Focal Liver Lesion

Mohamed Alassas, MD
Case

- 45 yo female presented with recurrent RUQ abdominal pain. Normal exam and lab investigations.

- US of the abdomen shows multiple gallbladder stones. Also showed a 3 cm solid, well-defined, uniformly echogenic liver mass.
Focal Liver Lesion

- How to identify and diagnose the radiologic finding?
- What are the diagnostic tools?
- What is the management of the liver lesion? resection or intervention vs observation
The differential diagnosis of focal liver lesions includes a broad spectrum of benign, malignant, and infectious etiologies.
Differential Diagnosis

- Cystic vs solid lesion
- Benign vs malignant
- Hemangioma is the most common benign lesion
- Metastatic neoplasm is the most common malignant lesion
Differential Diagnosis

- Focal Fatty infiltration
- Simple Cyst
- Hemangioma
- Focal Nodular Hyperplasia
- Adenoma
- Metastatic lesion
- Hepatocellular Carcinoma
- Cholangiocarcinoma
- Cirrhotic nodule
- Pyogenic abscess
- Amebic abscess
- Hydatid cyst
Differential Diagnosis

Points in clinical history to narrow D.D.

- Age
- Gender
- Use of oral contraceptives
- Presence of Cirrhosis
- Fever
- Travel history
- Extrahepatic malignancy
Tumor Markers

Alpha fetoprotein

- Alpha globulin normally present in high concentration in fetal blood
- Elevated in 60-70% of HCC
- Elevated in acute and chronic hepatitis and germ cell tumors
- Levels above 200 mcg/L are 99% specific
Tumor Markers

**CA 19-9**
- Elevated in pancreatoco-biliary malignancy
- Elevated in many other benign and malignant conditions (e.g. chronic pancreatitis, bilirary obstruction, liver cirrhosis, inflammatory bowel disease, colorectal cancer, gastric cancer, ovarian cancer, HCC)

**CEA**
- Elevated mainly in colorectal disease
- Non specific: Elevated in other benign and malignant diseases
Ultrasound

Advantages

- Safe with no radiation hazard
- Well-tolerated
- Cost effective
- Real-time imaging, quick and interactive
- Duplex US adds valuable information
- Specialized US:
  - endoscopic
  - Laparoscopic u/s is essential in liver surgery
Ultrasound

Disadvantages

- Operator dependent
- Difficult to review due to small field of view
CAT Scan

- The actual work horse for evaluation of liver disease
- Liver imaging was revolutionized with the invention of the MDCT
- Fast scanning time of MDCT made multiphasic liver scanning possible
- Improved resolution and ability to produce 3D imaging added valuable information
Observing the pattern of enhancement of the focal liver lesion during different phases of contrast perfusion allows to detect characteristic vascular morphology that differentiate liver lesions and allow accurate diagnosis
CAT Scan

Disadvantages

• Exposure to ionizing radiation
• Contrast allergy
• Limited in patients with renal impairment due to inability to use contrast
Liver MRI

Advantages

• More sensitive especially for smaller lesions
• Higher resolution
• Better detection and characterization of liver lesions
• No Ionizing radiation

Disadvantages

• Long procedure time
• Higher cost
PET Scan

- Useful in detecting extrahepatic disease in patients with metastatic cancer
- Inferior to contrast CT or MRI in detecting liver lesions
Liver Biopsy

• Most focal liver lesions have CT and MRI characteristics which makes liver biopsy unnecessary

• Role of liver biopsy
  • Verifying the diagnosis in equivocal cases
  • Establishing the diagnosis in unresectable cases
  • Assessing the liver parenchyma for cirrhosis or liver damage
Focal Fatty Infiltration

- Hepatic steatosis
- Non-alcoholic steatohepatitis is observed in 7-10% of liver biopsies
- May be diffuse or focal
- When focal may simulate a mass like process
- Obesity is the major risk factor
Hepatic Cystic Lesion

- Most commonly is a simple cyst
- Incidence is 2.5%
- Asymptomatic incidental finding
- Could be single or multiple
Hepatic Cystic Lesion Differential Diagnosis

**Developmental**
- Simple hepatic cyst
- Bile duct hamartoma
- Caroli disease

**Neoplastic**
- Biliary cystadenoma and cystadenocarcinoma
- Cystic HCC
- Cystic metastases

**Inflammatory**
- Abscess: pyogenic or amebic
- Hydatid cyst

**Others**
- Hematoma
- Biloma
- Pancreatic pseudocyst
Hepatic Cystic Lesion

- Biliary cystadenoma
- Biliary cystadenocarcinoma
Hepatic Cystic Lesion

- Cystic subtype of hepatocellular carcinoma
Hepatic Cystic Lesion

- Cystic metastatic tumors
Hepatic Hemangioma

- A mass of blood vessels irregular in arrangement
- The most common benign tumor of the liver
- Incidence reported at 2%
- Female to male ratio is 4-6 : 1
- Presents as incidental findings
- Large hemangioma may cause pain or compression symptoms
Hepatic Hemangioma

CT Scan

• Hypodense lesion on precontrast image

• Peripheral globular enhancement with progressive fill in

Radiol Bras. 2008 Mar/Abr;41(2):119–127
Hepatic Hemangioma

**MRI**

- T1 weighted: low signal
- T2 weighted: High signal
- Enhanced: Similar to CT
Hepatic Hemangioma

**Indications for intervention**

- Symptomatic hemangioma
- Rapidly growing hemangioma
- Hemorrhage or rupture

**Types of intervention**

- Surgical resection or enucleation
- Transarterial embolization
- Ablation
- Irradiation
Focal Nodular Hyperplasia

- Benign tumor
- Second most common tumor of the liver
- Incidence 0.9%
- Female : Male is 8 : 1
- Usually discovered incidentally and rarely symptomatic
- No malignant potential
- Diagnosis is radiologic and biopsy is rarely required
Focal Nodular Hyperplasia

• Well circumscribed mass with central scar

http://www.humpath.com/spip.php?article74
Focal Nodular Hyperplasia

Benign, tumor-like lesion consisting of hyperplastic parenchymal nodules with abundant abnormal vessels typically arising from a central stellate-shaped scar

http://www.pathologyoutlines.com/caseofweek/case200788image3.jpg
Focal Nodular Hyperplasia

CT Scan

• Unenhanced CT: Hypodense to liver

• Arterial phase: Enhancing lesion with central non-enhancing scar

• Venous phase: Isodense to liver

• Delayed phase: Central scar may enhance

Focal Nodular Hyperplasia

MRI

• T1-weighted: Isointense, central scar is low signal

• T2-weighted: Iso to mildly hyperintense, central scar is high signal

• Gadolinium enhanced: Similar to contrast CT

• MRI is more sensitive in detecting the central scar

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Focal Nodular Hyperplasia

Management

• Observation

• Indications for surgical resection:
  • rapidly growing tumor
  • symptomatic tumor
  • intratumoral bleeding

• Transarterial embolization is an alternative to surgery
Hepatocellular Adenoma

- Rare benign neoplasm of the liver
- Risk factors:
  - Women on contraceptives
  - Men using anabolic steroids
  - Other risk factors: DM, glycogen storage disorder (usually present as multiple adenomas)
- Presentation
  - Incidental
  - Right upper quadrant pain
  - Usually solitary. Multiple in 20% of the cases
  - May present with intratumoral bleeding
Hepatocellular Adenoma

- Hepatic adenomas are, typically, well-circumscribed nodules that consist of sheets of hepatocytes with a bubbly vacuolated cytoplasm. The hepatocytes are on a regular reticulin scaffold and less or equal to three cell thick.

- The histologic diagnosis of hepatic adenomas can be aided by reticulin staining. In hepatic adenomas, the reticulin scaffold is preserved and hepatocytes do not form layers of four or more hepatocytes, as is seen in hepatocellular carcinoma.

- Cells resemble normal hepatocytes and are traversed by blood vessels but lack portal tracts or central veins.
Hepatocellular Adenoma

**CT**
- Unenhanced: Hypodense or variable
- Arterial: Hyperdense
- Venous and delayed: Isodense

**MRI**
- High signal on non contrast MRI
- Hypervascular on MRI with contrast
Complications

• Risk of complications is higher in tumors > 5cm

• Bleeding: risk is 30%

• Malignant degeneration: risk is about 5%
Hepatocellular Adenoma

Management

• Discontinue contraceptives
• Avoid pregnancy - risk of bleeding
• Tumors less than 5 cm may regress off synthetic steroids
• Surgery is indicated for:
  • large tumors
  • all symptomatic tumors
  • in women who to desire to become pregnant
  • for complications e.g. bleeding
Hepatocellular Carcinoma

- Most common type of primary liver cancer
- The incidence of HCC is rising in the US and tripled over the past 30 years
- HCC incidence is higher in developing countries

| Age-standardized incidence per 100,000 inhabitants |
|-----------------|---------|---------|----------------|
| Overall         | 1.6     | 4.9     | 4.5            |
| Men             | 2.6     | 7.9     | 4.1            |
| Women           | 0.8     | 2.3     | 3.8            |

Estimated Liver Cancer Incidence Worldwide in 2008: Women

GLOBCAN 2008, International Agency for Research on Cancer
Hepatocellular Carcinoma

- In most cases HCC is preceded by liver cirrhosis
- Risk factors are commonly different causes of cirrhosis
Hepatocellular Carcinoma

- Risk factors
  - Viral hepatitis B & C
  - Non viral factors
    - Alcoholic cirrhosis
    - Exposure to aflatoxin
    - NASH
    - Hereditary hemochromatosis
    - Alpha-1 antitrypsin deficiency
    - Wilson’s disease
    - Primary biliary cirrhosis
Hepatocellular Carcinoma

- In the US and developed countries, the main risk factor is HCV and alcoholic cirrhosis.
- In developing countries, HCC incidence is related to HBV.
Hepatocellular Carcinoma

CT

• Unenhanced: Hypodense to isodense

• Arterial: Hypervascular

• Venous: Hypodense, rapid washout

• Delayed: Isodense
Hepatocellular Carcinoma

MRI

- Variable on T1 and T2 weighted images
- Enhanced MRI: Hypervascular on arterial phase, rapid washout on venous phase, delayed rim enhancement of fibrous capsule
HCC Treatment Options

Resection

- Requirements:
  - No extrahepatic disease
  - Solitary lesion
  - Adequate residual liver function
HCC Treatment Options

Transplant

• For unresectable lesions due to poor liver function

• Requirements:
  • No extrahepatic disease
  • Solitary lesion <5cm or <3 lesions <3 cm
HCC Treatment Options

**Ablation**

- Microwave or RFA ablation
- For those who do not meet resection or transplant criteria
- Disease confined to the liver
HCC Treatment Options

Chemoembolization (TACE)

- Large unresectable tumors not amenable to ablation

- Requirements:
  - No PV thrombosis
  - No encephalopathy

http://www.hopkins-gi.org
Cholangiocarcinoma

- Tumor arises from the bile duct epithelium
- Incidence in the United States is 1-2/100,000
- Extrahepatic, gallbladder and intrahepatic
- Risk factors:
  - Primary sclerosing cholangitis
  - Alcoholic liver disease
  - Cirrhosis
  - Viral hepatitis
  - Choledochal cysts
  - Congenital hepatic fibrosis
  - Parasitic infection
Cholangiocarcinoma

CT Scan

- Unenhanced: Hypodense
- Arterial phase: Isodense
- Venous and delayed phase: Increasing enhancement
Cholangiocarcinoma

• MRI

• T1 weighted: Low signal

• T2 weighted: High signal

• Arterial phase: Peripheral enhancement

• Portal venous: Centripetal enhancement
Metastatic Liver Lesions

- The most common malignant liver lesion
- Liver is the most common site of solid organ metastases
- Most common lesions are:
  - Colon
  - Lung
  - Breast
  - Pancreas
  - Neuroendocrine
  - Melanoma
  - Stomach
Metastatic Liver Lesions

- Hypervascular tumors
  - Metastatic melanoma
  - Metastatic Renal cell carcinoma
  - Metastatic neuroendocrine tumors
  - Metastatic sarcoma
- Hypovascular tumors
  - Metastatic colorectal cancer
  - Metastatic lung cancer
  - Metastatic pancreatic cancer
Case

• 59 yo women with no significant past medical history presented with bleeding per rectum and fatigue
• Colonoscopy showed sigmoid colon cancer
• CT chest, abdomen and pelvis showed multiple large liver metastases involving the right hepatic lobe
• No evidence of extrahepatic metastases
Case

- Patient received neoadjuvant chemotherapy with Folfox and Bivacizumab
- After 6 cycles restaging with PET CT and liver MRI showed no evidence of progression of disease and about 50% reduction in the hepatic tumor volume
Case

- Laparoscopic sigmoid colectomy and right hepatectomy
Case
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- The Incidence and Epidemiology of Hepatocellular Carcinoma: A Global and Regional Perspective Alan P. Venook, Christos Papandreou, Junji Furuse, Laura Ladrón de Guevara The Oncologist 2010; 15:5-13; doi:10.1634/theoncologist.2010-S4-05
Thank you
Cancer Incidence Worldwide

Breakdown of the estimated 12.7 million new cases, World-age standardised incidence rates and the most commonly diagnosed cancers by the different regions of the world, 2008.

Map updated February 2011
http://info.cancerresearchuk.org/cancerstats/