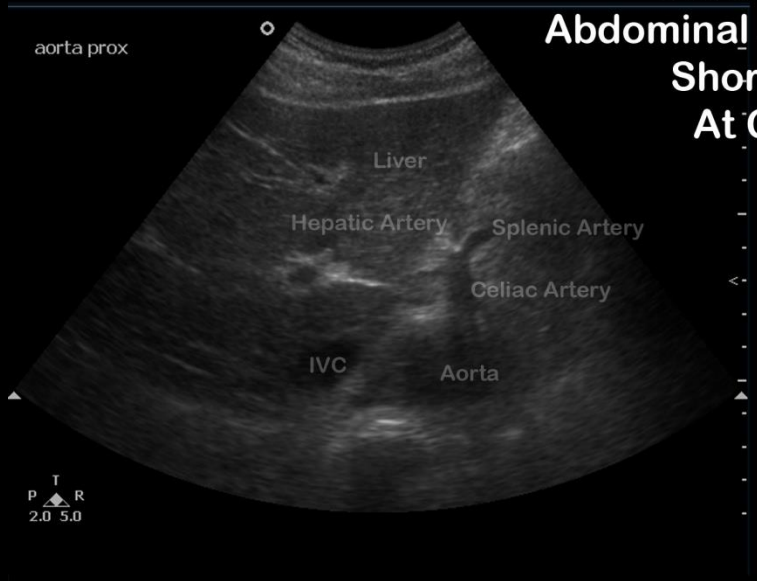
Abdominal Aorta

Ultrasound
Abdominal Aorta
Short Axis
At Celiac



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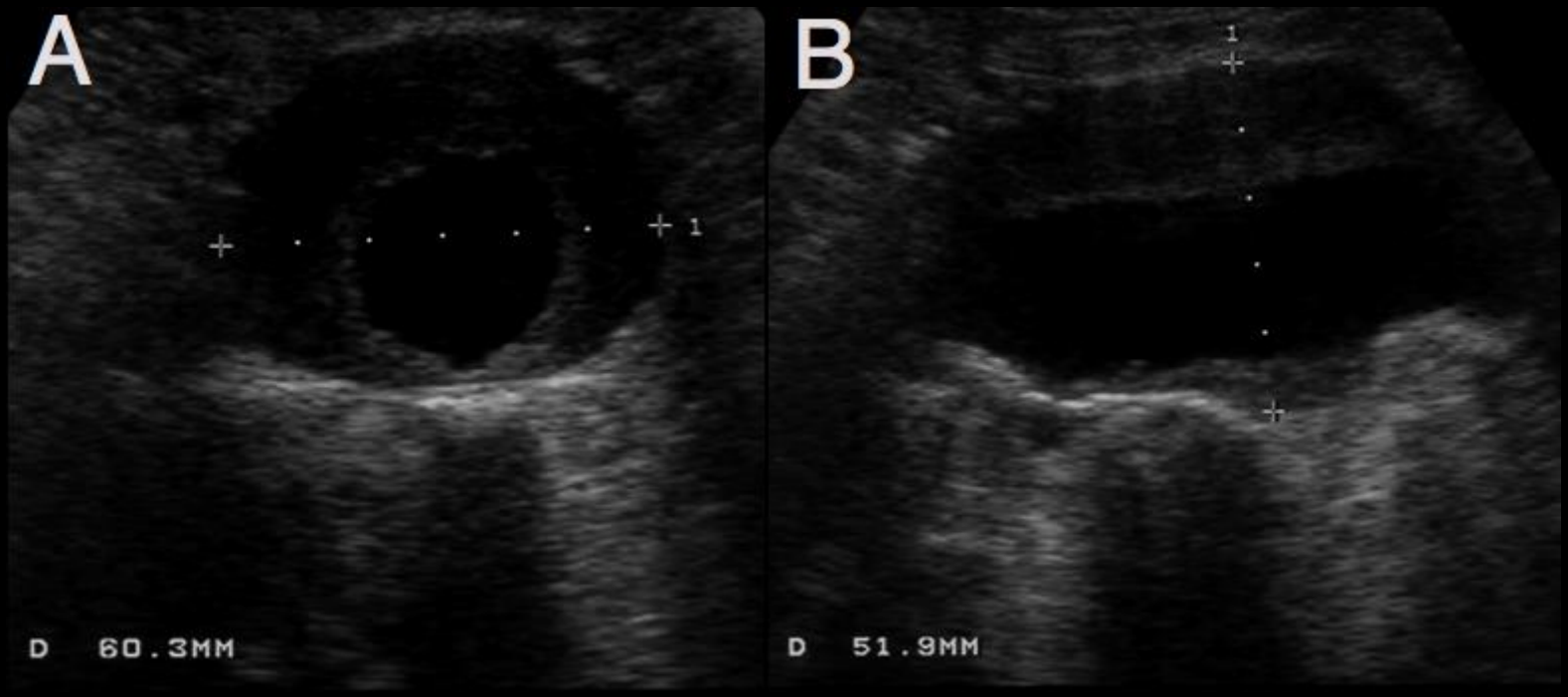
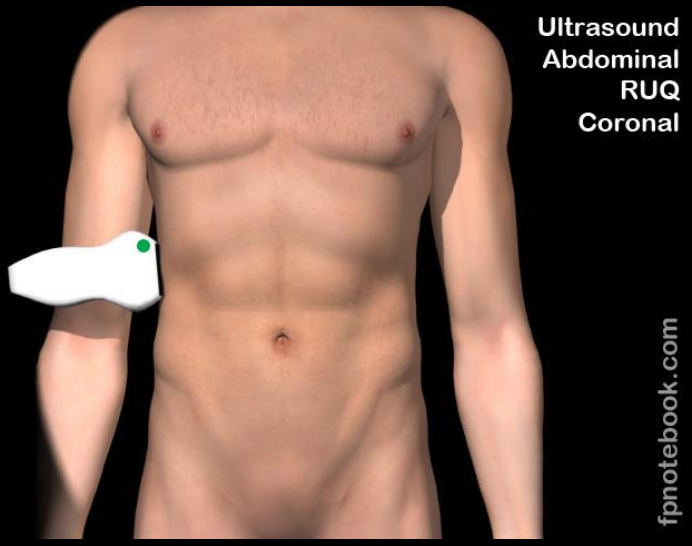
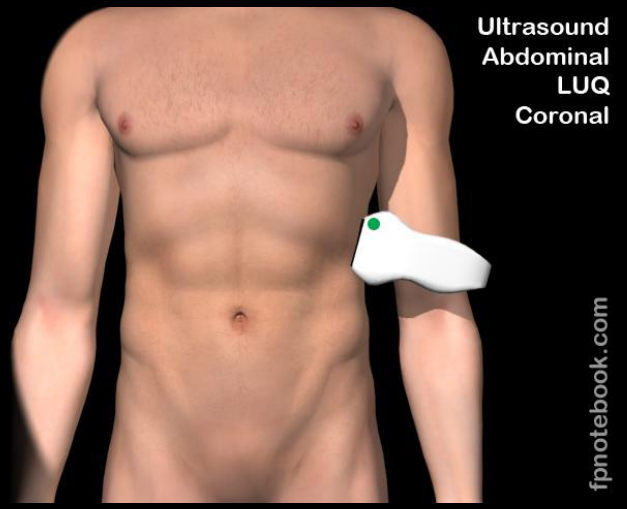
Abdominal Aortic Aneurysm



The Renal Ultrasound

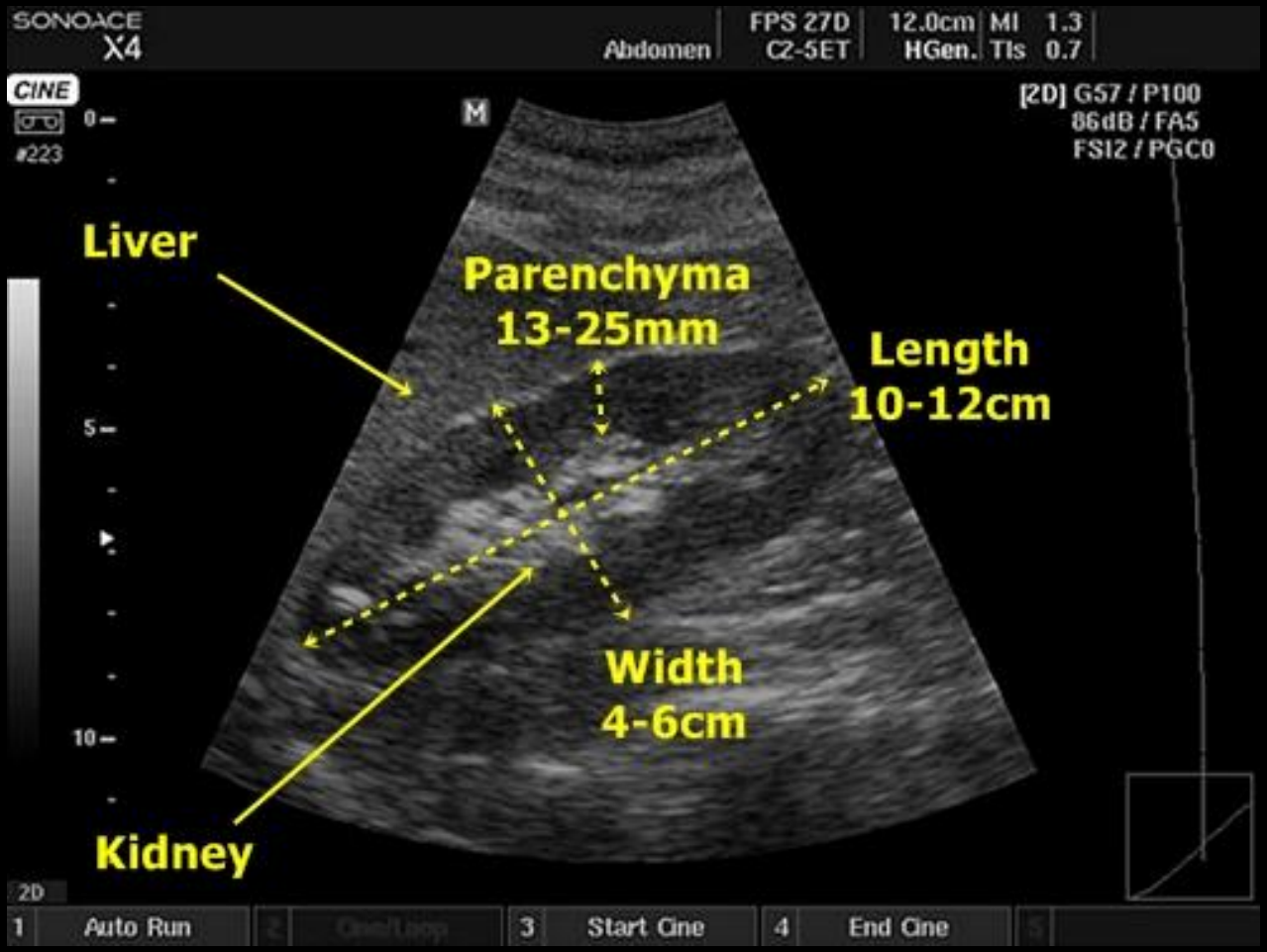
- If coronal plane →Rotate the probe 90 degrees to the short axis



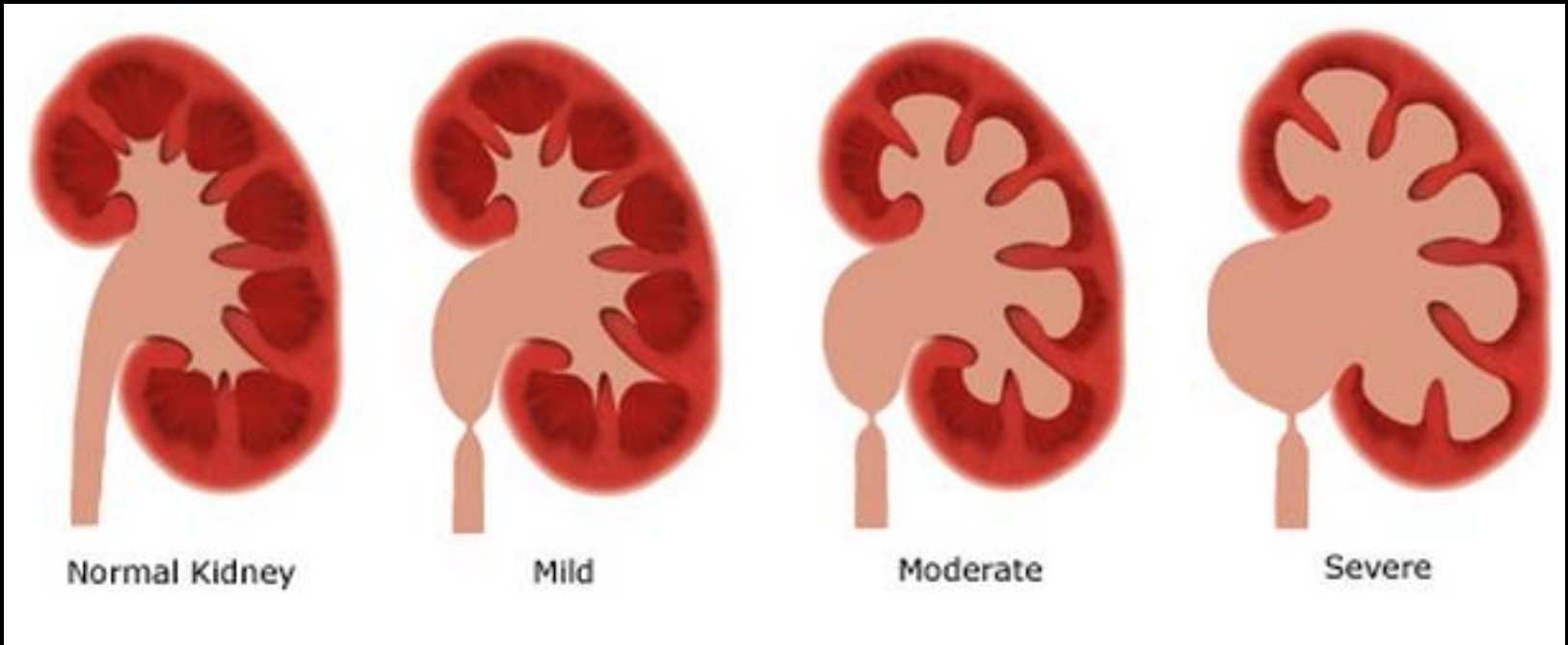


Left Kidney : higher lying and overlying gas in LUQ, probe in a more lateral, mid-axillary position and holding deep breath

The normal kidney



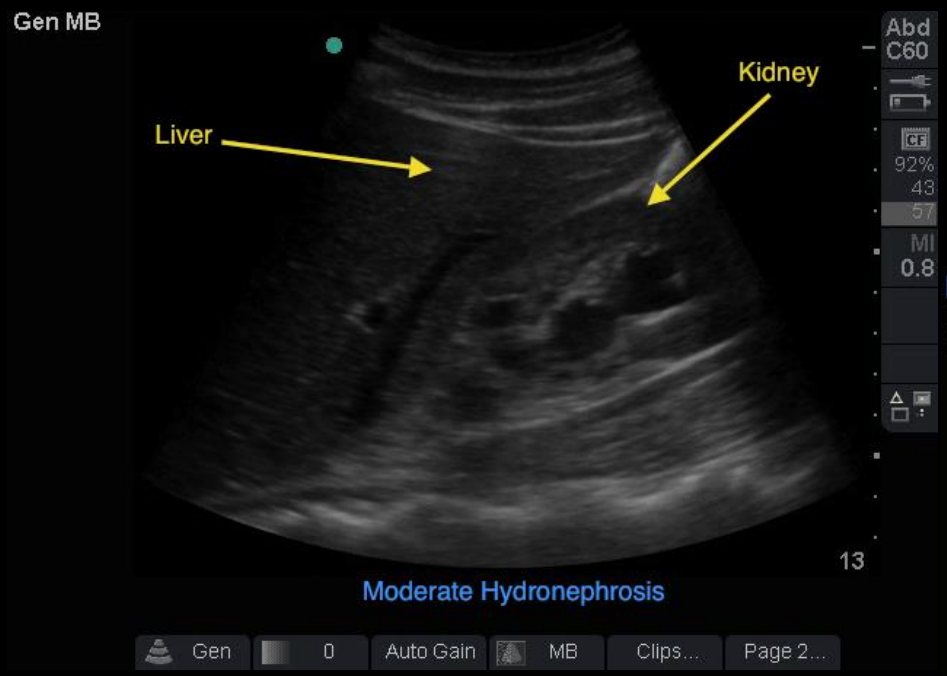
The Renal Ultrasound - hydronephrosis

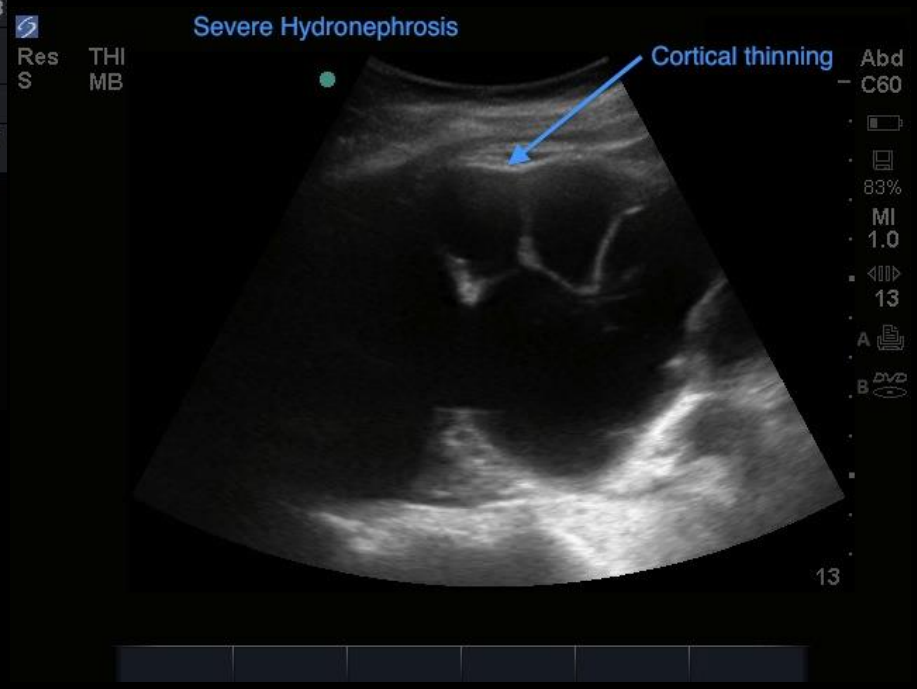


Mild : dilatation of the renal pelvis without dilatation of the calyces but normal renal architecture

Moderate : moderate dilatation of the renal pelvis and calyces enlarge blunting of forncies and flattening of papillae

Severe : Calyces enlarge and loss of borders between the renal pelvis and calyces, Cortex is compressed


Gen MB
Liver
Kidney
Abd
C60
92%
43
57
MI
0.8
13
Moderate Hydronephrosis
Gen
0
Auto Gain
MB
Clips...
Page 2...


Res
S
THI
MB
Severe Hydronephrosis
Cortical thinning
Abd
C60
83%
MI
1.0
13
13

The Renal Ultrasound – renal calculi

- Hyperechoic stone-like lesions with posterior "clean" shadowing