간암과 유사병변
최진영
연세의대
Arterioportal shunt
Hypovascular HCC
Large DN vs HCC
Imaging Diagnosis of HCC
Role of MRI
HCC mimickers
Bile duct invasion by HCC
Imaging after treatment of HCC
AP Shunt

- Nontumorous APS vs Tumorous APS
- Early enhancement of peripheral PV
- Peripheral location, wedge shape, presence of normal vessels coursing through lesions
- Precontrast, equilibrium phase
- MR: iso SI on T1, T2, SPIO, hepatobiliary phase
Small Arterially Enhancing Lesion

1. Follow-up CT
2. MRI
3. Biopsy
4. CEUS
Small Arterially Enhancing Lesion

- Perfusion abnormalities- APS, THAD
- Benign lesions- hemangioma, FNH, RN, DN
- HCC
  - 5-17% on dynamic CT and 15% on CTHA
- SAEL (<2 cm) on MR
  - 93%; nonneoplastic
  - 7%; overt HCC, HCC arising in DN, DN
- Suggested interval: 3-6 Mon

Takayasu et al, Oncology 2007
Freeny et al, Abd Imag 2003
Holland et al, Radiol 2005
Yu et al, JCAT 2008
<table>
<thead>
<tr>
<th>Pathological Dx</th>
<th>RN</th>
<th>LGDN</th>
<th>HGDN</th>
<th>e-HCC</th>
<th>WD-HCC</th>
<th>MD-HCC</th>
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<tbody>
<tr>
<td>Kupffer cell</td>
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<td>CTAP</td>
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<td>Iso (hyper)</td>
<td>Hypo - defect</td>
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<td>Hypovascular</td>
<td>Hypervascular</td>
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<tr>
<td>CEUS</td>
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<td>Hypovascular</td>
<td>Hypervascular</td>
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<tr>
<td>SPIO-MRI</td>
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<td></td>
<td></td>
<td></td>
<td>Iso- increased uptake</td>
<td>Decreased uptake</td>
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<tr>
<td>MRI</td>
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<td>T2 I-L</td>
<td>T2 H</td>
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<td>MDCT/ dynamic MRI</td>
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<td>Hypovascular</td>
<td>Hypervascular</td>
</tr>
</tbody>
</table>

Adapted from Kudo, Oncology 2007
Hypovascular HCC

• Hypovascular nodules at both CT and CEUS
  – 64% → nonmalignant
  – 36% → hypovascular HCC
  – 17% in HCC with a diameter of 1-2 cm

• Nodules of 1-2 cm would miss the diagnosis of HCC in upto 38% on imaging

Bolondi et al, Hepatology 2005
Imaging Dx of HCC

- EASL, AASLD Guideline
- Bolondi et al, 2005 Hepatol
  - All lesions that met EASL criteria were HCC
  - 1-2 cm: Bx required
- Forner et al 2007 Hepatol
  - HCC ≤ 2 cm: if both CEUS and MRI are conclusive
  - Low sensitivity (33%)
  - False positive: cholangiocarcinoma, hemangioma, RN
Early HCC

- **Definition**
  - Small HCC
  - **Early HCC**: vaguely nodular appearance, well-differentiated
  - **Progressed HCC**: distinctively nodular, moderately differentiated, microvessel invasion

- **Imaging Findings**
  - Iso/hypo, rarely hypervascular
  - T1 hyper or iso / T2 iso
60/M

Early HCC

Main lesion

HBP

SPIO

Dynamic

CT
Role of Liver MRI

  – 81% for MR
  – 68% for CT
• Better diagnostic performance than dual or triple phase CT for lesions smaller than 2 cm
  – Gd-EOB MR (82.1%) vs CT (71%)
• A change in surgical therapy: 14.5%
1. HCC  2. Hepatic adenoma  3. cholangiocarcinoma  4. FNH
Hepatic Adenoma

- Oral contraceptive, anabolic steroid, glycogen storage dz, adenomatosis
- Lack central scar and radiating septa
- Necrosis and hemorrhage are frequent
- Bile ducts and portal tracts are absent
- Blush of homogeneous arterial enhance
- Complete or partial pseudocapsule
FNH

- Lobulated, well-circumscribed, unencapsulated
- Central scar with radiating septa
- Malformed biliary ductules
- Homogeneous arterial enhance
- Enhancement on HBP (90-98%)
1. acute pancreatitis
2. hemobilia
3. cholangiocarcinoma
4. HCC
1. HCC with BD invasion  
2. cholangiocarcinoma
HCC with BD invasion

- Infiltrative type or mixed infiltrative and nodular type
- Oval defect in the bile duct (70%), missing duct or localized stricture
- Intraductal polypoid mass
  - HCC with bile duct invasion
    - Presence of parenchymal mass, Liver cirrhosis, hyperattenuating intraductal tumor on HAP
  - Intraductal papillary cholangiocarcinoma
    - Higher enhancement ratio on PVP

Jung et al, JCAT 2006
1. HCC-HCC
2. HCC-cholangiocarcinoma
3. Cholangiocarcinoma-HCC
4. HCC- hemangioma
<table>
<thead>
<tr>
<th>Margin</th>
<th>HCC</th>
<th>CC</th>
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<tbody>
<tr>
<td></td>
<td>Well-demarcated, capsule</td>
<td>Infiltrative</td>
</tr>
<tr>
<td>Color</td>
<td>Yellowish</td>
<td>White</td>
</tr>
<tr>
<td>characteristics</td>
<td>Hemorrhage, necrosis</td>
<td>Abundant fibrous stroma</td>
</tr>
<tr>
<td>Arterial phase</td>
<td>High attenuation</td>
<td>Peripheral rim enhancement</td>
</tr>
<tr>
<td>Portal and delayed</td>
<td>Hypoattenuation</td>
<td>Central fill-in, high attenuation</td>
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<tr>
<td>Ancillary findings</td>
<td>Vascular invasion, satellite nodule, cirrhosis</td>
<td>Capsular retraction, parenchymal atrophy, bile duct dilatation</td>
</tr>
</tbody>
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- <3 cm: no difference of enhancement between CC and HCC
- >3cm: peripheral rim like enhancement or centripetal enhancement, absence of washout

Kim SJ et al, AJR 2007
1. Infiltrative HCC  
2. Cholangiocarcinoma  
3. Fibrosis
Confluent hepatic fibrosis
CT or MR after TACE or RFA

- Within 1 month: peripheral enhanced lesion
- Comparison with preablation images

<table>
<thead>
<tr>
<th></th>
<th>Reactive Hyperemia</th>
<th>Residual or Recurred Tumor</th>
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<tbody>
<tr>
<td>Enhancement</td>
<td>Uniform in thickness</td>
<td>Focal, crescentic and irregular peripheral enhancement</td>
</tr>
<tr>
<td>Peripheral rim</td>
<td>Iso or high during portal/eq</td>
<td>Low attenuation during eq</td>
</tr>
<tr>
<td>With time</td>
<td>Shrinkage of ablated zone</td>
<td>Enlargement of ablated lesion, loss of sharp margin</td>
</tr>
</tbody>
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- Focal defect or washout $\rightarrow$ viable tumor
- Lipiodol negative area $\rightarrow$ not actually represent viable tumor
- Dynamic MRI
Summary

- APS
  - Peripheral location, wedge shape, presence of normal vessels coursing through lesions
- DN vs early HCC
- HCC mimicking lesions
- HCC with BD invasion
- Imaging follow-up after treatment
Thank You