

# ***FROM ACUTE HEPATITIS TO LIVER FAILURE***

***INTERNATIONAL HEPATOLOGY ULTRASOUND COURSE  
UNIVERSITY COLLEGE OF LONDON***

***ROYAL FREE HOSPITAL***

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# **ACUTE HEPATITIS**

Acute hepatitis is a generic term used to define a hepatic inflammatory reaction associated to hepatocellular damage.

# ACUTE HEPATITIS

Clinical history, biochemistry, serology and sometimes liver biopsy are needed for diagnosis.



# ACUTE HEPATITIS

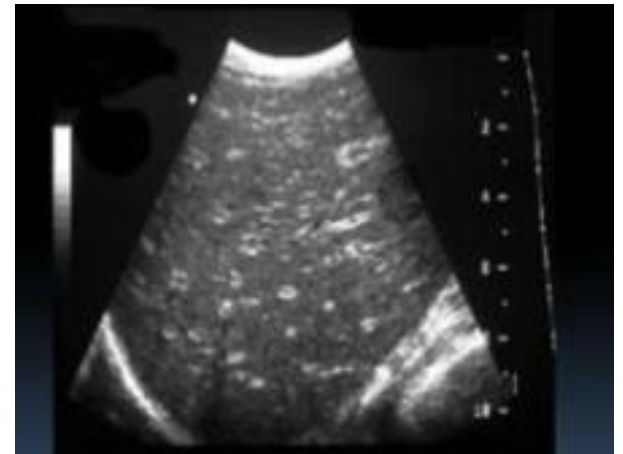
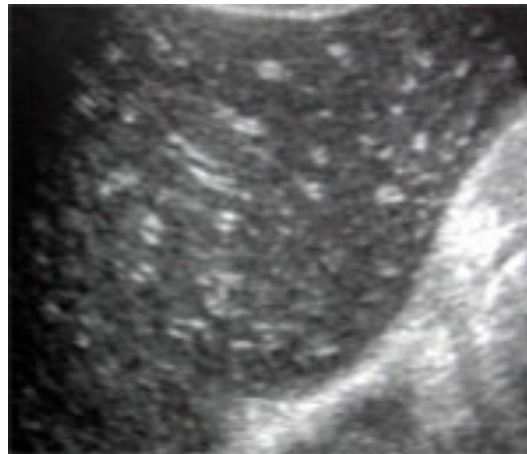
- Viral Hepatitis
- Alcohol steatohepatitis (ASH)
- Toxic hepatitis (DILI or other toxins)
- Autoimmune hepatitis
- Ischemic hepatitis
- Metabolic (Wilson's disease)

# ULTRASOUND IN ACUTE HEPATITIS

- Non specific findings
- Normal appearance
- Enlarged (longitudinal diameter >15 cm)

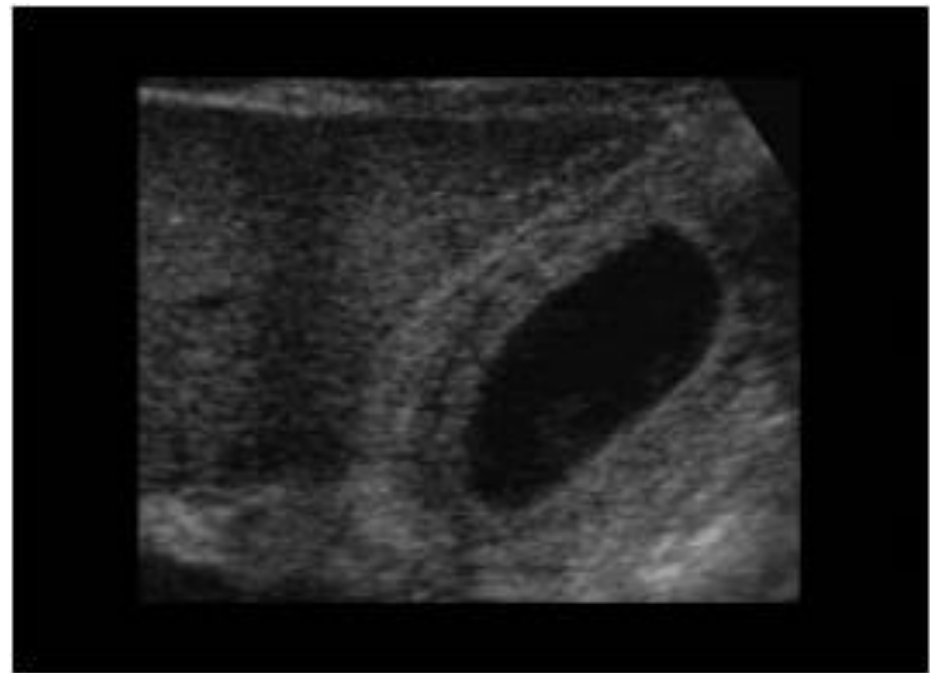
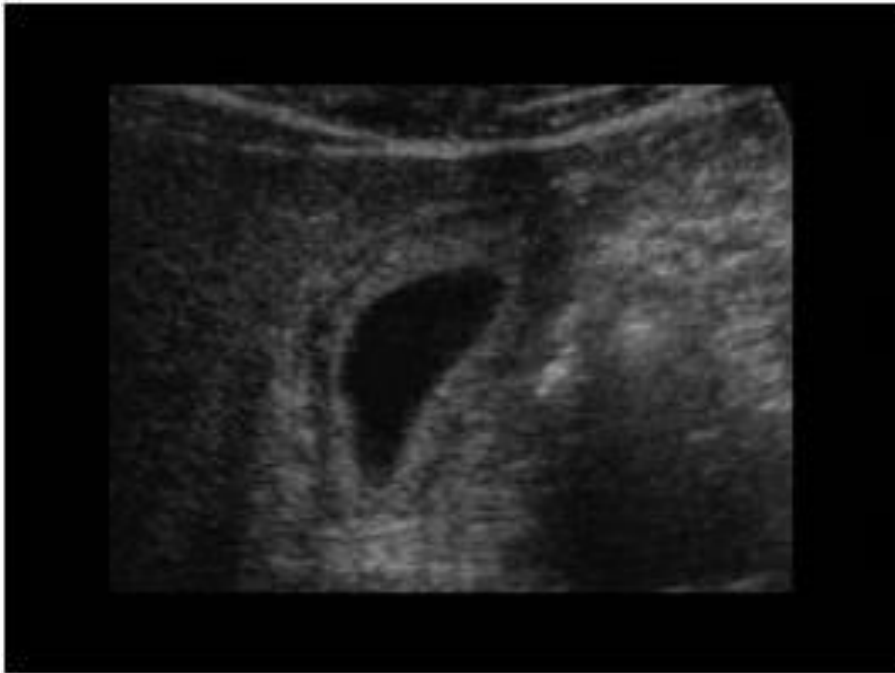
# ULTRASOUND IN ACUTE HEPATITIS

- Slightly hypoechoic appearance due to hydropic swelling of the hepatocytes and increase extracellular fluid with hyperechogenicity of portal tracts walls



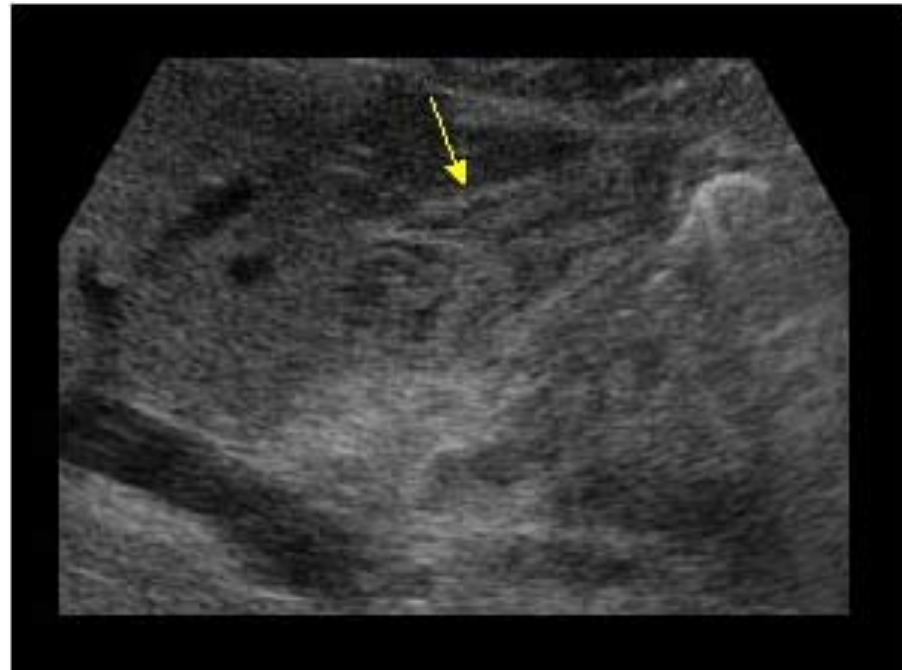
# ULTRASOUND IN ACUTE HEPATITIS

- Thickening of the gallbladder mimicking an acute acalculous cholecystitis



# ULTRASOUND IN ACUTE HEPATITIS

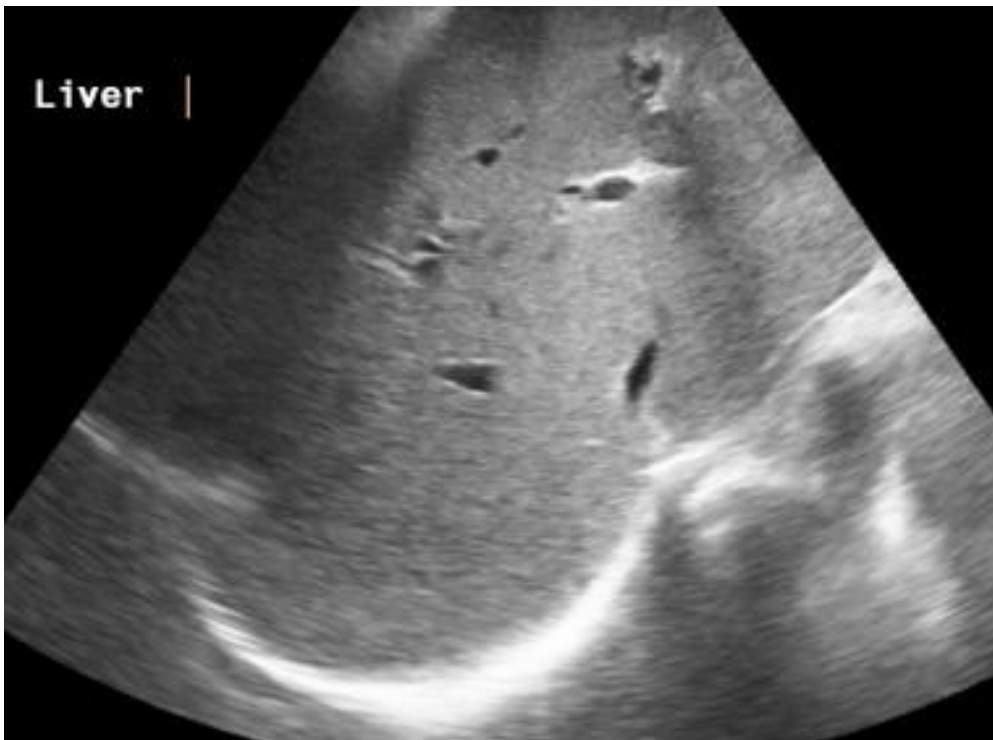
- The gallbladder might be thickened and sometimes completely collapsed





# ULTRASOUND IN ACUTE ALCOHOLIC HEPATITIS

- Enlarged liver of bright appearance



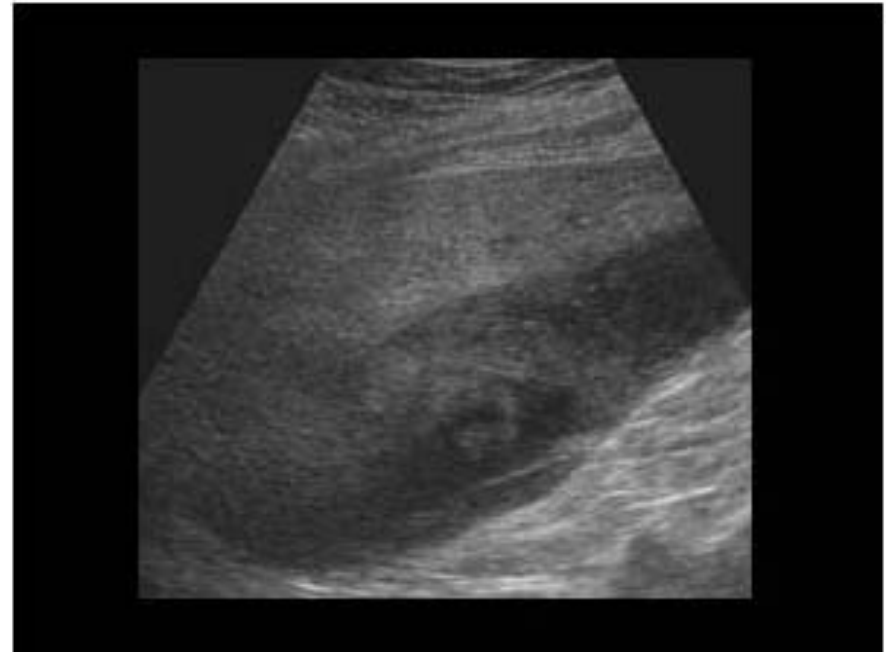
# ULTRASOUND IN ISCHEMIC HEPATITIS

## Causes of ischemic hepatitis

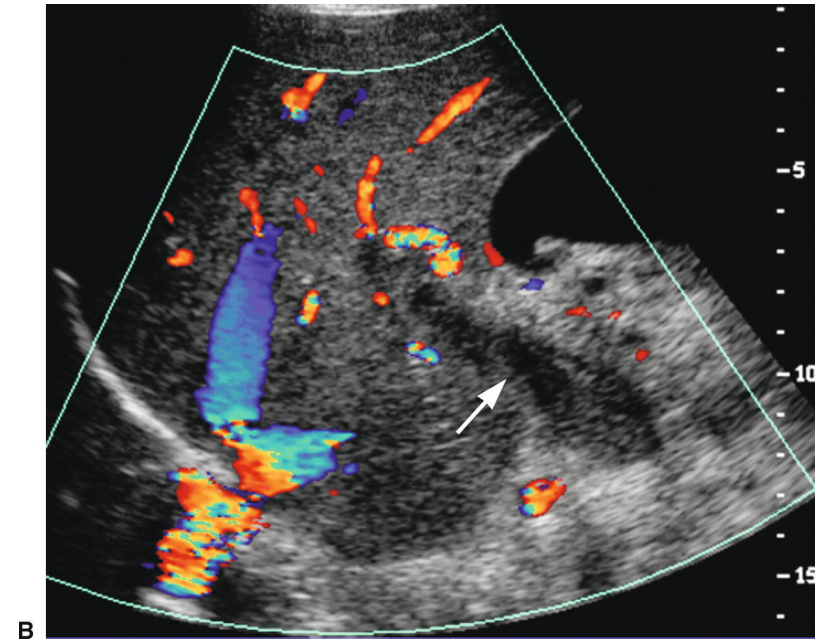
- Reduced blood supply
  - Left sided heart failure (MI , arrhythmia)
  - Arterial embolism
  - Acute PV thrombosis
  - Vasculitis

# INFARCTED LIVER

**IRREGULAR HYPOECHOIC AREA, OFTEN  
WEDGED-SHAPED**



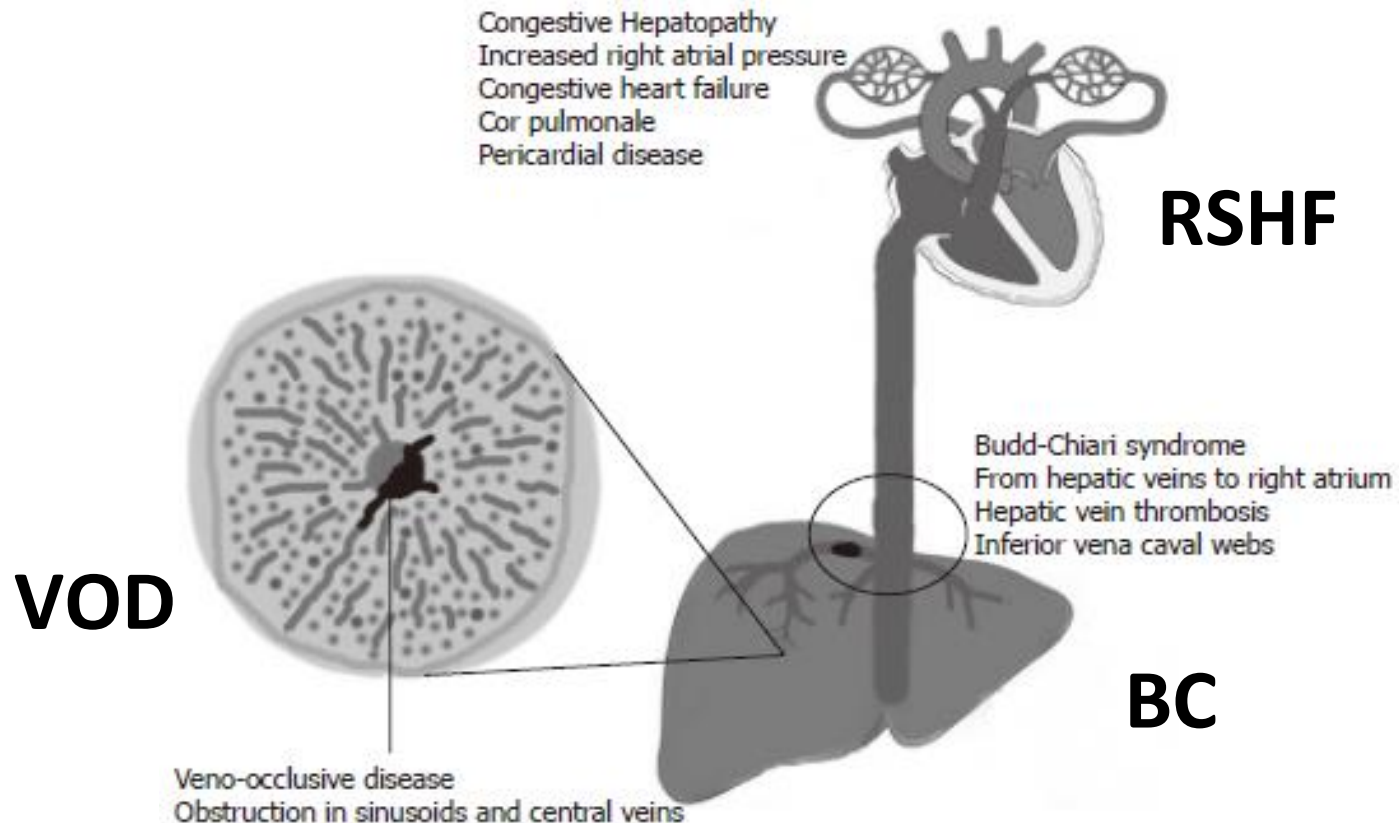
# PVT



**THE PORTAL VEIN CONTAINS ECHOGENIC MATERIAL AND THERE IS NO EVIDENCE OF FLOW ON COLOR-DOPPLER**

# ULTRASOUND IN ISCHEMIC HEPATITIS

## REDUCED BLOOD DRAINAGE

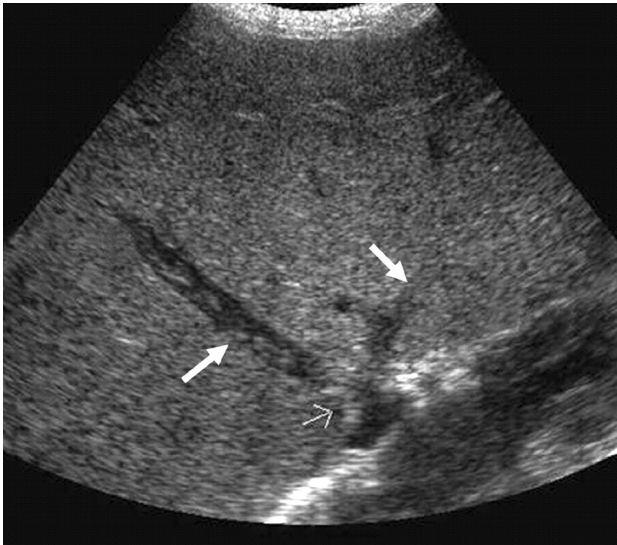
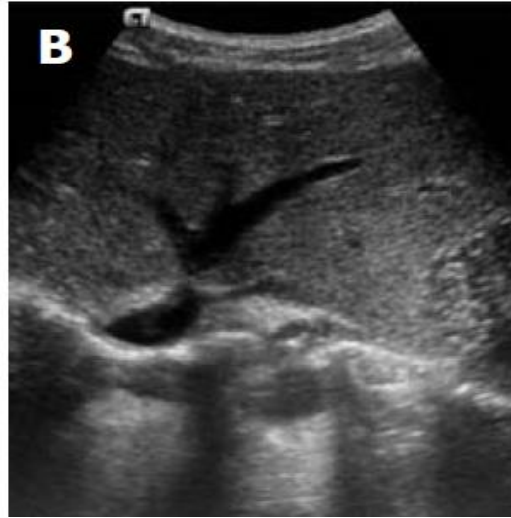


# RITE SIDED HEART FAILURE

Non-specific hypoechoic liver with “starry sky” appearance can be found together with a “sea star” appearance of the distended IVC and hepatic veins.



# BUDD-CHIARI SYNDROME

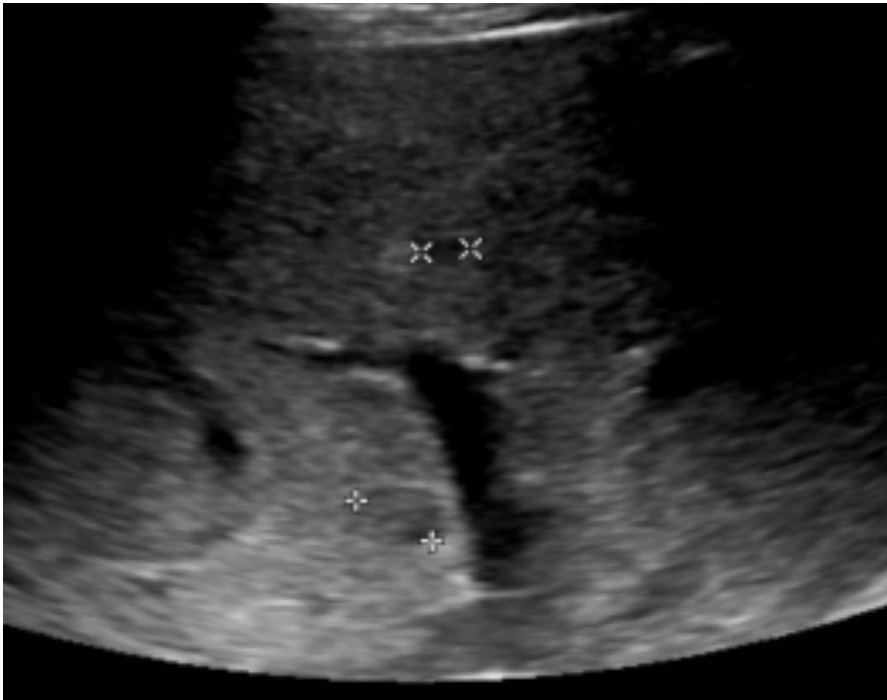
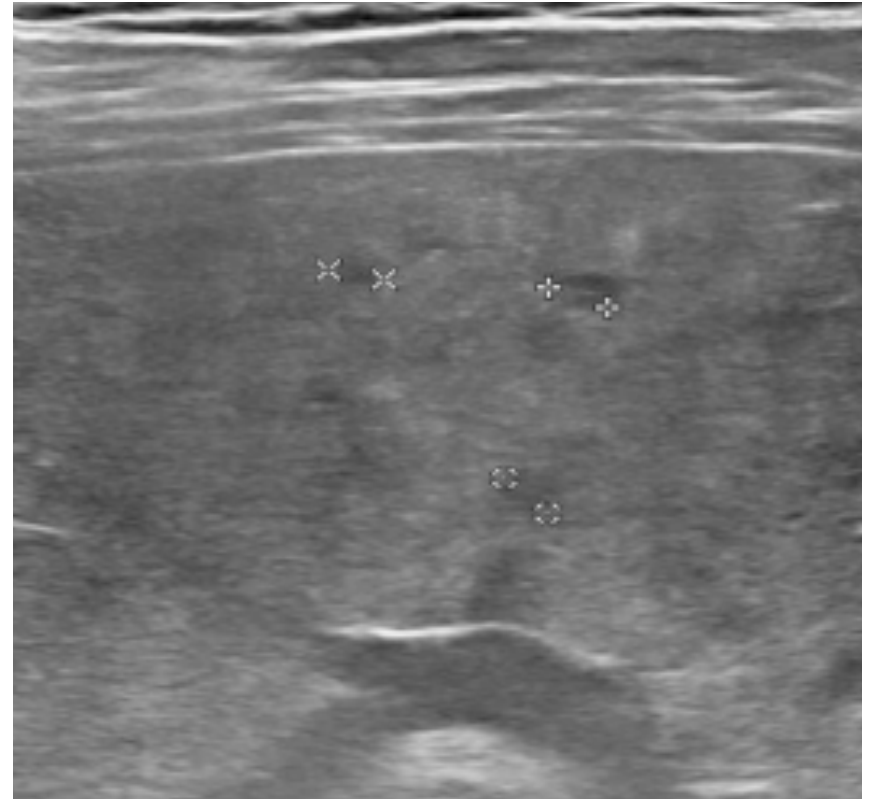
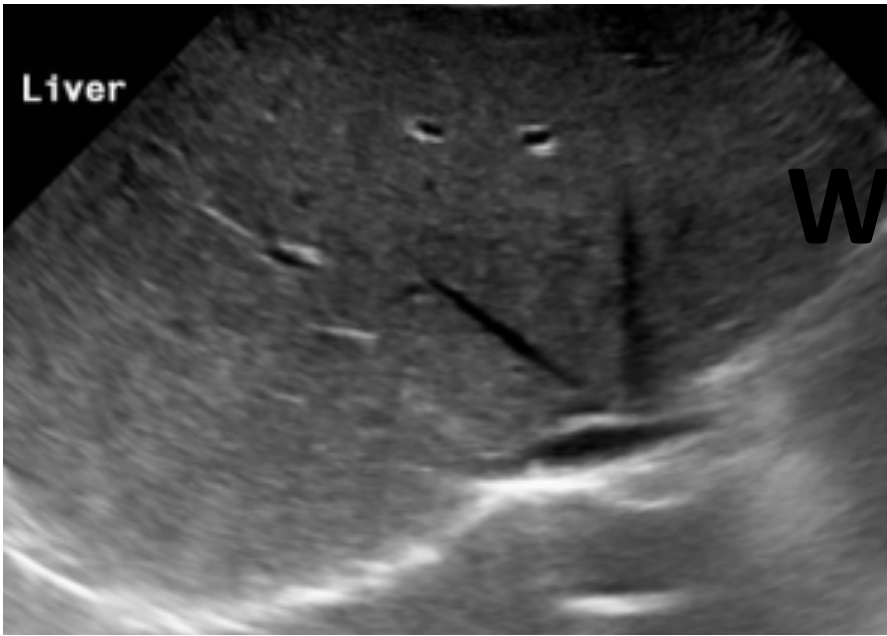


- **LARGE THROMBUS IN THE IVC**
- **HVS OCCLUSION**



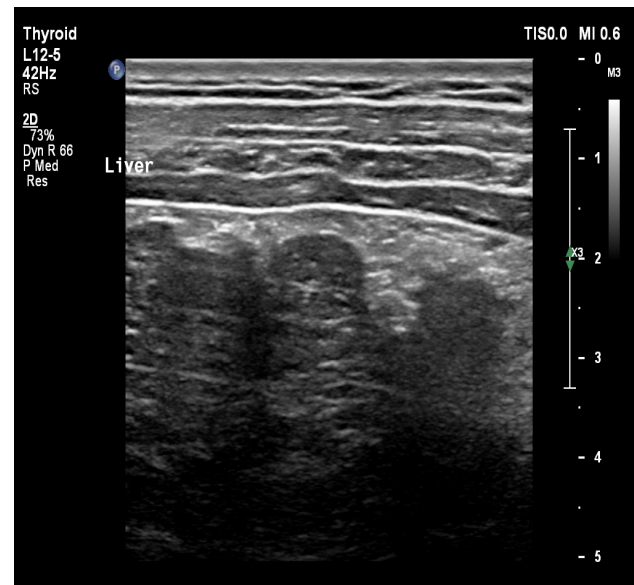
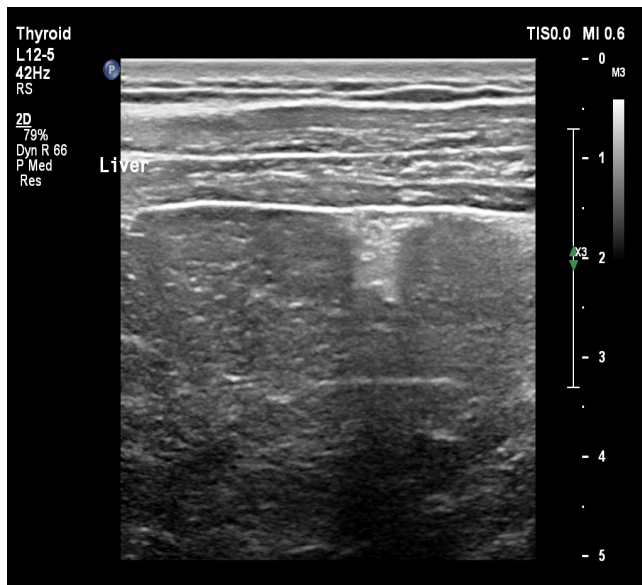
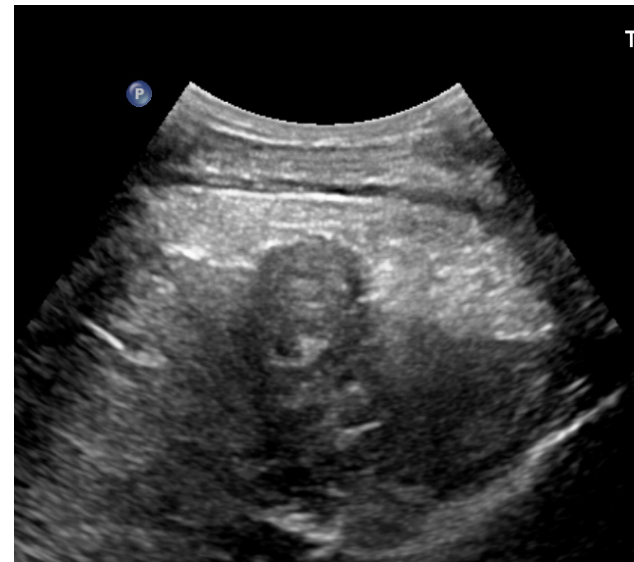
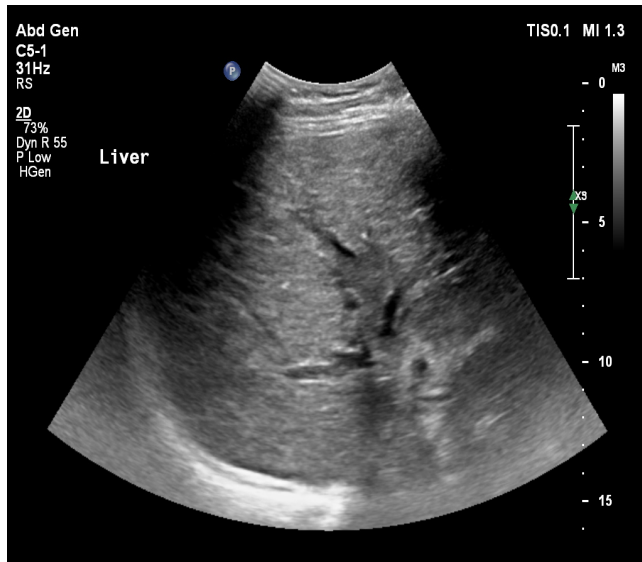
Liver

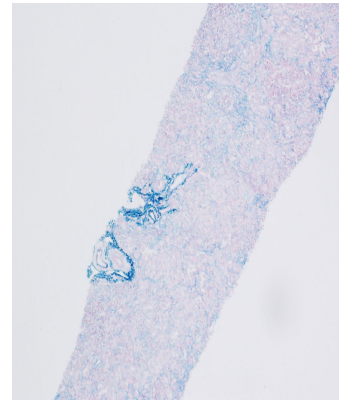
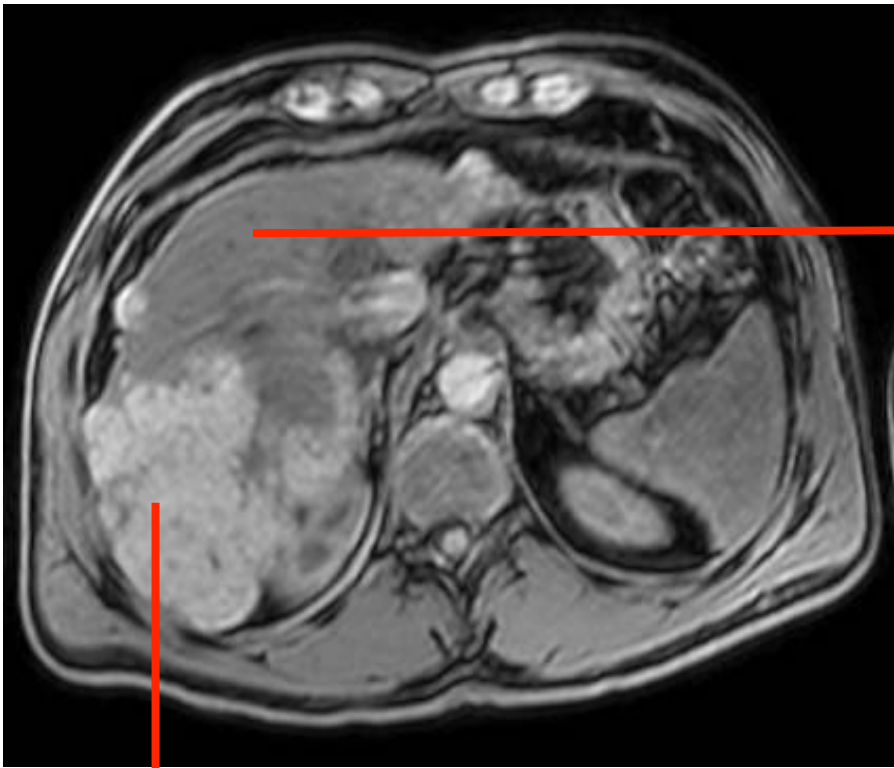
# WILSON'S DISEASE



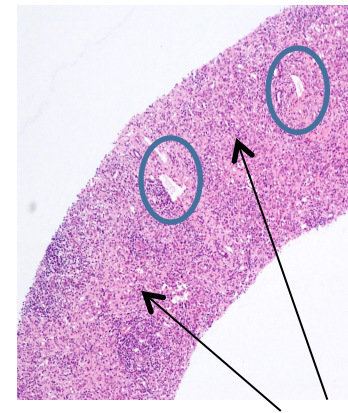


# AUTOIMMUNE HEPATITIS

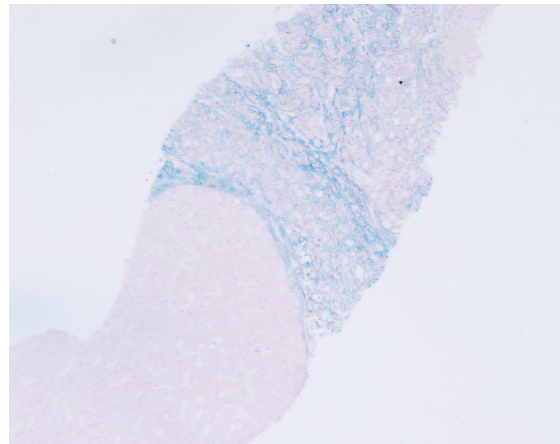




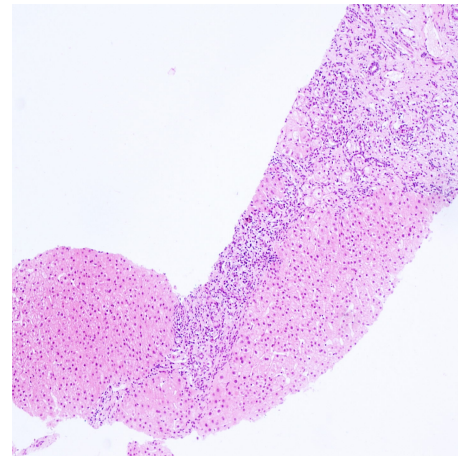
Little elastification of the areas with panacinar necrosis. Portal tracts highlighted by dense well-formed elastin



Panacinar necrosis. No viable liver parenchyma. Basic underlying lobular architecture preserved with identifiable portal tracts



Elastified panacinar necrosis with regenerating nodules



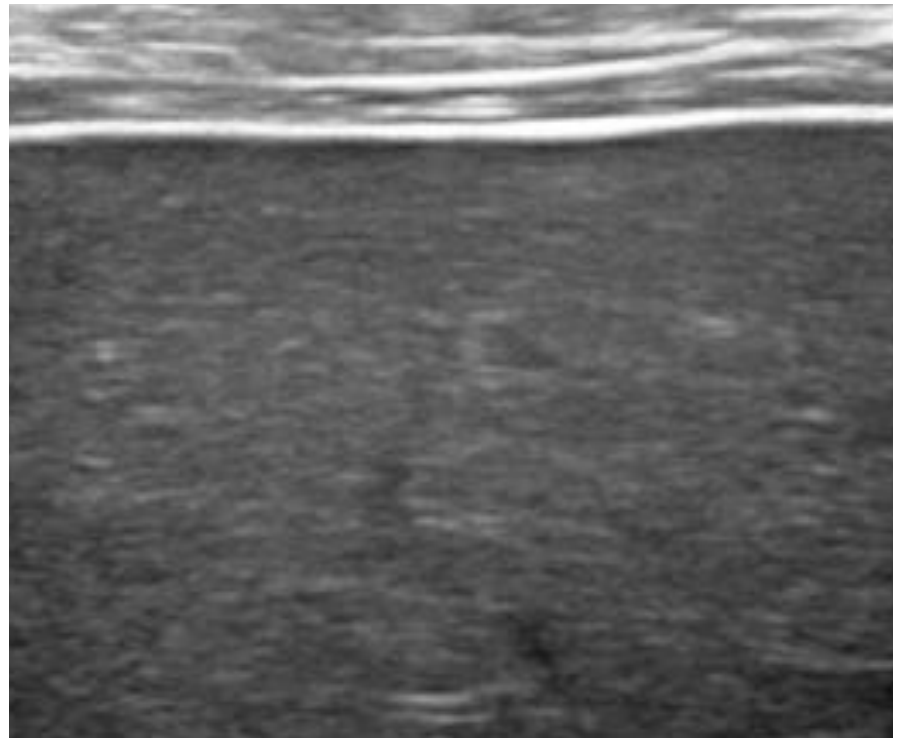
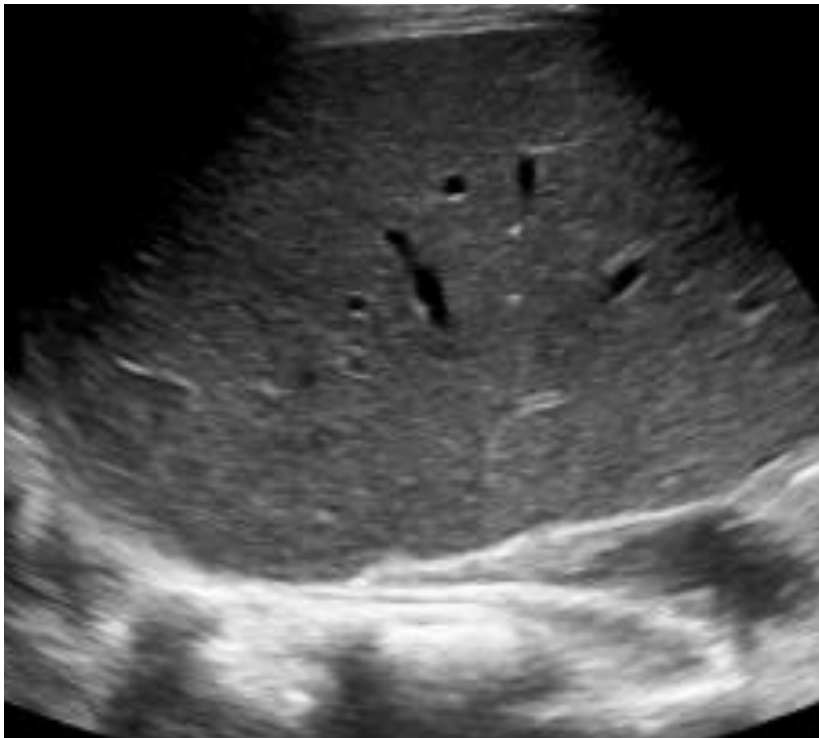
Hepatocyte nodules separated by thick fibrous septa with marked ductular proliferation and a mild, mainly lymphoplasmacytic inflammatory infiltrate

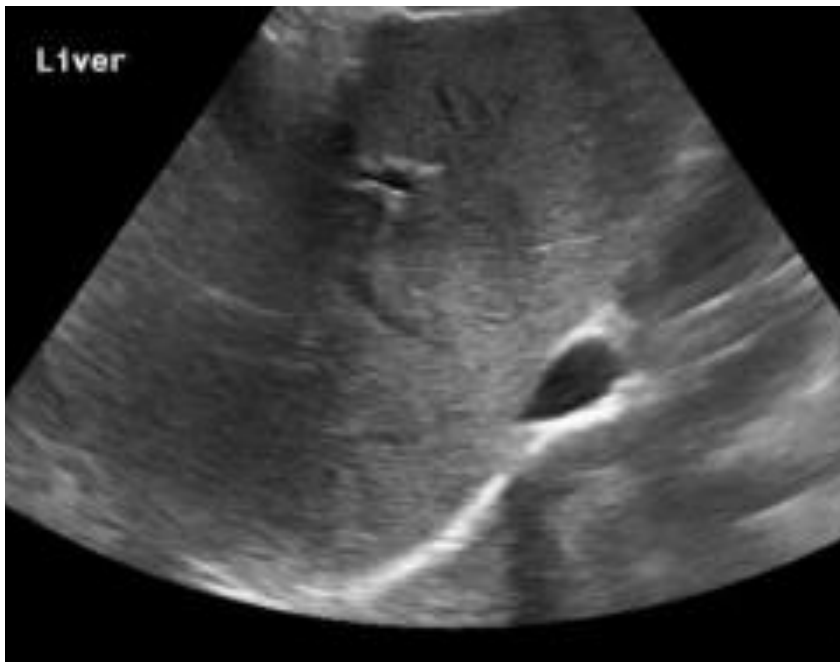
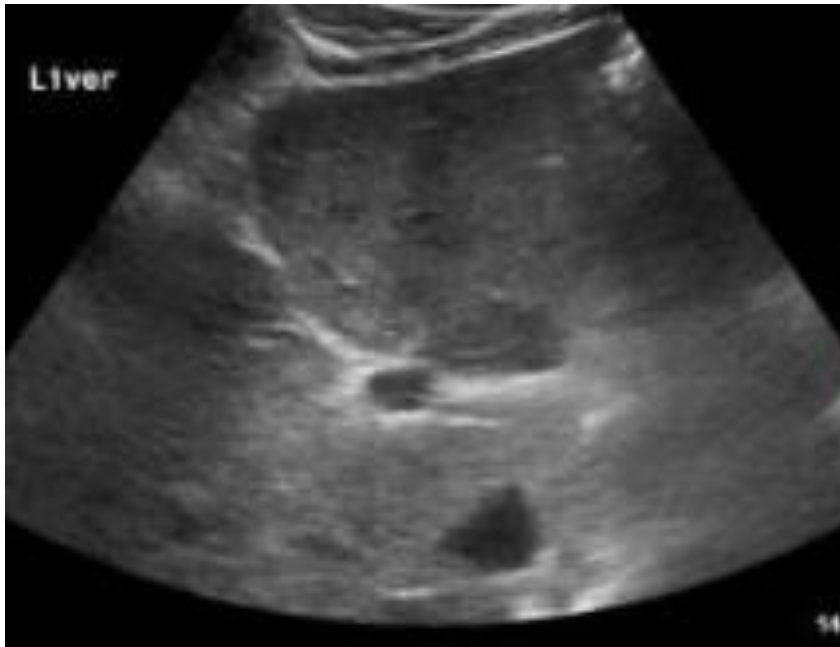
# ULTRASOUND IN LIVER FAILURE

- Hyperacute if occurring within 7 days
- Acute if occurring between 8 and 28 days
- Subacute if occurring between 29 day and 12 weeks
- Chronic liver failure
- Acute on chronic liver failure

# ULTRASOUND IN LIVER FAILURE

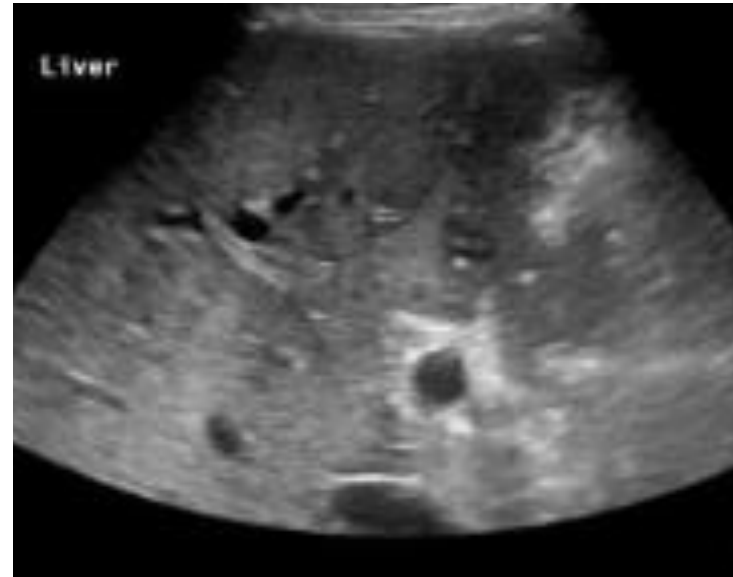
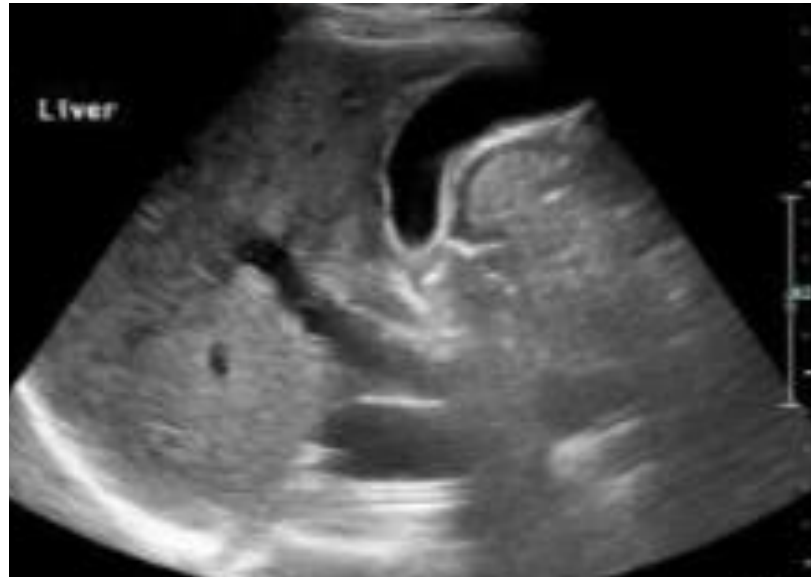
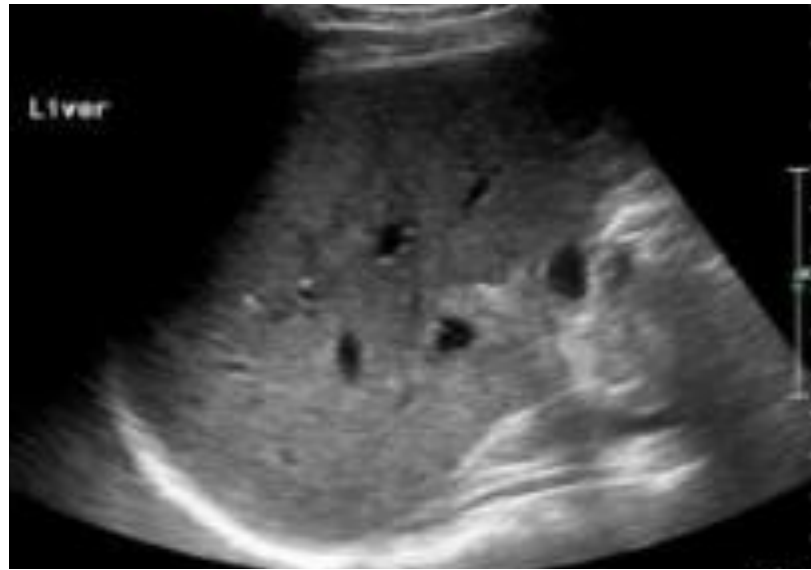
Sonographic findings may range from slightly enlarged hypoechoic enlarged liver even with smooth contour



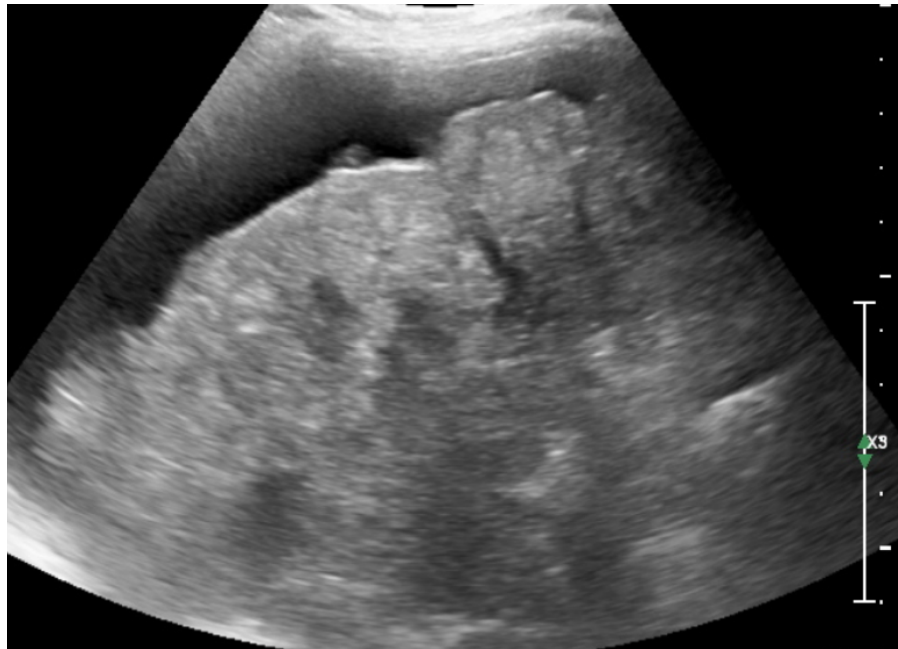
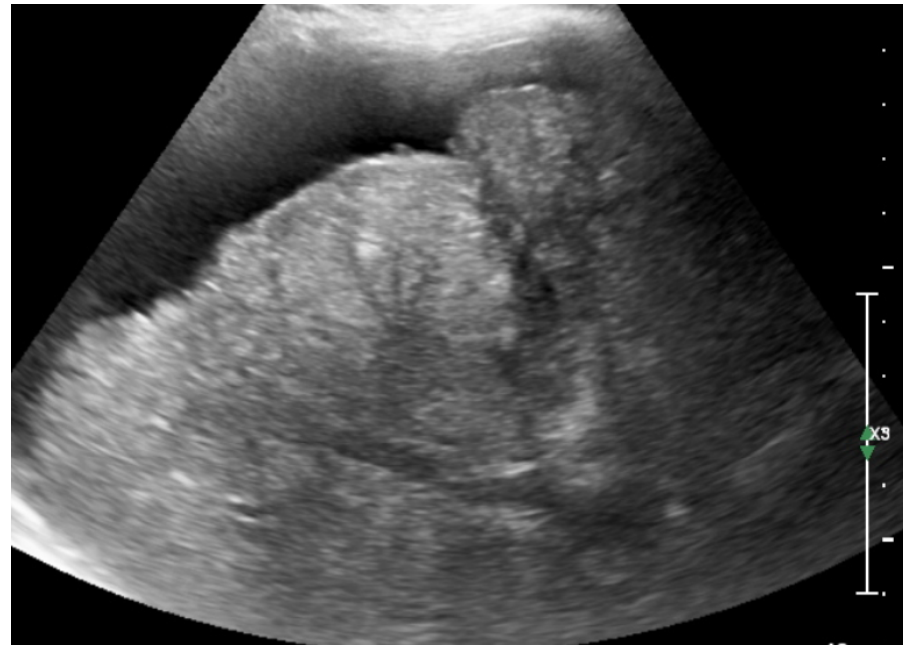
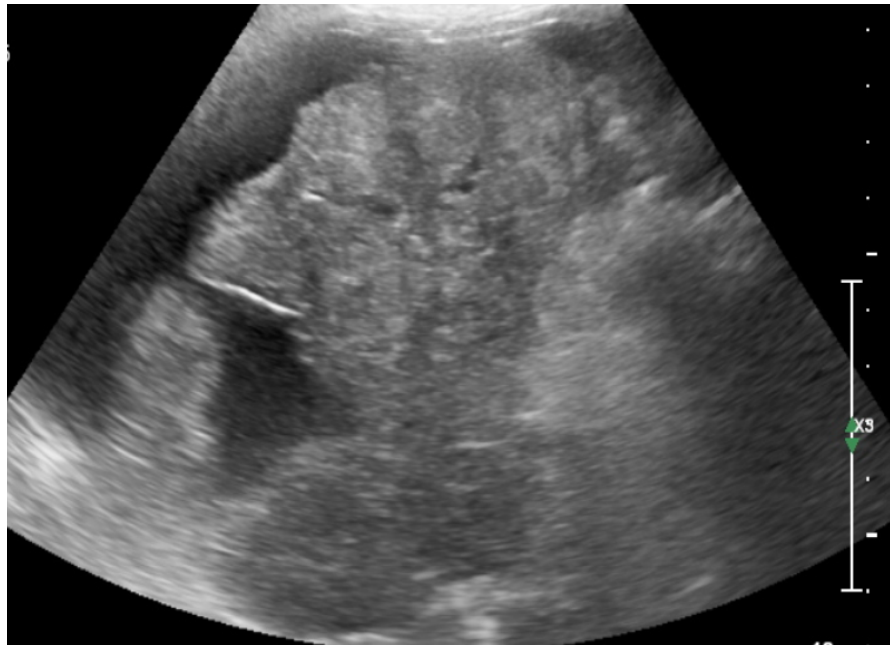


**...WITH TIME...**





**...ill-defined hypoechoic areas as a sign of parenchymal necrosis**



**Grossly irregular  
parenchymal  
structure without  
specific nodularities**

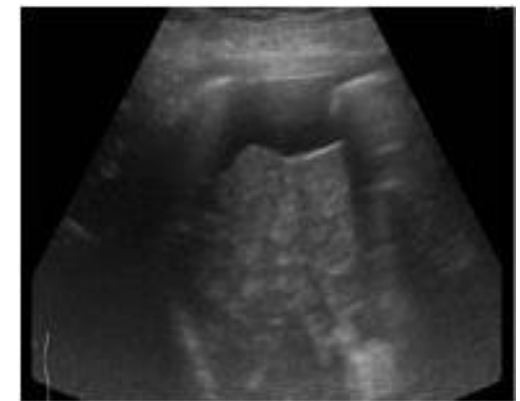
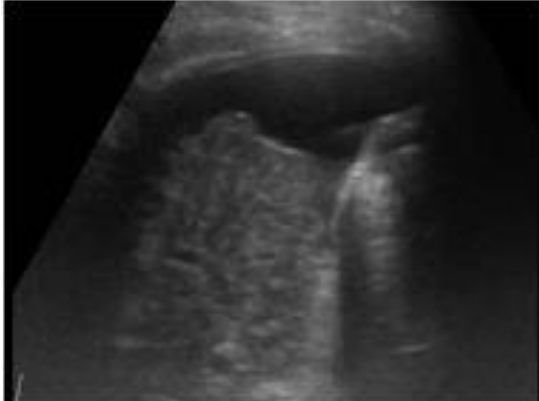
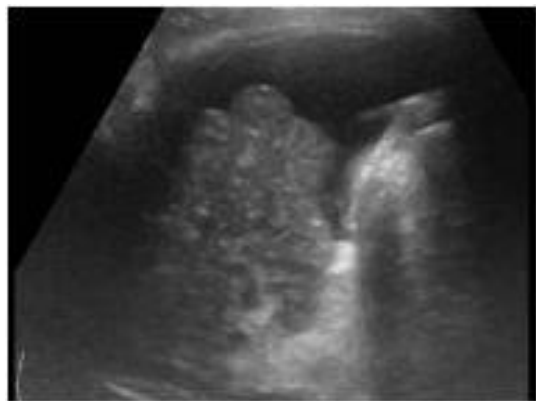
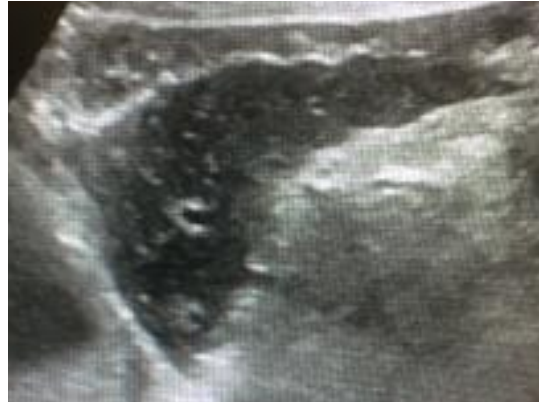
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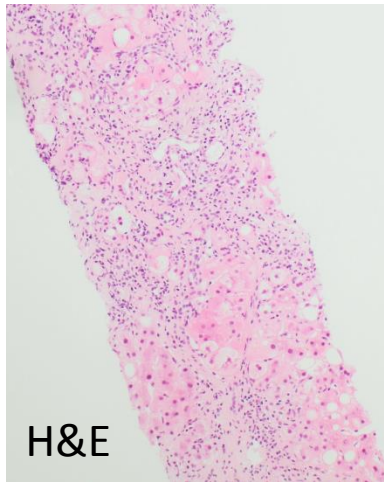


# SUBACUTE LIVER FAILURE

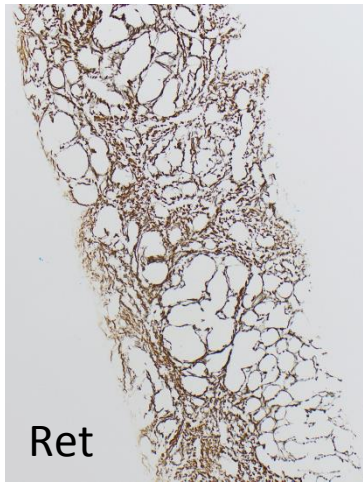
Shrunken liver due to sub-massive hepatocellular necrosis surrounded or not by ascites



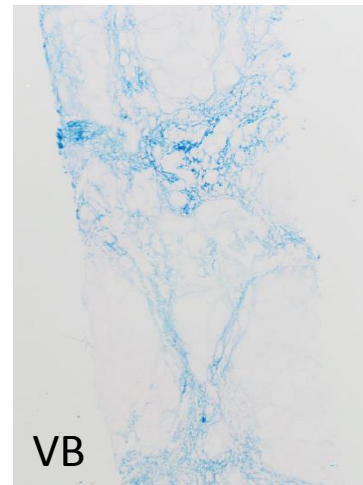




H&E



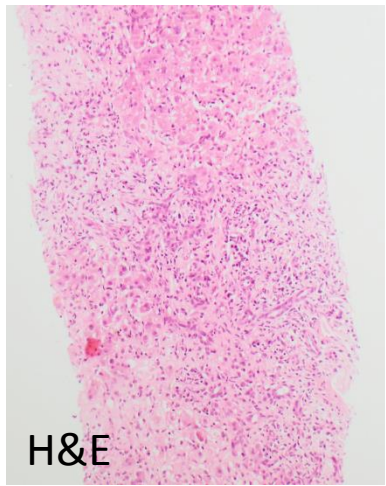
Ret



VB

ALD cirrhosis: nodular appearance with Victoria Blue + in fibrous septa





Severe acute hepatitis with massive necrosis: nodular appearance on H-E and reticulin, but negative on VB



**CIRRHOSIS**



**NECROTIC LIVER  
ALF SECONDARY TO  
OMEPRAZOLE**

# Clinical US in Liver failure

In the absence of histology, clinical assessments (history, physical examination, and laboratory tests) including abdominal imaging studies are important to distinguish ALF from decompensated cirrhosis.

# Clinical US in acute/subacute Liver Failure

1. Irregular contour **yes**
2. Atrophic appearance **yes**
3. Portal vein diameter **usually not dilated**

# Clinical US in acute/subacute Liver Failure

4. Splenomegaly is often not present
5. Ascites very common in the presence of atrophic liver
6. Vascular collaterals only at a later stage



# Clinical US in Liver Failure

- The onset, extent and the amount of necrosis are responsible of the sonographic appearance.
- The longer and the more intense the liver injury has been, the more distorted will be the hepatic parenchyma.
- Portal hypertension develops as a result of the sinusoidal collapse due to submassive hepatic necrosis.

# CONCLUSIONS

- The sonographic findings in patients with liver failure usually are not specific.
- However there are exception like for example in Budd-Chiari syndrome which has a typical appearance.

- In the presence of severe liver injury the parenchymal appearance might change rapidly and on ultrasound the liver might have a pseudo-cirrhotic pattern. Histological confirmation by trans-jugular approach if the patient is coagulopathic and the liver is surrounded by ascites is very important when obtainable. Nevertheless the history, the comparison with previous imaging (when available) and the rapid decline of liver function in a previously healthy patient help guide the diagnosis.
- Cross sectional imaging is obviously important to have a panoramic view, evaluate liver volume and planning for liver transplantation.