Liver Mass Work Up

Jorge A. Marrero, MD, MS
Keith S. Henley, MD Collegiate Professor of Gastroenterology
Director, Multidisciplinary Liver Tumor Program

Work-up of a Liver Mass

• History and Physical
• Radiology
  – MRI vs CT
• Histology
Age-Adjusted Incidence Rates in USA: 1975-2008

Hepatocellular Carcinoma

Cholangiocarcinoma

Evaluation

- Detailed history
  - age, gender, history of cancer, history of liver disease, steroid use, exposure (vinyl chloride)
- Physical Examination
  - palpable mass, fever, ascites, stigmata of liver disease, bruit in RUQ
- Laboratory data
  - evidence of chronic liver disease, evidence of hematologic disease, tumor markers (CEA, AFP, CA 19-9)
Arterial-dominant phase

Portal-venous phase 60-90 s
### Washout of an Arterially Enhancing Mass in Cirrhosis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds Ratio (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients (n=124)</td>
<td></td>
</tr>
<tr>
<td>AFP &gt; 20 ng/ml</td>
<td>11.7 (2.3-30.7)</td>
</tr>
<tr>
<td>Washout</td>
<td>61 (3.8-73)</td>
</tr>
<tr>
<td>&lt; 2 cm only (n=35)</td>
<td></td>
</tr>
<tr>
<td>Washout</td>
<td>6.3 (1.8-13)</td>
</tr>
</tbody>
</table>

Marrero JA, et al Liver Transplant 2004

---

### Contrast Washout in HCC

![Arterial Phase](image1.png) ![Portal Venous Phase](image2.png)

Arterial Phase Portal Venous Phase
MR vs CT

• Comparable
• MR slight superior to CT for focal lesion detection and characterization *


MRI versus CT in Diagnosis of HCC in Cirrhosis

<table>
<thead>
<tr>
<th></th>
<th>Gold Std</th>
<th>No. Pts</th>
<th>No. Nodules</th>
<th>HCC (n)</th>
<th>CT (%)</th>
<th>MRI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sens Sp</td>
<td>Sens Sp</td>
</tr>
<tr>
<td>Explant</td>
<td>Explant</td>
<td>Explant</td>
<td>Explant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>88</td>
<td>54</td>
<td>51</td>
<td>84</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>69</td>
<td>13</td>
<td>53</td>
<td>92</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>127</td>
<td>76</td>
<td>61</td>
<td>66</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td>136</td>
<td>77</td>
<td>50</td>
<td>79</td>
<td>70</td>
</tr>
</tbody>
</table>

**Eovist: Distribution and Elimination**

- **Intravenous administration**
- Plasma, extracellular extravascular space
- OATP1
- cMOAT
- Liver/hepatocyte

- Biphasic distribution
  - Dynamic phase
  - Hepatocyte phase
- Dual elimination

OATP1 = organic anion transporting polypeptide 1 (active, ATP dependent)
cMOAT = canalicular multi-organic anion transporter

**Small HCC characterized on Eovist-enhanced MRI**

Arrow indicating the small HCC lesion on the MRI scans.
Other Liver Masses
Hemangioma

- Well circumscribed, lobulated
- Peripheral location
- Filling of contrast from early through late phases
- 3 types based on size
- Treatment: conservative

Bennett GL et al. AJR 2000; 174(2): 477-85
Focal Nodular Hyperplasia (FNH)

- T2: iso or mildly hyperintense
- Arterial phase: homogeneous blush
- Delayed phase: iso or hypointense
- Central scar: 10-49% (vessels, ducts, fibrosis, inflammation, edema)
- Treatment: conservative
Hepatic Adenoma

- T1: hypo, iso or hyperintense (fat, hge)
- T2: mildly hyperintense, heterogenous
- Arterial: hypervascular (heterogeneous)
- Delayed: iso or hypointense
- Thin pseudocapsule (DD: HCC)
- Treatment: resection

Chung KY et al. AJR 1995; 165(2):303-308
Contrast Washout in HCC

Arterial Phase

Portal Venous Phase
Atypical Hepatocellular Carcinoma

- 85% of HCC > 2cm have "washout"\(^{(1)}\)
- Some lesions are atypical
- Biopsy is important for these lesions


Metastasis from colon ca
Cholangiocarcinoma

Proper hepatic artery (possibly involved in tumor)

Common hepatic artery
Splenic artery
Celiac artery
Intrahepatic Cholangiocarcinoma

- Hypodense in the arterial and portal venous phase with some peripheral enhancement.
- Hyperdense in the equilibrium phase indicating dense fibrous tissue.
- The lesion causes retraction of the liver capsule.

The finding of an infiltrating mass with capsular retraction and delayed persistent enhancement is very typical for a cholangiocarcinoma.

Biopsy of Liver Mass

- 1012 biopsies using sheath
- 3% bleeding
- No seeding reported – 128 HCC

International Consensus on Small Nodular Lesions in The Liver

<table>
<thead>
<tr>
<th>IWP classification</th>
<th>L-DN</th>
<th>H-DN</th>
<th>WD-HCC</th>
<th>MD-HCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathological features</td>
<td>Gross appearance</td>
<td>distinctly-nodular</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td></td>
<td>Stromal invasion</td>
<td>(-)</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Clinical (imaging)</td>
<td>Arterial supply</td>
<td>iso/hypo</td>
<td>iso/hypo</td>
<td>iso/hypo</td>
</tr>
<tr>
<td></td>
<td>Portal vein supply</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Clinico-pathological</td>
<td>Premalignant</td>
<td>Early HCC</td>
<td>Progressed HCC</td>
<td></td>
</tr>
</tbody>
</table>


Conclusions

• History and physical exam is important to determine the presence of liver disease, history of cancer and medications
• Imaging is critical. MRI better for characterizing lesions
  – 3 phase examination is essential
  – MRI important in Cholangiocarcinoma (extrahepatic > intrahepatic)
• Biopsy is important if imaging equivocal