Evaluation of Liver Mass Lesions

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Objectives

• Clinical classification of liver masses
• Evaluation of liver mass lesions
• Common benign mass lesions
  • Clinical features
  • Imaging characteristics
  • Optimal management
• Hepatocellular carcinoma

Three Categories of Liver Masses

1. Benign lesions usually requiring no further intervention
2. Benign lesions requiring further investigation and therapy
3. Malignant lesions requiring appropriate management
Three Categories of Liver Masses

1. Benign lesions usually requiring no further intervention
   • Cavernous hemangioma
   • Focal nodular hyperplasia
   • Simple cyst
   • Focal fatty change or sparing

2. Benign lesions requiring further investigation and therapy
   • Hepatic adenoma and adenomatosis
   • Biliary cystadenoma
   • Hepatic abscess – pyogenic or amebic
   • Echinococcal cyst
   • Granulomatous inflammation
   • Inflammatory pseudotumor
Three Categories of Liver Masses

3. Malignant lesions requiring appropriate management
   • Metastases from other primary sites
   • Hepatocellular carcinoma
   • Cholangiocarcinoma
   • Biliary cystadenocarcinoma
   • Lymphoma
   • Hepatic angiosarcoma

Clinical Approach to Liver Mass Lesions

• Symptoms
• Physical examination
• Laboratory studies
• Imaging characteristics: Ultrasound, CT, MRI (especially with newer hepatobiliary contrast agents)
• Need for biopsy
• Optimal management
Cavernous Hemangioma

Epidemiology

• Most common benign tumor of the liver (7% of autopsies)
• Female predominance (1.5-5:1)
• Multicentric in up to 30% of cases

Cavernous Hemangioma: Histology

Network of vascular spaces separated by thin, fibrous stroma

Large hemangiomas may have areas of thrombosis, scarring, and calcification
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Cavernous Hemangioma

45 yo F with a Liver Mass

Peripheral nodular arterial phase enhancement, with fill-in to the center in the venous phase
Management of Cavernous Hemangioma

- Observation
  - Asymptomatic hemangiomas

- Surgical resection
  - Pain
  - Enlarging over time
  - Uncertain diagnosis
  - Kasabach-Merritt syndrome

Focal Nodular Hyperplasia

Epidemiology

- Women of childbearing age
- Female predominance (2-4:1)
- Multiple in 10-20% of cases
Focal Nodular Hyperplasia: Histology

- Benign reaction to congenital arterial malformation
- Vascular stellate scar and septal fibrosis
- Polyclonal hepatocytes and functioning bile ductules
- Aspirates indistinguishable from adenoma

MRI of Focal Nodular Hyperplasia
Sodium Gadoxetate MRI for Distinguishing FNH from Adenoma

- Brightly enhancing in arterial phase
- Isointense in portal venous phase
- Retained intensity in the hepatobiliary phase supports the diagnosis of FNH

Hepatic Adenoma & Adenomatosis

Epidemiology

- 3rd and 4th decade
- Female predominance (2-6:1)
- Association with oral contraceptive use
  - Relative risk (RR) 2.5 for 3-5 years of use
  - RR 25-40 after 9 years of use
- Familial in maturity onset diabetes of the young and glycogen storage diseases
- Hemochromatosis, acromegaly, androgen use
- Recently: obesity and alcohol use in men
- Multiple in 20%; greater than 10 is adenomatosis
Hepatic Adenoma: Clinical Features

• Usually asymptomatic
• Hemorrhage may cause abdominal pain
• Propensity to rupture
  - rarely hemoperitoneum and shock
• May decrease in size after withdrawal of oral contraceptives, sometimes increase
• Risk of malignant transformation
• Beta catenin mutations > risk of HCC

Markers for Risk Stratification of Adenomas

• \( \beta \)-catenin activation is associated with an increased risk of malignant transformation
  • Found in 64% of malignant adenomas
  • Immunohistochemistry: nuclear \( \beta \)-catenin
• HNF1A inactivated adenomas predict steatotic phenotype which has low malignant risk
  • Genotyping not routinely available
• Inflammatory adenomas have mutations in IL6ST, GNAS, STAT3, FRK or JAK1 gene

Histopathology of Adenoma

Adenoma:
- Monoclonal hepatocytes
- Prominent “naked” arteries
- No normal portal tracts or bile ducts

Beta Catenin Staining of Adenomas

- Negative Membrane Staining
- Positive Nuclear Staining
Gadobenate Dimeglumine MRI for Distinguishing FNH from Adenoma

- Heterogeneous arterially enhancing mass
- Isointense in portal venous phase
- Decreased intensity in the hepatobiliary phase supports the diagnosis of adenoma
Management of Hepatic Adenomas

- High Risk: Resect
  - Lesions ≥ 5 cm (or increasing size)
  - Hemorrhage
  - Male Gender (increased malignant risk)
  - Positive β-Catenin IHC
  - Older females with no history of OCP use
- Low Risk: Stop OCPs, Surveillance imaging
  - Young Females, lesions < 5 cm on OCP
  - Careful observation during pregnancy
- Alternative to Resection in Pts with High Surgical Risk: Radiofrequency ablation

Benign Liver Cysts

Epidemiology

- Occur in 3.6% of individuals
- Female predominance (4:1)
- Prevalence increases with age
- Often multiple
- Often co-exist with other mass lesions in the liver
Imaging Characteristics of Liver Cysts

Ultrasound

- Best test
- No internal echoes
- No flow on color flow or duplex Doppler
- Through transmission
- Well-defined posterior walls
- May have thin echogenic septa

Symptomatic Cyst in a 72 yo F with Painless Jaundice and Leg Edema

Presentation

1 year after cyst aspiration & EtOH sclerosis

2 years later
Focal Fatty Change: 65 yo Woman Referred for Evaluation of Presumed Gallbladder Carcinoma

Imaging Characteristics of Focal Fat or Fat Sparing

- Ultrasound Hyperechoic
- T1 Weighted In & Out of Phase

3 Month Follow-Up
Focal Fat or Fat Sparing

- **Epidemiology:**
  - Fatty liver is increasingly common
  - Focal fatty infiltration looks like a mass
  - Also focal sparing in diffuse fatty infiltration

- **Associations:**
  - Obesity
  - Diabetes mellitus
  - High alcohol consumption
  - Altered metabolism due to chemotherapy

Hepatocellular Carcinoma
Non-Invasive Diagnosis: Arterial Enhancement and Venous “Washout”

20 yo F with a Large Liver Mass
Fibrolamellar Subtype of HCC

- Young females
- Lymph node metastases
- Aggressive surgery recommended
Summary

• History, physical exam, and laboratory tests are important in the evaluation of liver masses.
• Imaging techniques allow accurate identification of most benign liver masses
• Repeat imaging after an interval or biopsy when the diagnosis remains uncertain
• The commonest conundrum is the distinction between FNH and adenoma
• Focal fat or sparing in a fatty liver frequently masquerade as a mass
• Perform surveillance in patients at risk for HCC

Thank You for Your Attention!