

# LIVER and SPLEEN

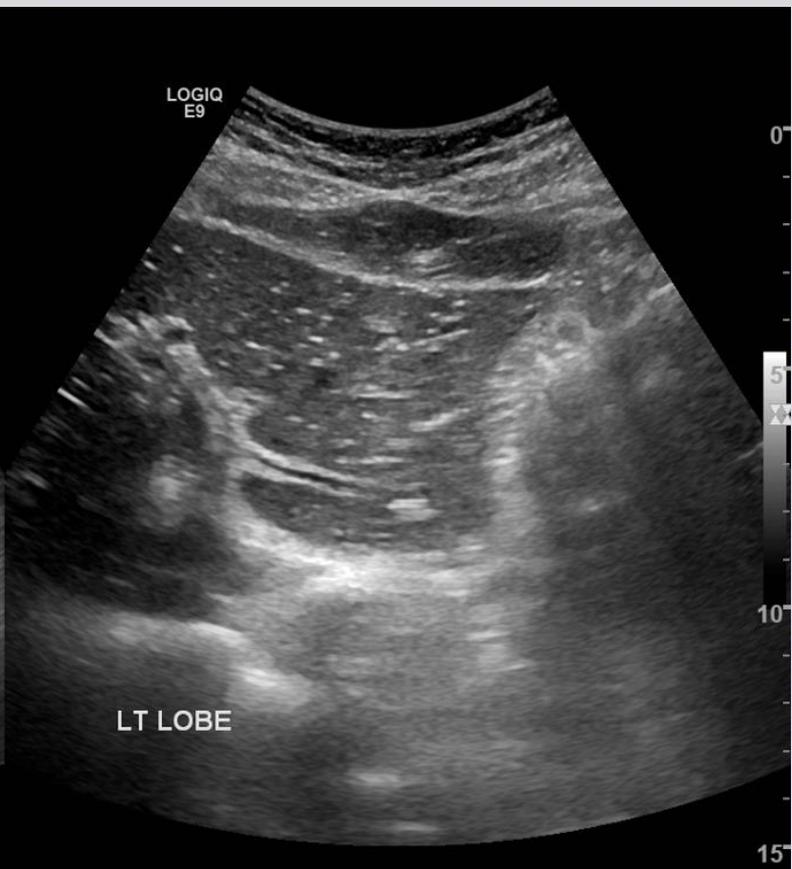
# LIVER and SPLEEN

The image features a dark blue background with a pattern of fine, wavy, parallel lines in a lighter blue color. A large, semi-transparent orange and yellow gradient shape is positioned in the lower-left corner, partially overlapping the blue background. The text "LIVER and SPLEEN" is centered in a bold, yellow, sans-serif font.

# CASE 1

- ❑ 67, male
- ❑ Hypertensive and with elevated creatinine
- ❑ For general check-up





# IMPRESSION: **BILIARY HAMARTOMA**



# Biliary Hamartomas (von Meyenburg complexes)

- ❑ Small, focal developmental lesions
  - ❑ Dilated intrahepatic bile ducts set within a dense collagenous stroma
- ❑ From embryonic bile duct remnants that failed to involute

## Significance:

- ❑ Isolated finding with no significance
- ❑ Associated with congenital disorders



# Biliary Hamartomas (von Meyenburg complexes)

Key sonographic findings

- ❑ Bright echogenic foci with distal comet tail artifact without obvious mass effect



# Biliary Hamartomas (von Meyenburg complexes)

## Differential diagnoses

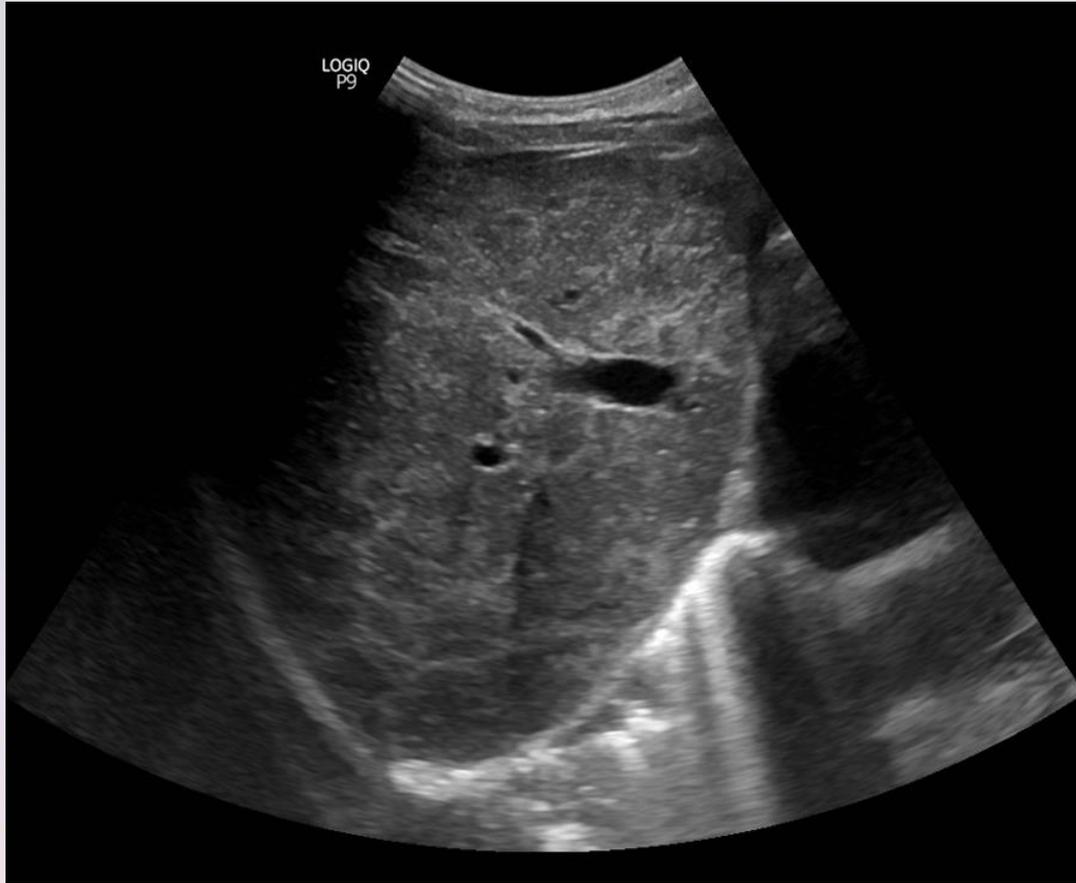
- Metastasis
- Multiple small hepatic cysts
- Caroli disease (Type V choledochal cyst)

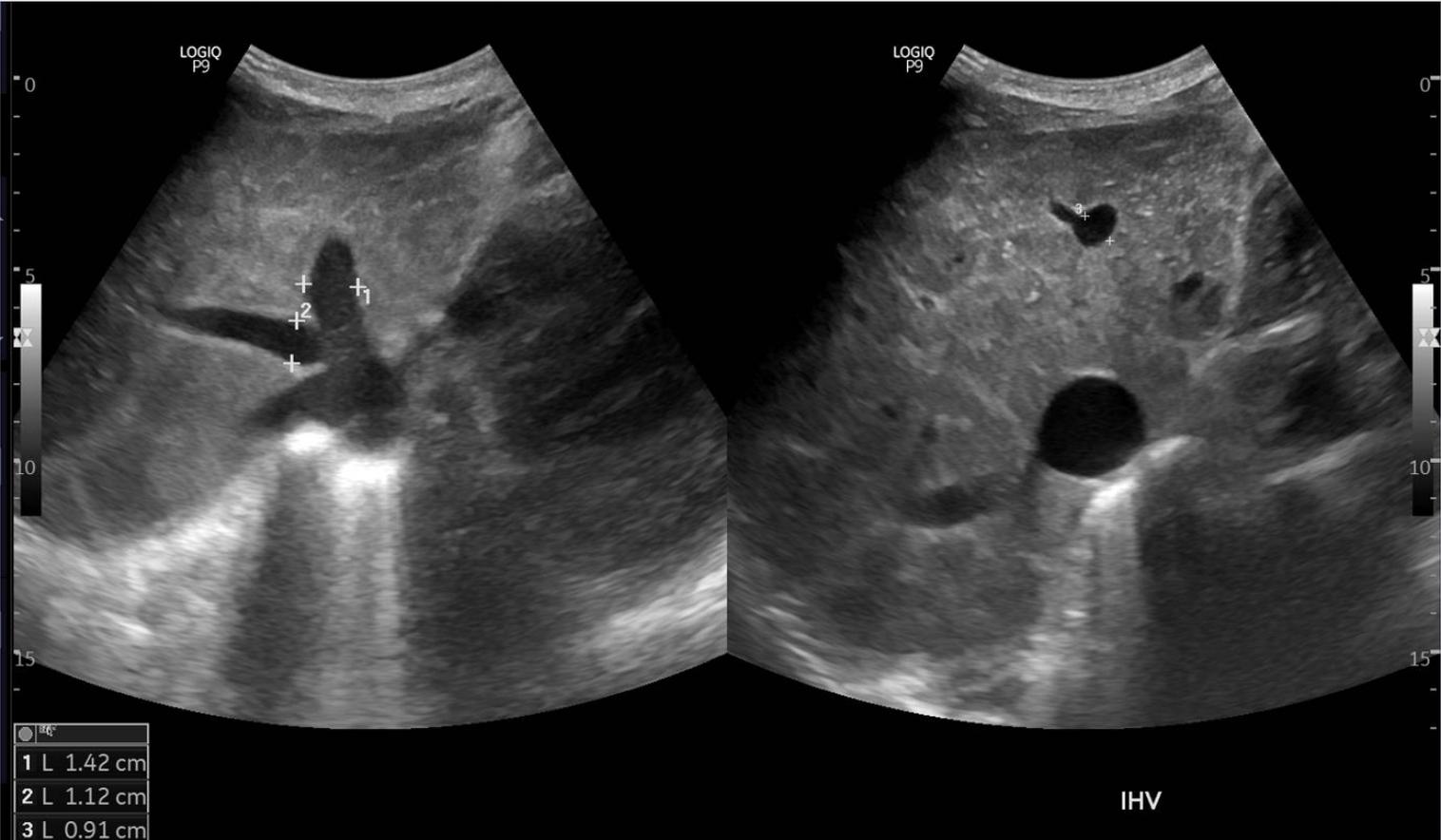


## CASE 2

- ❑ 41, female
- ❑ From Davao
- ❑ Chief complaint: Body weakness and Difficulty of breathing
- ❑ Chronic kidney disease on hemodialysis







# IMPRESSION: **HEPATIC SCHISTOSOMIASIS**



# Hepatic Schistosomiasis

- ❑ Caused by *S. mansoni*, *S. japonicum*, *S. mekongi*, and *S. intercalatum*
- ❑ Ova reach the liver through the portal vein and incite a chronic granulomatous pattern





ENDEMIC PROVINCE	OVERALL SNAIL INFECTION RATE (%)
Cagayan	25
Oriental Mindoro	No Data
Sorsogon	10.4
Negros Occidental	
Bohol	2.9
Eastern Samar	5
Northern Leyte	4.6
Northern Samar	21.6
Western Samar	2.5
Zamboanga del Norte	8.7
Zamboanga Sibugay	14.3
Zamboanga del Sur	7.9
Bukidnon	15
Lanao del Norte	20.6
Misamis Occidental	7.8
Davao de Oro	6.8
Davao del Norte	2.4
Davao Oriental	100
Davao del Sur	3.7
North Cotabato	8.7
South Cotabato	20.5
Sultan Kudarat	6.7
Agusan del Norte	1.9
Agusan del Sur	8.4
Surigao del Norte	7.7
Surigao del Sur	8.7
Lanao del Sur	4.2
Maguindanao	0



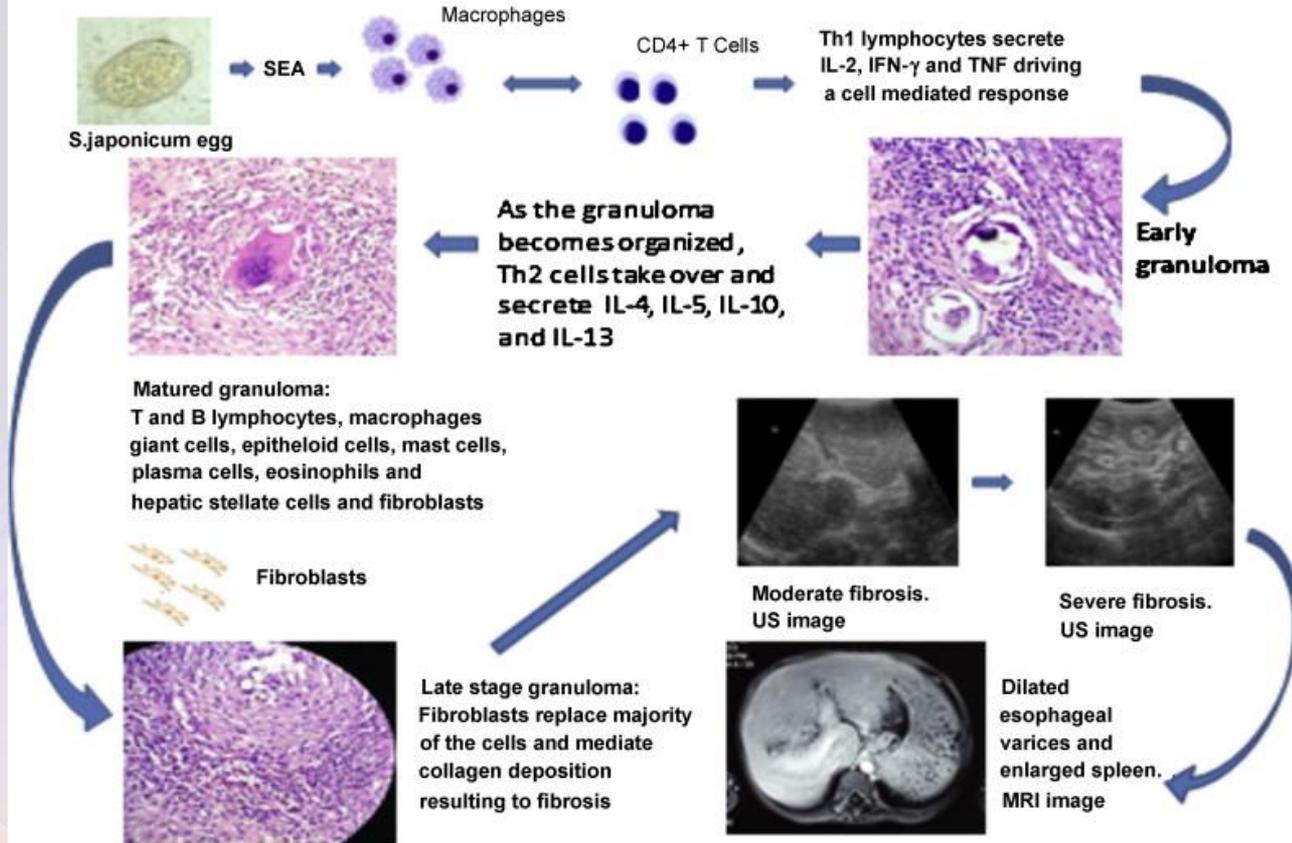
# Hepatic Schistosomiasis

## Key sonographic findings

- ❑ Widened echogenic portal tracts
- ❑ Initial hepatomegaly becoming contracted in later stages



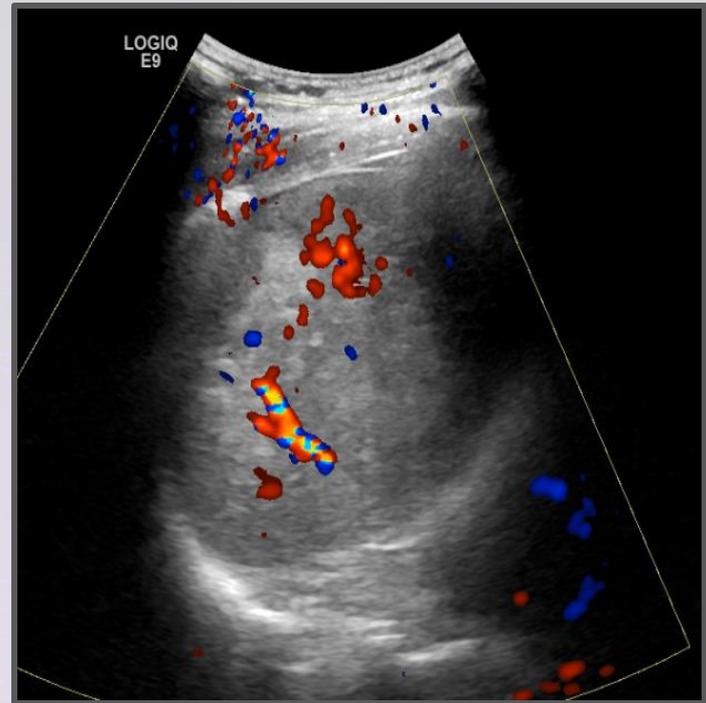
## Pathogenesis of hepatic fibrosis leading to hepatosplenic schistosomiasis japonica

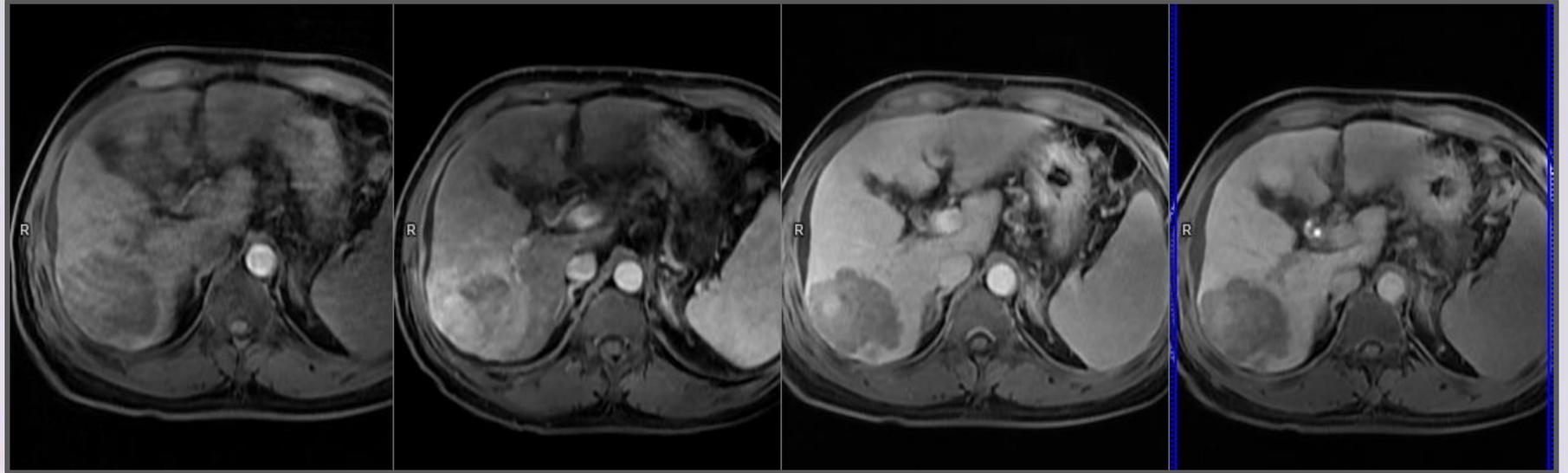


## CASE 3

- ❑ 60, male
- ❑ Known case of liver cirrhosis







IMPRESSION:  
**HEPATOCELLULAR  
CARCINOMA**



# Hepatocellular carcinoma

- ❑ One of the most common malignant tumors
- ❑ 5:1 (**Male** : Female)
- ❑ Alcoholic cirrhosis, Hepatitis C and Hepatitis B
- ❑ **Fatty liver** (Western)
- ❑ **Nonalcoholic fatty liver** (North America)
- ❑ **Aflatoxins, toxic metabolites** (Developing countries)



# Hepatocellular carcinoma

## Clinical Presentation

- ❑ Delayed until tumor reaches an advanced stage
- ❑ Occurs in the setting of **cirrhosis**
- ❑ Symptoms
  - ❑ RUQ pain
  - ❑ Weight loss
  - ❑ Abdominal swelling : (+) ascites
- ❑ Alpha-fetoprotein: elevated



# Hepatocellular carcinoma

3 forms

- Solitary
- Multiple
- Diffuse infiltration



# Hepatocellular carcinoma

Variable sonographic appearance

- Hypoechoic
- Complex
- Echogenic

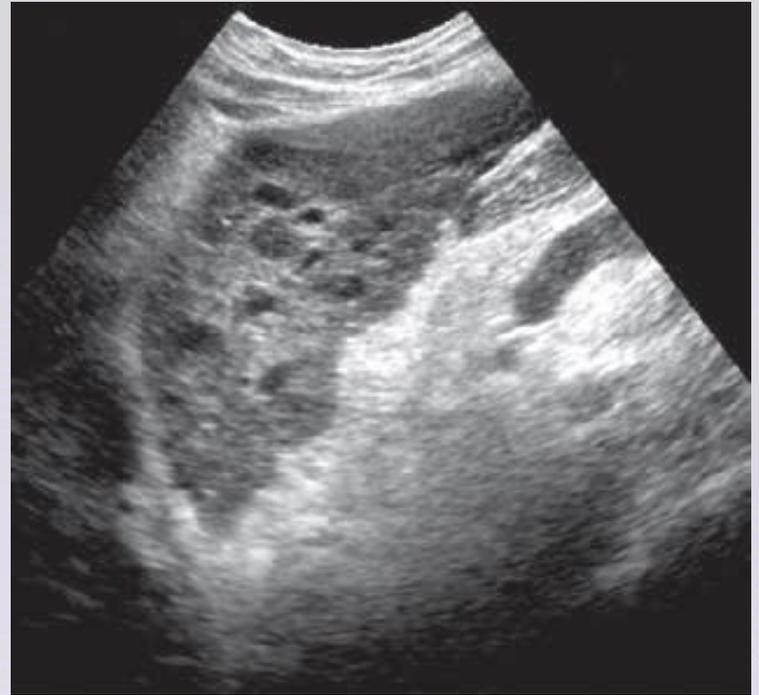


# Hepatocellular carcinoma

Variable sonographic appearance

**Hypoechoic** - small <5 cm : solid tumor without necrosis

- ❑ Thin, peripheral hypoechoic halo : fibrous capsule



# Hepatocellular carcinoma

Variable sonographic appearance

**Complex** : necrosis and fibrosis

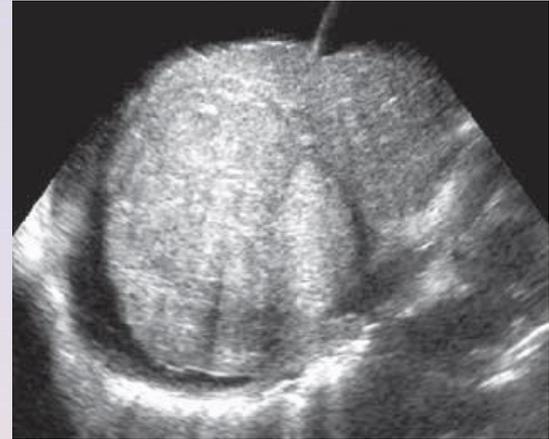


# Hepatocellular carcinoma

Variable sonographic appearance

## Echogenic

- Due to fatty metamorphosis or sinusoidal dilatation : indistinguishable from focal fatty infiltration, cavernous hemangiomas and lipomas



# Hepatocellular carcinoma

Variable sonographic appearance

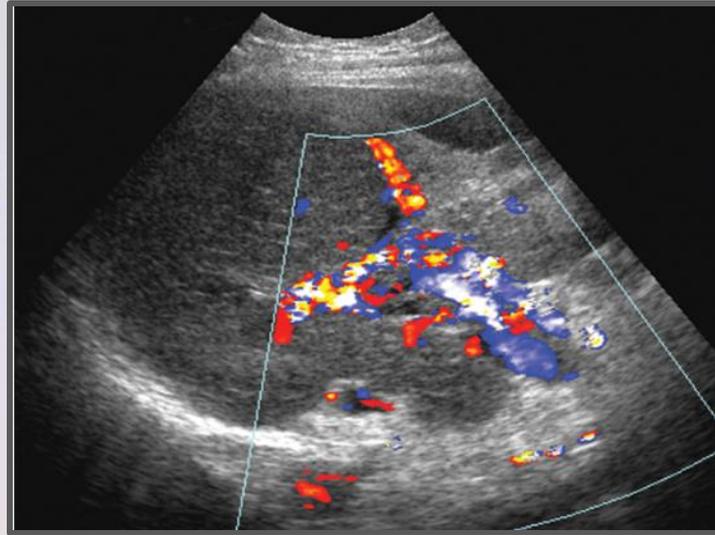
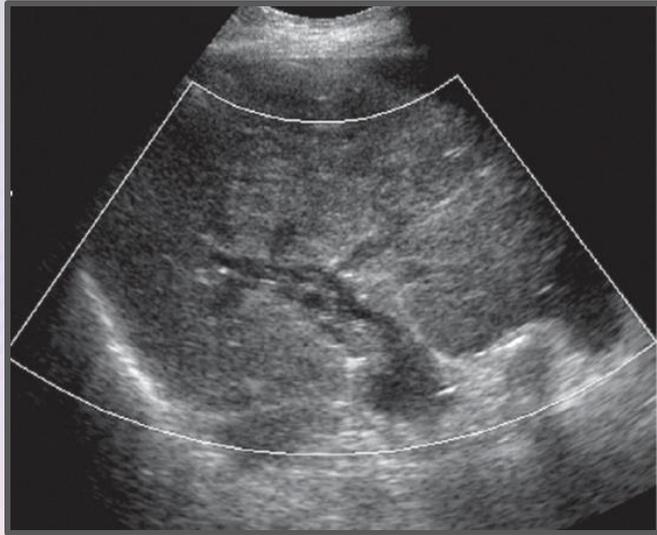
- ❑ Calcification : uncommon
- ❑ (+) Intratumoral fat : larger masses
- ❑ Rare surface lesions : rupture and hemoperitoneum



# Hepatocellular carcinoma

Key sonographic findings

- 30% to 60%: **portal vein involvement**



# Hepatocellular carcinoma

Key sonographic findings

Contrast-Enhanced Ultrasound

- ❑ Hypervascular, (+) dysmorphic vessels, non-enhancing necrosis/scarring



# Hepatocellular carcinoma

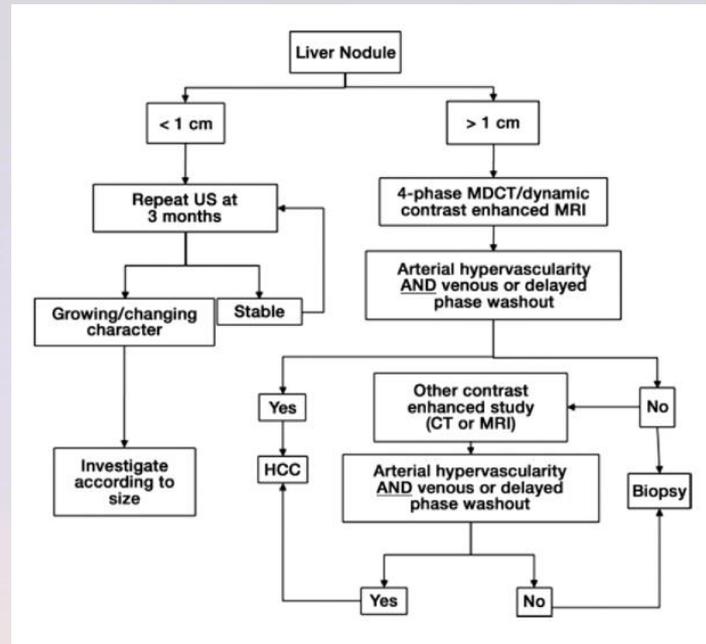
## Differential Diagnoses

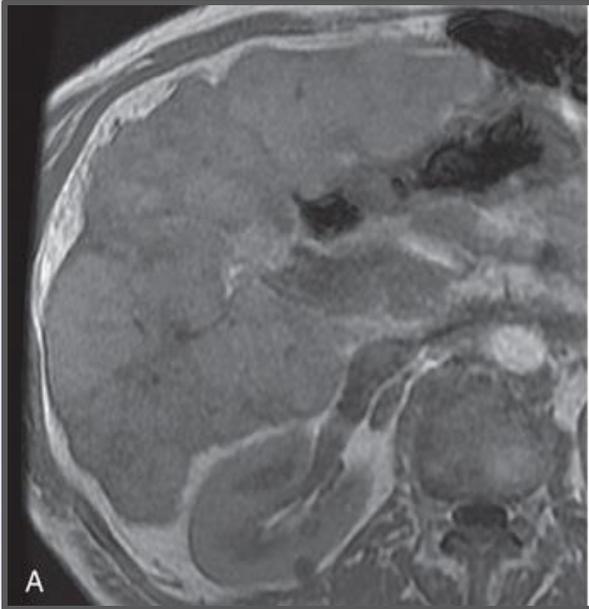
- Metastasis
- Focal nodular hyperplasia
- Hepatic adenoma
- Cholangiocarcinoma



# Hepatocellular carcinoma

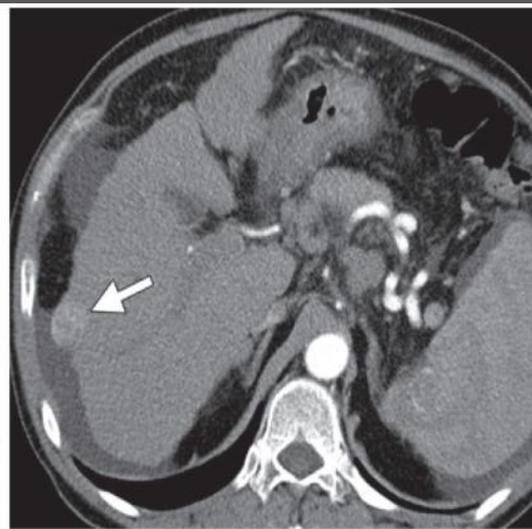
## Correlation with other Imaging Modalities



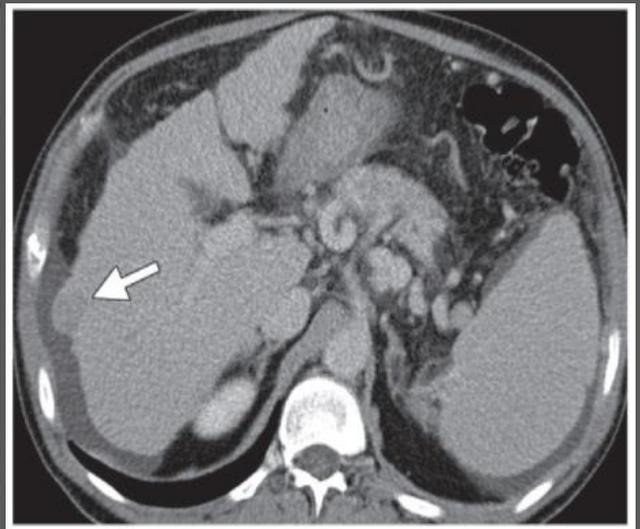




a.



b.



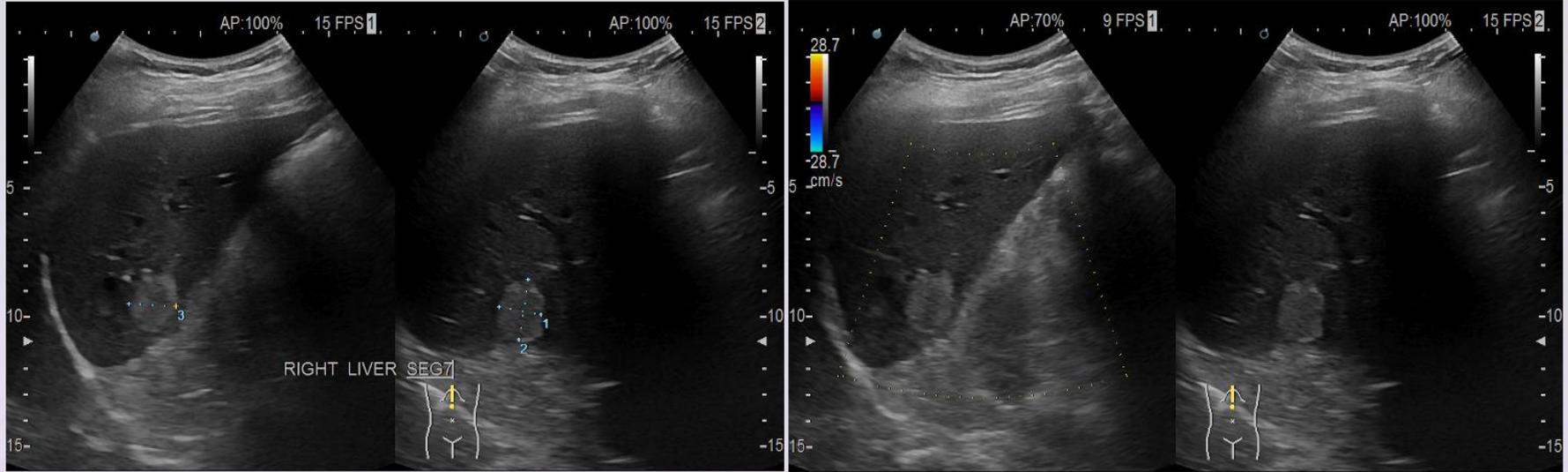
c.



# CASE 4

- 48, male
- No subjective complaint
- For General Check-up





# IMPRESSION: **HEPATIC HEMANGIOMA**



# Hepatic hemangioma

- ❑ Most common **benign tumor of the liver**
- ❑ ~4% of the population
- ❑ **Adults**
- ❑ ~5:1 (**Female : Male**)



# Hepatic hemangioma

- ❑ Multiple vascular channels
  - ❑ Single layer of endothelium - separated and supported by fibrous septa
  - ❑ Vascular spaces may contain thrombi

## Clinical presentation

- ❑ Asymptomatic
- ❑ Acute abdominal pain - large lesions (rare)



# Hepatic hemangioma

## Key sonographic findings

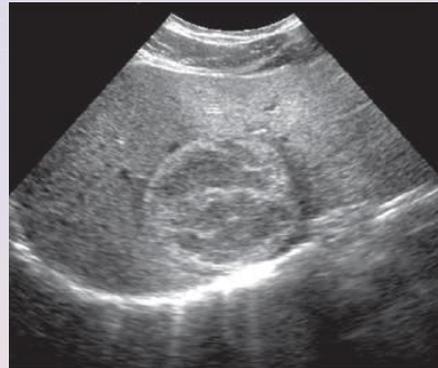
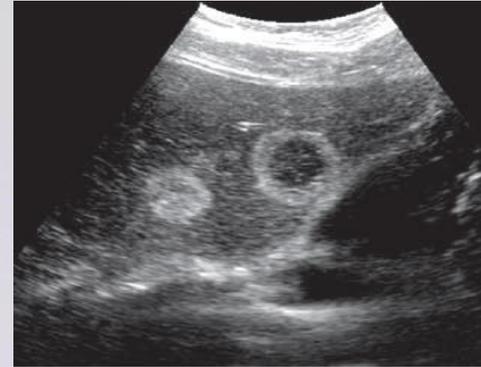
- ❑  $< 3$  cm in diameter
- ❑ Well-defined
- ❑ Homogeneous
- ❑ Hyperechoic
  - ❑ Numerous interfaces between the walls of the cavernous sinuses and the blood within



# Hepatic hemangioma

## Other sonographic findings

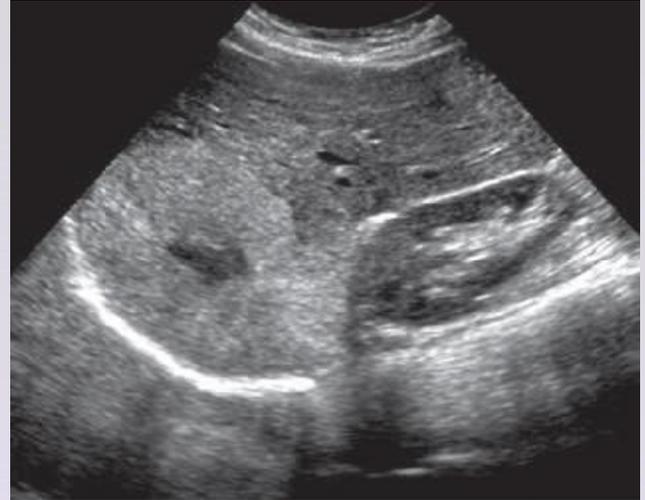
- ❑ Non homogeneous central area with hypoechoic portions
- ❑ Uniformly granular or lace-like
- ❑ Echogenic border
  - ❑ Thin rim or a thick rind
  - ❑ Scalloping of the margin



# Hepatic hemangioma

## Other sonographic findings

- ❑ Larger lesions
  - ❑ Heterogeneous with central hypoechoic foci
  - ❑ Fibrous collagen scars or large vascular spaces



# Hepatic hemangioma

## Differential Diagnoses

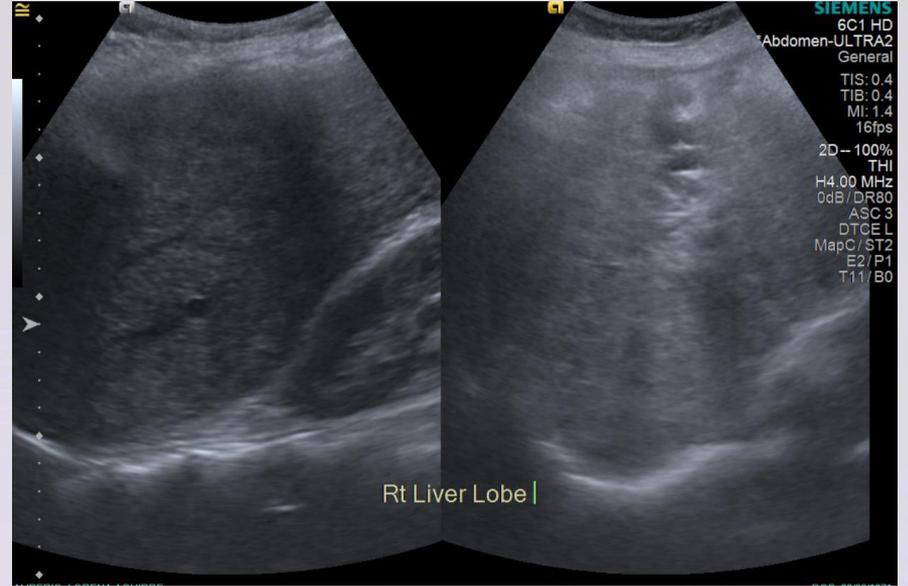
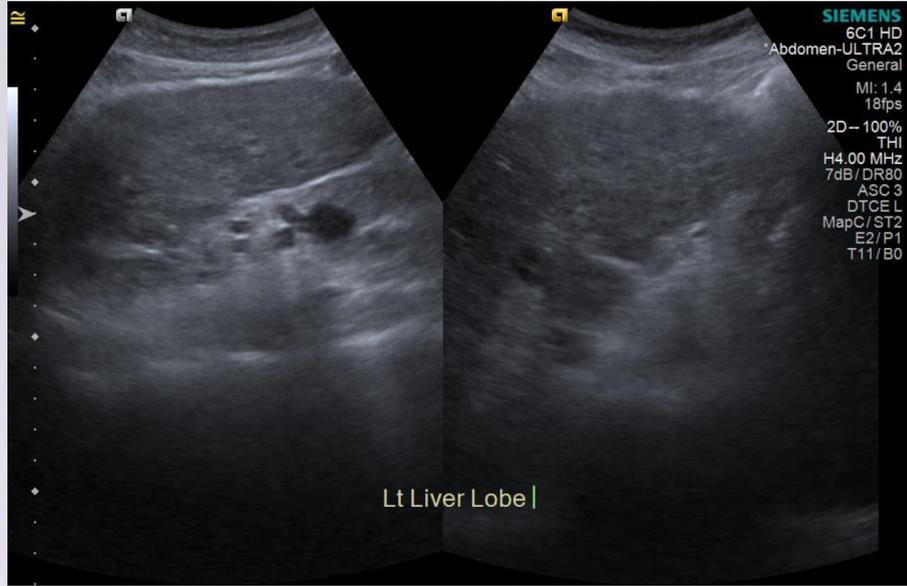
- Metastasis
- Hepatocellular carcinoma
- Focal fatty change

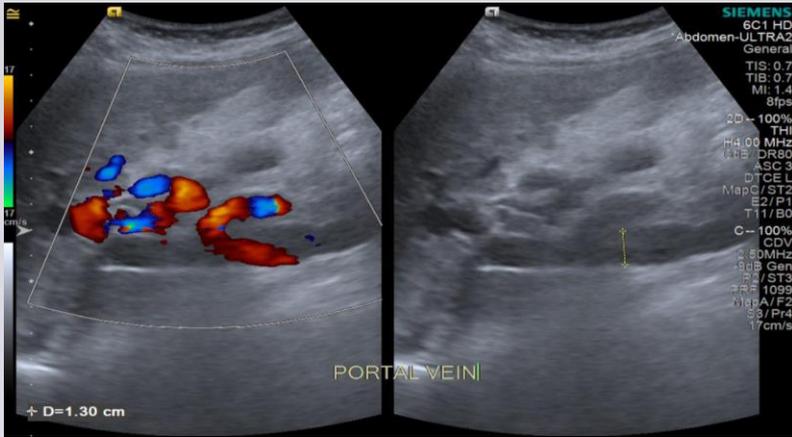


# CASE 5

- ❑ 52, female
- ❑ Chief complaint: bloatedness







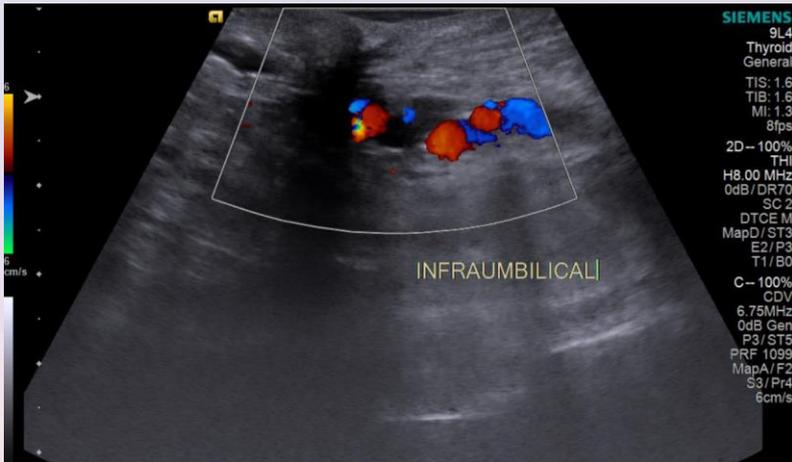
SIEMENS  
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17cm/s

PORTAL VEIN

+ D=1.30 cm

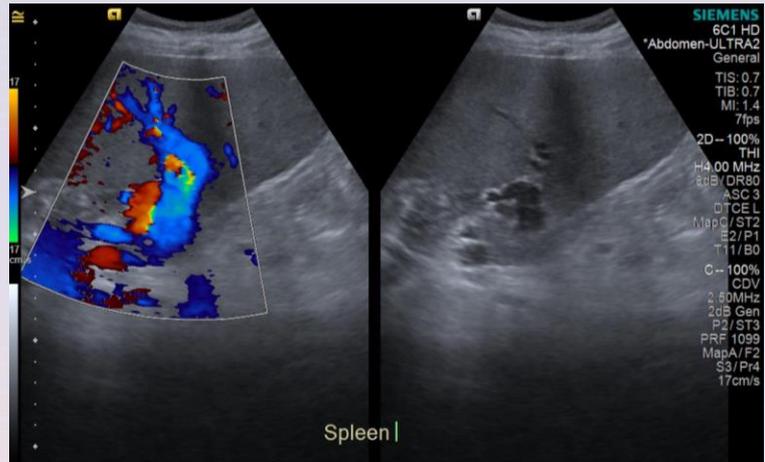


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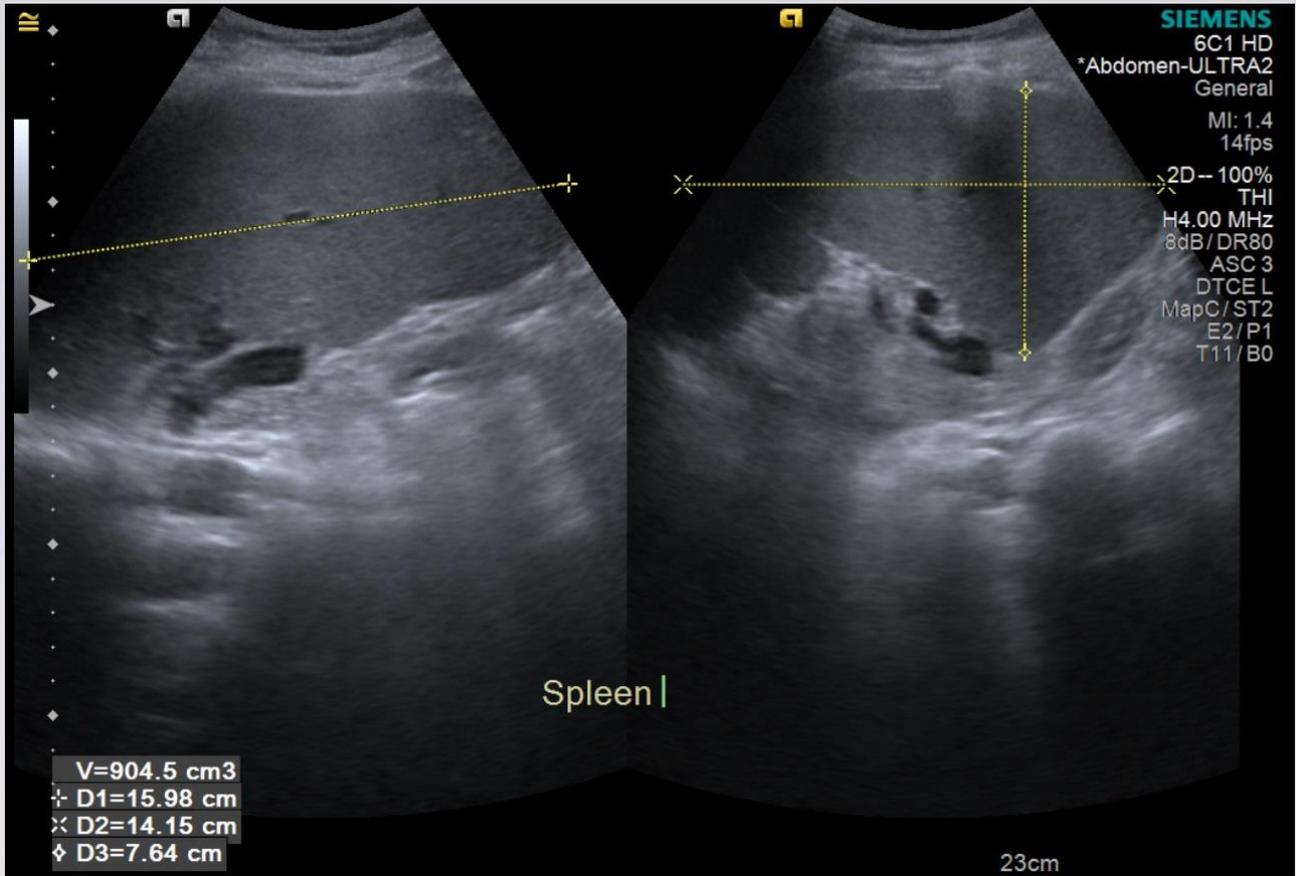
INFRAUMBILICAL



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E2/P1  
T11/B0  
C - 100%  
CDV  
2.50MHz  
2dB Gen  
P2/ST3  
PRF 1099  
MapA/F2  
S3/Pr4  
17cm/s

Spleen





**IMPRESSION:  
LIVER CIRRHOSIS WITH SIGNS  
OF PORTAL HYPERTENSION,  
SPLENOMEGALY**



# Liver cirrhosis

3 major pathologic mechanisms

- Cell death
- Fibrosis
- Regeneration

Classification

- Micronodular** nodules - 0.1 to 1.0 cm (**Alcohol**)
- Macronodular** nodules - up to 5 cm (**Chronic Viral Hepatitis**)



# Liver cirrhosis

## Clinical Presentation

- Hepatomegaly
- Jaundice
- Ascites



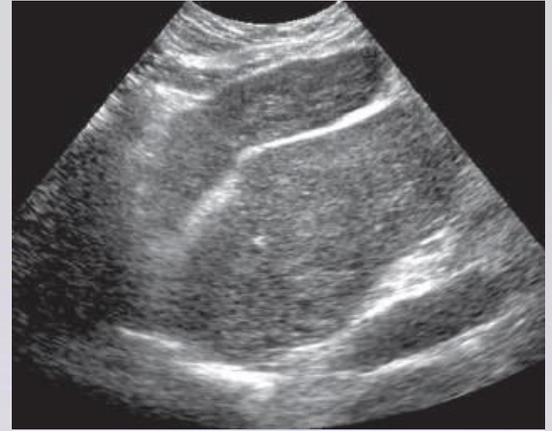
# Liver cirrhosis

Key sonographic findings

- ❑ **Volume redistribution**

Early stages - enlarged

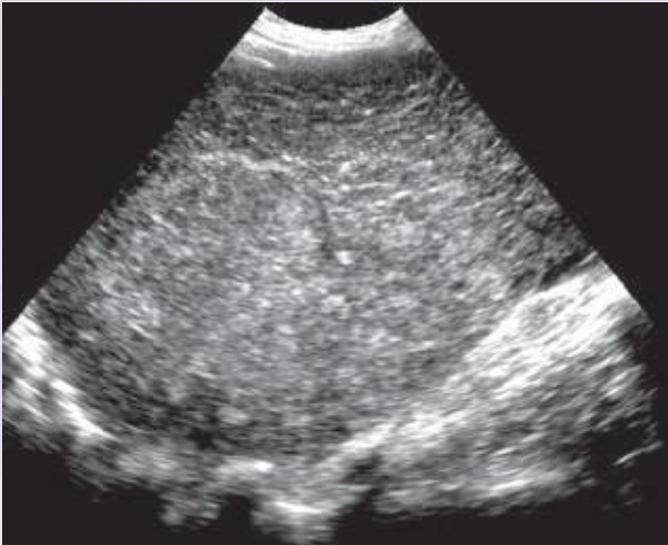
Advanced stages - small, with enlargement of the caudate, left lobe or both, compared with the right lobe



# Liver cirrhosis

Key sonographic findings

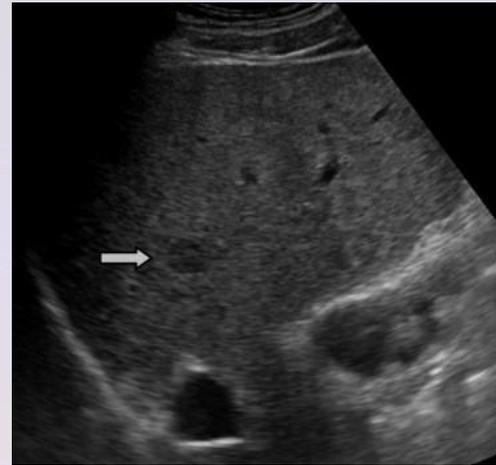
- ❑ **Coarse echotexture and nodular surfaces**



# Liver cirrhosis

## Key sonographic findings

- ❑ **Regenerative nodules** - isoechoic or hypoechoic with a thin, echogenic border that corresponds to fibrofatty connective tissue
- ❑ **Dysplastic nodules** - larger than regenerative nodules and are considered premalignant



# Liver cirrhosis

- ❑ Most common cause of **intrahepatic portal hypertension**
- ❑ >90% : Portal hypertension (West)
- ❑ Distorted vascular channels increase resistance to portal venous blood flow and obstruct hepatic venous flow



# Portal hypertension

Sonographic findings of portal hypertension include the secondary signs of:

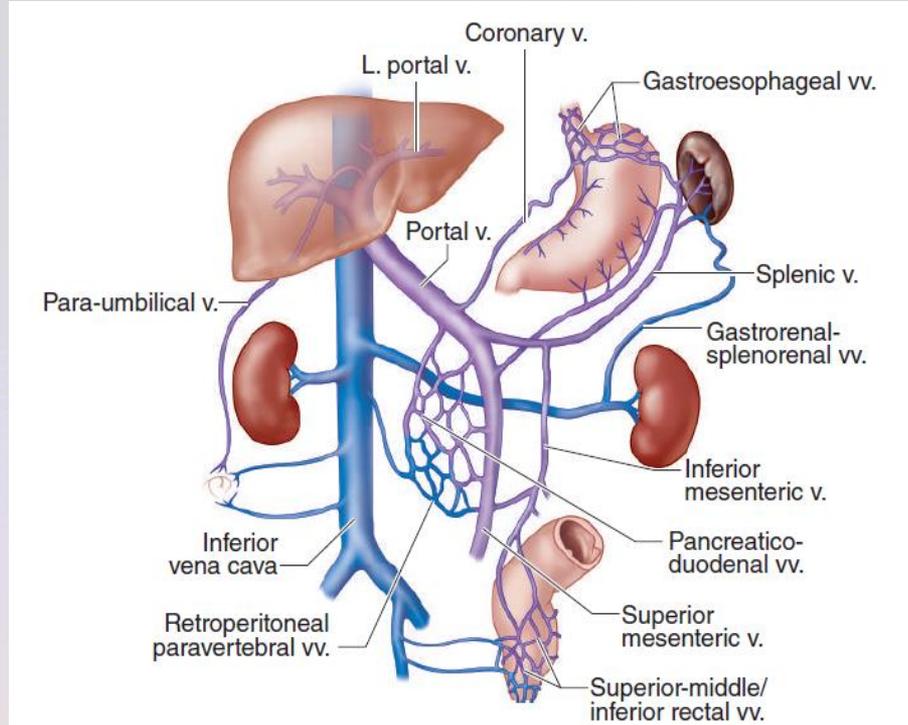
- Splenomegaly
- Ascites
- Portosystemic venous collaterals



# Portal hypertension

Major sites of portosystemic venous collaterals

- ❑ Gastroesophageal junction
- ❑ Paraumbilical
- ❑ Splenorenal and gastorenal
- ❑ Intestinal-retroperitoneal
- ❑ Hemorrhoidal



# Portal hypertension

- ❑ Dilated portal vein (>13mm)
- ❑ < 20% increase in the diameter of the portal vein with deep inspiration
- ❑ Portal vein loses its undulatory flow pattern → monophasic
- ❑ Increasing severity → flow becomes **biphasic** and finally **hepatofugal**



# Splenomegaly

- ❑ The normal size depends on gender, age and body height
- ❑ Massive Splenomegaly: >18 cm
- ❑ Most common finding is diffuse enlargement



# Splenomegaly

## Differential Diagnosis

- Infectious (mononucleosis, tuberculosis, malaria)
- Hematologic disorders (myelofibrosis, lymphoma, leukemia)
- Congestion (portal hypertension, portal/splenic vein thrombosis, congestive heart failure)
- Inflammation (sarcoidosis)
- Neoplasia (hemangioma, metastases)
- Infiltration (Gaucher disease)



# Splenomegaly

## Complications

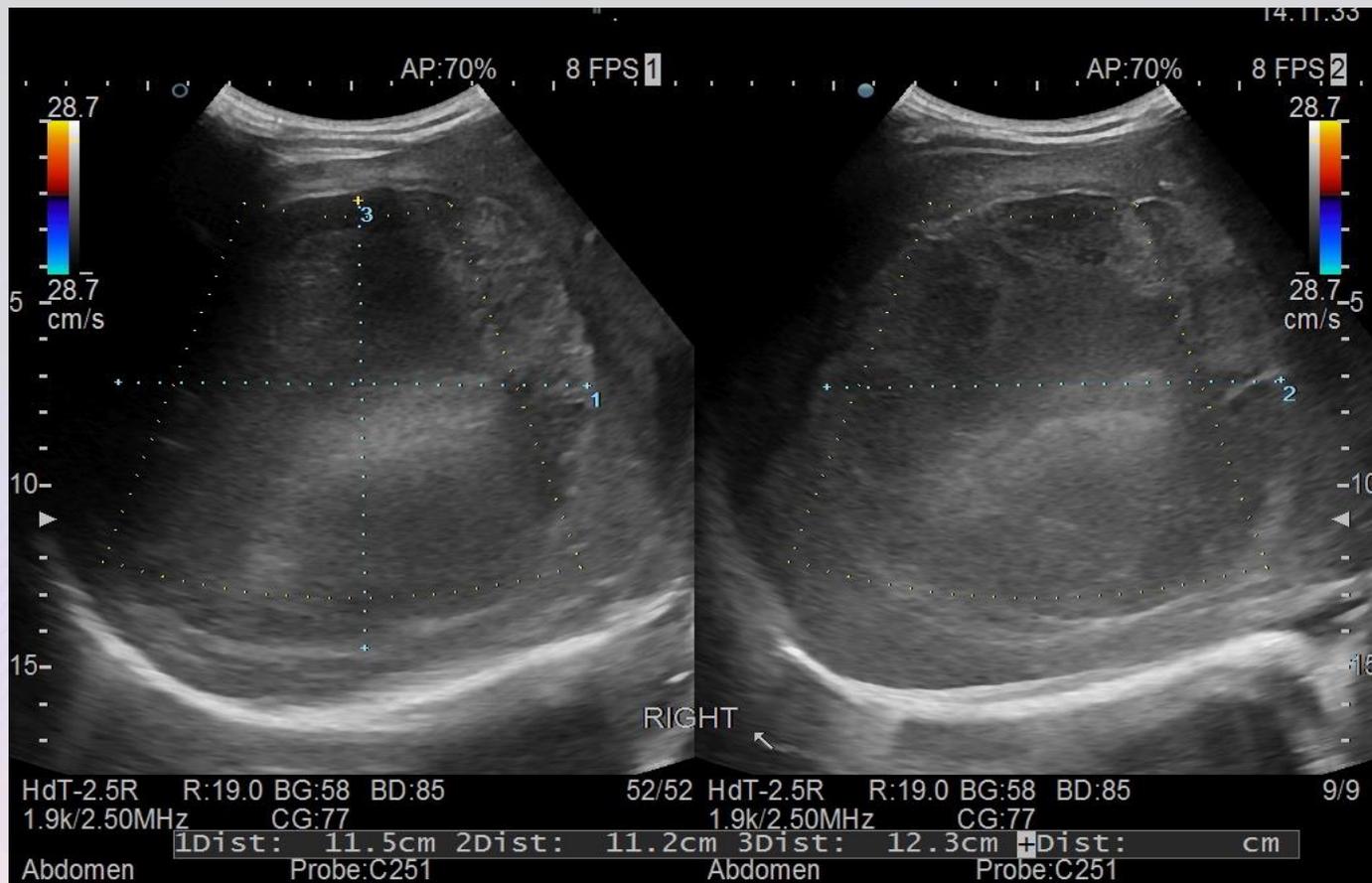
- Hypersplenism
- Spontaneous splenic rupture



## CASE 6

- 41, female
- Chief Complaint: right upper quadrant pain
- (+) fever
- (+) jaundice
- CBC: leukocytosis





# IMPRESSION: **LIVER ABSCESS**



# Liver abscess

## Routes of spread

- Direct extension from the biliary tract
- Hematogenous spread
- Direct inoculation

## Clinical Presentation

- Fever
- Malaise
- Anorexia
- Right upper quadrant pain
- Jaundice (25%)



# Liver abscess

## Key sonographic findings

- Varied
- Purulent abscess
  - Cystic : echo free to highly echogenic
- No vascularity within



# Liver abscess

## Key sonographic findings



Poorly defined  
**mass effect** or  
**phlegmon**



24 hours later:  
**Central area of**  
**liquefaction**

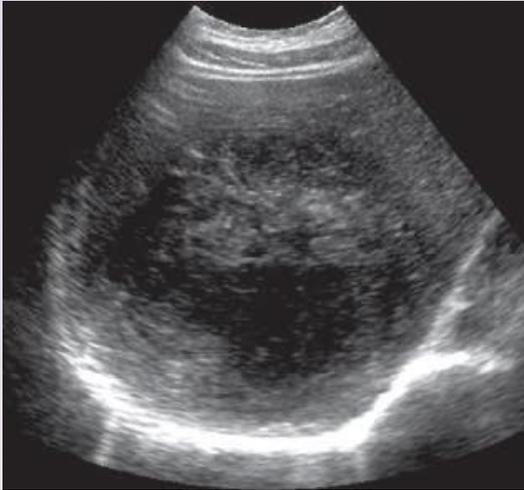
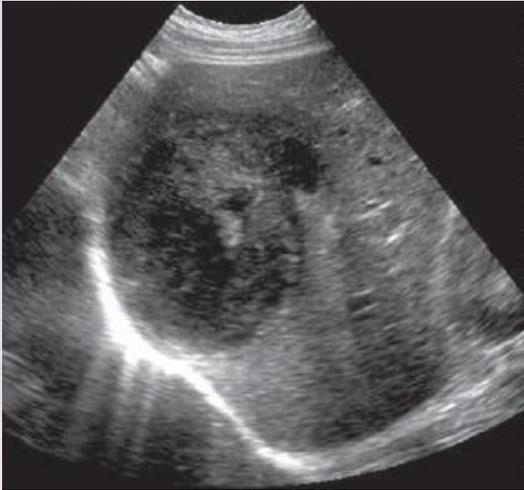


**Early abscess**  
Poorly marginated and  
bulges the liver capsule

# Liver abscess

## Key sonographic findings

- ❑ Regions of early suppuration: appear solid with altered echogenicity, usually hypoechoic



# Liver abscess

## Key sonographic findings

- ❑ Gas producing organisms: echogenic foci with a posterior reverberation artifacts



# Liver abscess

## Differential Diagnoses

- Amebic / echinococcal infection
- Simple cyst with hemorrhage
- Hematoma
- Necrotic or cystic neoplasm

## Ultrasound-guided liver aspiration

- Expeditious means to confirm the diagnosis



# References

- ❑ Rumack, Carol M., and Deborah Levine. *Diagnostic Ultrasound*. 5th ed., Elsevier, 2018. 2 vols.
- ❑ McEvoy, Sinead H., et al. "Hepatocellular carcinoma: Illustrated guide to systematic radiologic diagnosis and staging according to guidelines of the American Association for the study of liver diseases." *RadioGraphics*, vol. 33, no. 6, Oct. 2013, pp. 1653–1668, <https://doi.org/10.1148/rg.336125104>.
- ❑ David U. Olveda, Remigio M. Olveda, Donald P. McManus, Pengfei Cai, Thao N.P. Chau, Alfred K. Lam, Yuesheng Li, Donald A. Harn, Marilyn L. Vinluan, Allen G.P. Ross, The chronic enteropathogenic disease schistosomiasis, *International Journal of Infectious Diseases*, Volume 28, 2014, Pages 193-203, ISSN 1201-9712

