Focal Lesions in the Cirrhotic Liver – How Good is MR Imaging?

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I have no conflicts of interest to disclose with regard to the subject matter of this presentation. I will, however, be describing off-label use of MRI contrast agents.
Cirrhotic Nodules

Regenerative Nodule

“Atypical” Nodule

Hyperplastic Nodule

Dysplastic Nodule

Hepatocellular Carcinoma

Confluent Fibrosis

Hypertrophic Pseudotumor (Regional Regeneration)

Benign Enhancing Pseudonodule (AVF)
Siderotic Regenerative Nodules

Viral Cirrhosis: HCC was present in 52% with, vs. 34% without, siderotic RNs.

Hyperplastic Nodule

- FNH-like lesion
- Hyperplastic response to deficient portal perfusion
- Budd-Chiari, cirrhosis
- No malignant potential
- *Hyperplasia vs. Regeneration* ambiguous in pathology literature
- *Major distinction is hemodynamic*
Cirrhotic Nodules - MRI of HCC - Other Imaging - Screening - Communication

Dysplastic Nodule

Pre-Gd

Arterial

Portal

T1-SE

T2-SE

Direct CTA

CTAP
Hepatocellular Carcinoma: 
*Nodule-in-Nodule*
HCC: Nodule-in-Nodule

HCC: MRI features

- Hypo, Iso or Hyper on T1 & T2
  - T2 Bright is specific, not sensitive
- Copper = Bright T1
- Lipid in ~10%
- Marginated (Round or Lobulated)
  (prior to portal invasive)
- Capsule
- Internal Nodularity (mosaic)
- Rapid Enhancement & Washout
  - Delayed Hypointensity
- Multi-focal
  - Ambiguous term
  - Multiple focal primary HCC
  - Intrahepatic metastases (PV invasion)
Delayed hypointensity (washout pattern) improves specificity

Hyper-enhancing lesions not seen on other images: > 90% are benign

HCC Screening?

- High risk population: HBV, HCV, EtOH, NASH
- High cure rate for <3 cm lesion
  - Chemo-embo, chemo-injection, RF ablation, etc
- Transplant: The only cure for whole liver
  - Tumor priority points for HCC 2-5 cm
- Transplant denied
  - > 5 cm HCC; > 3 cm multiple HCCs; > 3 HCCs
- Sensitivity limitations
  - Sub-centimeter
  - Non-hypervascular
- Specificity limitations
  - Hypervascular benign & pseudo-lesions
Imaging Criteria Sufficient for Dx


Incidental small HCCs detected in explant did not alter survival.


Small well-dif. HCC usually grows slowly

166 cirrhotic patients had MRI-detected proven HCC (most with HCV)

21 patients (33 HCCs) had prior MRI (6 - 24 months)

29/33 initially considered benign nodules or indeterminate, or seen only retrospectively

Most seen only on HAP; none had washout

Diameter range 6-19 mm

Mean diameter doubling time = 856 days

All 33 HCCs satisfied criteria for cure
Hepatitis C: HCC Risk Categories
(TJU evolving approach)

- **No lesion with high suspicion of HCC**
  - Patient is still at high risk
  - HCC surveillance (? Serial US, annual MRI)
  - Tiny “UBOs” do not change this

- **Indeterminate/suspicious lesion**
  - F/U ~ 6 weeks - 3 months

- **Probable HCC**
  - Treat or biopsy if > 2 cm
  - F/U if smaller

- **HCC**
  - Treat, or list for transplant
1. **No focal lesion suspicious for HCC (Risk Estimate <5%)**
   (Note: Since these features are not clinically significant, they do not necessarily have to be mentioned in the report.)
   - **Imaging features**
     - No lesion demonstrated.
     - < 1 cm transient arterial enhancing, and seen on the arterial phase images only.
     - < 1 cm, T1 hyperintense, and enhances similar to background liver.
     - < 1 cm nodular area of focal fatty or iron sparing without arterial enhancement in the setting of diffuse fatty liver.
   - **Management**
     - Continue annual follow-up.

2. **Probably benign lesion (Risk Estimate 5 - 20%)**
   - **Imaging features**
     - Round transient arterial enhancing, 1 - 2 cm, and not visible on other sequences.
     - New, < 1 cm T1 hyperintense, and enhances similar to background liver.
   - **Management**
     - Short term (3 month) follow up.

3. **Indeterminate lesion (Risk Estimate 21 - 70%)**
   (Note: A category 2 lesion may be placed in category 3 if in the radiologist’s judgment the lesion is of higher probability. A “nearly category 4” lesion may also fall in category 3 if technical or other limitations limit confidence.)
   - **Imaging features**
     - > 2 cm, T1 hyperintense, and enhances similar to background liver.
   - **Management**
     - Short-term follow-up, biopsy or alternative imaging (e.g. angiography, US, etc)

4. **Probable HCC (Risk Estimate 71 - 95%)**
   - **Imaging features**
     - As in category 5 below. Suboptimal image quality or other factors, at radiologist discretion, may decrease confidence.
   - **Management**
     - Treat or biopsy.

5. **HCC (Risk Estimate >95%)**
   - **Imaging features**
     - Hypoenhancement with either washout, T2 brightness or a delayed enhancing capsule.
     - A solid round mass that is T2 bright. The presence of any additional feature (i.e. enhancing capsule, washout, or enhancement) increases confidence that this is not confluent fibrosis.
     - Note that many HCCs have washout and other HCC features, but not T2 brightness. T2 brightness is specific but not extremely sensitive.
   - **Management**
     - Treat. Biopsy is not needed.
Standardized reporting of HCC and possible HCC can greatly facilitate communication and reduce confusion.