54 year old woman with a liver mass
Overview

- Liver anatomy
- Presentation of our patient
- Differential diagnosis
- Menu of tests
- Radiographic images
- Discussion of our patient’s diagnosis
Anatomy

- Anatomic lobes
  - Right, left, caudate, and quadrate
- 8 functional segments
- Vascular and biliary supply
- Dual blood supply
  - Hepatic artery (25%)
  - Portal vein (75%)
- Venous drainage
  - Sinusoids -> central v. -> interlobular v. -> hepatic v. -> IVC

http://www.ctisus.org/
Our patient

- 54 year old woman
- Hepatitis C
- Recently:
  - Fever, nausea, night sweats, and fatigue
  - Abdominal pain (R lower and upper quadrants)
  - Denies weight loss
  - Fecal occult blood: trace positive
- Abnormal surveillance ultrasound in segment 5
Differential diagnosis

**Benign**
- **Common:**
  - Hemangioma
  - Focal nodular hyperplasia
  - Nodular regenerative hyperplasia
  - Hepatocellular adenoma
  - Cyst
- **Uncommon:**
  - Cholangioma

**Malignant**
- **Common:**
  - Metastases
  - Hepatocellular carcinoma
  - Cholangiocarcinoma
- **Uncommon:**
  - Fibrolamellar carcinoma
  - Angiosarcoma
 Imaging studies

- **Ultrasound**
  - Screening for Hep C patients
  - Frequently non-specific, requires additional studies

- **MR**
  - Better for distinguishing regenerating nodules from hepatocellular carcinoma in cirrhotic patients
  - Better sensitivity for small lesions
  - Expensive

- **CT**
  - Fast and less expensive
Multidetector CT (MDCT)

✓ Non-contrast

✓ Fast bolus IV contrast
  ✓ Hepatic arterial phase (30 s)
    ✓ Peak contrast within hepatic artery
    ✓ Sensitive for small arterially-supplied masses
  ✓ Portal venous phase (60 s)
    ✓ Peak contrast within portal vein
    ✓ Homogeneous enhancement of hepatic parenchyma
  ✓ Delayed equilibrium phase (3 min)
    ✓ Hepatic vein
    ✓ Interstitium
MDCT

Non-contrast

Hepatic arterial phase

Early arterial enhancement

IVC

PACS (BIDMC)
MDCT

Portal venous phase

Delayed equilibrium phase

PACS (BIDMC)
MDCT

Non-contrast

Hepatic arterial phase

Hepatic a.

Multiple enhancing areas

PACS (BIDMC)
MDCT

Portal venous phase

Delayed equilibrium phase

Splenic v.

Portal vein

PACS (BIDMC)
MDCT

Non-contrast

Hepatic arterial phase

Enhancing areas

IVC

PACS (BIDMC)
MDCT

Portal venous phase

Delayed equilibrium phase

Hepatic v.

PACS (BIDMC)
MDCT

Delayed equilibrium phase
MDCT

Hepatic arterial phase

Tumor thrombus
Diagnosis

- Significant findings:
  - Chronic liver disease
  - Elevated AFP (53,905)
  - Multifocal, early enhancing, heterogeneous mass in hepatic arterial phase
  - Hypodense or isodense in portal venous and delayed phases
  - Venous invasion

- DDx of early enhancing liver lesion:
  - Hemangioma
  - Focal nodular hyperplasia
  - Metastasis
  - Hepatocellular carcinoma
  - Cholangiocarcinoma

Ultrasound-guided biopsy revealed hepatocellular carcinoma
Hepatocellular carcinoma

- AKA hepatoma
- Most frequent primary visceral malignancy in the world
- 80-90% of all primary liver malignancies
- Incidence:
  - Western hemisphere < 1%
  - Africa, Asia (Japan) 5%
  - Male > Female (2:1 to 8:1)
Etiology

- **Cirrhosis:**
  - 12% Chronic hepatitis B and C
  - 5% Alcoholic cirrhosis
  - 14-30% Hemochromatosis

- **Carcinogens:**
  - Aflatoxin, siderosis, thorotrast, OCPs, anabolic androgens

- **Metabolic disorders:**
  - Alpha-1 antitrypsin, galactosemia, type 1 glycogen storage disease (Von Gierke), Wilson’s, tyrosinosi
Hepatocellular carcinoma

✓ **Prognosis:**
  ✓ Frequently late clinical presentation
  ✓ Median survival 6-20 months

✓ **Treatment:**
  ✓ Surgical resection
  ✓ Ablation (cryo, chemoembolization, EtOH, RF)
  ✓ Chemotherapy
  ✓ Radiation
  ✓ Liver transplantation
Radiographic Features

✓ 3 forms:
  • Solitary (25-60%)
  • Multifocal nodules (15-25%)
  • Diffuse (10-25%)

✓ Vascular invasion is common
  • Portal vein 35%
  • Hepatic vein 15%

✓ Mets: lung > lymph nodes, adrenal > bone
References

- Schwartz, JM, Carithers, Jr., RL. Epidemiology and etiologic associations of primary hepatocellular carcinoma. *Up-to-date Online* 12.3.
- Schwartz, JM, Carithers, Jr., RL. Clinical features, diagnosis, and screening for primary hepatocellular carcinoma. *Up-to-date Online* 12.3.
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