Cirrhosis – the < 2 cm lesion: What is it?

Richard L. Baron, M.D.
University of Chicago
Cirrhosis – focal lesions

**CIRRHOSIS SPECIFIC**
- Regenerative Nodule
- Dysplastic Nodule
- Infarcted Nodule
- HCC
- Focal Fibrosis

**GENERAL LIVER LESIONS**
- Cyst
- Hemangioma
- Vascular malformation
- Vascular flow phenomena
Cirrhosis – focal lesions

- Enhancing Lesions
  - HCC
  - Vascular flow phenomena
  - Hemangioma
  - Vascular malformation

- “Less”/Nonenhancing Lesions
  - Regenerative Nodule
  - Dysplastic Nodule
  - Infarcted Nodule
  - Focal Fibrosis
  - Cyst
Siderotic Nodules: CT

Non Contrast  Portal Venous Phase
Importance of Unenhanced CT
Siderotic Nodules: Contrast MR

T2

T1 GRE
Gadolinium
Pathogenesis of HCC: Key Role of Dysplastic Nodules

- Regenerative Nodule
  - Large Regenerative Nodule
    - Dysplastic Nodule
      - HCC (nodule-in-nodule)
        - HCC
Dysplastic Nodules
(aka Adenomatous Hyperplasia)

- Low Grade
  - Nuclear atypia is minimal
  - Portal tracts present

- High Grade
  - High nuclear cytoplasmic ratio
  - Rare mitotic figures
  - Resistance to iron accumulation
  - New vessels (nontriadal arteries) increase
  - Portal flow to nodules decreases
Dysplastic Nodules: MR

CT: ~ 10% Lim et al, BJR 2004

MR: 10 – 15% Krinsky, Radiology 2001
Dysplastic Nodule with Early HCC
"Nodule in Nodule" Evolution
Evolution of DN to HCC
Dysplastic Nodule -- HCC

1/08  3/08  7/08  1/09
Small (10-20 mm) Enhancing CT/MR Nodules

- O’Malley et al (Am J. Gastro 2005): 28% HCC
  - Doubling time – 6 mos.
- Jeong et al (AJR, 2002): 13% HCC

- Most small enhancing nodules are not HCC
- Importance of multimodality & follow-up imaging
Screening Cirrhosis: False + CT HCC Diagnosis

- 37/430 (8.6%) patients transplanted
  - Hypoattenuated 23 (5.3%)
  - Hyperattenuated 14 (3.3%)

Hyperattenuating
- THAD 3
- Reg. Nodule 3
- Hemangioma 2
- Peliosis 1
- Focal Fibrosis 1
- Uncertain 4

Prospective CT interpretation almost equally likely to misdiagnose HCC
Value of Equilibrium Phase images

AP

EQ
HCC: Washout
Importance of Equilibrium Phase
Value of Equilibrium Phase Imaging (MR)  
46 Cirrhotic Patients; Transplanted  

Holland et al, Radiology, 2005  
NYU Radiology

• 16 patients; 45 A-Phase only lesions  
  (occult at T2, PV and EQ phase)

• 15 patients: No tumor at pathology  
  – 1 patient had HCC nodule

• All A-Phase only lesions in patients without HCC elsewhere were benign
Enhancing Nodule: Value of T2 characteristics
Value of Equilibrium Phase CT

01/22/2008

Pre  Early arterial  Late arterial  Portal  Equilibrium

10/30/2007
Hypoattenuating Nodules

- 10 – 15% of small HCC are hypovascular
- 60% of small hypoattenuating nodules transformed to enhancing vascular lesions (Takayasu et al, AJR, 2006).
Hypovascular Nodules
Diagnosis of Small Nodules
Forner et al, Hepatology, 2007

- Serially followed cirrhotic patients for 3 yrs
- 89 patients developed NEW nodule
  - 60 HCC, 1 cholangiocarcinoma
  - 28 benign nodules (regenerative/dysplastic predominate)

- 24/89 nodules = hypovascular
  - 2/24 hypovascular nodules HCC
Infarcted Regenerative Nodule
HCC Detected in Cirrhosis Screening
HEMANGIOMA LIKE LESIONS IN CIRRHOSIS

From Caturelli et al, Radiology, 2001; 220:337-342

- 1982 patients
- 44 hemangioma like lesions
- 22 hemangiomas; 22 HCC

- 1648 patients followed
- 26 hemangioma like lesions
- 22 HCC; 4 dysplastic nod.

DYSPLASTIC NODULE

HCC

HEMANGIOMA
Contrast enhancement characteristics are key to diagnosis and characterization.

80 – 90% of small lesions that are HCC can be accurately characterized.

Observation over time characterizes most of confusing lesions without changing outcomes of future treatments.