AMSER Case of the Month
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HPI: 41-year-old male with abnormal liver function tests.

Nicole Abedrabbo, MS3, Duke University School of Medicine
Diana Kadi, MD, Research Fellow, Department of Radiology, Duke University Hospital
Mustafa R. Bashir, MD, Departments of Radiology and Medicine, Duke University Hospital
Patient Presentation

- **HPI:** A 41-year-old male presented to the clinic for a health maintenance exam and was found to have abnormal liver enzymes, with a predominant hepatocellular pattern. Per the patient, he has had intermittently high LFTs for several years. The patient has no symptoms or signs of chronic liver disease. Of note, the patient is a bodybuilder and took anabolic steroids for 10 years, ceasing use six years before presentation.

- **Past Medical Hx:** GERD, depression, anxiety, degenerative joint disease, hypogonadism 2/2 prior exogenous steroid use, hypothyroidism

- **Surgical Hx:** Nissen fundoplication

- **Family Hx:** Autoimmune hepatitis

- **Medications:** Levothyroxine, testosterone injections, trazodone

- **Physical Exam:** No scleral icterus, ascites, or HSM, abdomen is soft, non-tender, BS present
Pertinent Labs

• CMP:
  - AST: 69 U/L (normal: 15 - 41 U/L)
  - ALT: 119 U/L (normal: 15-50 U/L)
  - Bilirubin: 0.5 mg/dL (normal: 0.4-1.5 mg/dL)
  - Alk phos: 55 U/L (normal: 24-110 U/L)

• AFP: 2.2 ng/mL

• Hepatitis Panel: Non-Reactive for HAV, HBV, or HCV
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

Abnormal liver function tests. Hepatocellular predominance with mild aminotransferase increase. Initial imaging.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>US abdomen</td>
<td>Usually Appropriate</td>
<td>O</td>
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<tr>
<td>US duplex Doppler abdomen</td>
<td>Usually Appropriate</td>
<td>O</td>
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<tr>
<td>US shear wave elastography abdomen</td>
<td>May Be Appropriate</td>
<td>O</td>
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<tr>
<td>MR elastography abdomen</td>
<td>May Be Appropriate</td>
<td>O</td>
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<tr>
<td>MRI abdomen without and with IV contrast with MRCP</td>
<td>May Be Appropriate</td>
<td>O</td>
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<tr>
<td>MRI abdomen without IV contrast with MRCP</td>
<td>May Be Appropriate</td>
<td>O</td>
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<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>May Be Appropriate</td>
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<tr>
<td>US abdomen with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
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<tr>
<td>CT abdomen and pelvis with IV contrast</td>
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<tr>
<td>CT abdomen and pelvis without and with IV contrast</td>
<td>Usually Not Appropriate</td>
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This imaging modality was ordered by the primary care physician.
Findings (labeled)

Heterogenous echogenic lesion with hyperechoic periphery measuring 2.8 x 2.3 cm

Uninvolved liver is normal in echogenicity, no surface nodularity, and no ascites on the remaining images.
Select the applicable ACR Appropriateness Criteria

This imaging modality was ordered for further assessment of the liver mass; US visibility was limited in the original study.

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<td>US abdomen with IV contrast</td>
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<td>O</td>
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<tr>
<td>MRI abdomen without and with IV contrast</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>CT abdomen with IV contrast multiphase</td>
<td>Usually Appropriate</td>
<td></td>
</tr>
<tr>
<td>MRI abdomen without IV contrast</td>
<td>May Be Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>Image-guided biopsy liver</td>
<td>Usually Not Appropriate</td>
<td>Varies</td>
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<tr>
<td>CT abdomen without IV contrast</td>
<td>Usually Not Appropriate</td>
<td></td>
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<tr>
<td>Liver spleen scan</td>
<td>Usually Not Appropriate</td>
<td></td>
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<tr>
<td>RBC scan abdomen and pelvis</td>
<td>Usually Not Appropriate</td>
<td></td>
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<tr>
<td>CT abdomen without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td></td>
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<tr>
<td>DOTATATE PET/CT skull base to mid-thigh</td>
<td>Usually Not Appropriate</td>
<td></td>
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<tr>
<td>FDG-PET/CT skull base to mid-thigh</td>
<td>Usually Not Appropriate</td>
<td></td>
</tr>
<tr>
<td>Octreotide scan with SPECT or SPECT/CT chest and abdomen</td>
<td>Usually Not Appropriate</td>
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</table>
Findings (Labeled)

Multiple arterially hyperenhancing lesions measuring up to 3.5 cm, with areas of heterogeneity and washout and capsule in the venous phase.

Background liver: Normal in morphology, signal characteristics, and enhancement. Patent portal and hepatic veins.
Histologic findings:
- Liver segment 3 biopsy: well-differentiated hepatocellular carcinoma with areas of reticulin loss surrounding neoplastic cells.
- Liver segment 2, tumor #1: well-differentiated neoplasm, beta-catenin mutated atypical hepatocellular adenoma
- Liver segment 2, tumor #2: hepatocellular adenoma
- Uninvolved liver: no significant lobular inflammation, steatosis, or fibrosis
Final Dx:

Hepatic Adenomas and Hepatocellular Carcinoma
Case Discussion

➢ Background

- Hepatocellular adenomas (HCAs) are rare, benign liver lesions typically developing in non-cirrhotic livers.
- HCAs tend to be solitary (70-80%).
- HCAs have a significant risk for hemorrhage or malignancy transformation, particularly in lesions greater than 5 cm.
- HCAs with beta-catenin mutations are associated with an increased risk for malignant transformation. These mutations are associated with males and anabolic androgen use.
- HCAs undergo malignant transformation in up to 4.2% of individuals.
- Malignant transformation is more common in males vs. females.
Case Discussion

➢ Risk Factors for HCAs
- Exposure to estrogen – OCP use
- Anabolic androgen use – Fanconi Syndrome, aplastic anemia, hereditary angioedema, bodybuilders
- Genetic syndromes – Glycogen storage diseases and Familial Adenomatous Polyposis
- Metabolic Syndrome & obesity.
Case Discussion

➢ Clinical features for HCAs

- Presentation varies from incidental findings in asymptomatic patients to life-threatening hemorrhage.

- When symptomatic, episodic abdominal pain localized to the RUQ or epigastric area is the most common symptom.

- Hypotension with severe pain may signify bleeding into the peritoneum.

- Physical Exam: abdominal mass, hepatomegaly, or jaundice may be present

- Abnormal LFTs are uncommon unless the lesion > 5cm

- AFP can be normal with or without malignant transformation
Case Discussion

➢ Diagnosis/Imaging

- MRI is the preferred modality
- The presence of arterial phase hyperenhancement, fat, or hemorrhage may suggest an HCA
- HCAs may appear variable on T1 (Hyper-, Hypo-, or Isointense)
- HCAs typically appear mildly hyperintense on T2
- In females, MRI alone is sufficient to confirm HCA
- In males, contrast-enhanced multiphase MRI with histology obtained at the time of surgical resection is used to confirm HCA.

➢ Other Imaging modalities

- CEUS and MRI with hepatobiliary contrast agents can help differentiate between FNH and HCA
- CT, nuclear medicine scans may also be used
Case Discussion

➢ Management
- Depends on symptoms, lesion size, lesion progression, and patient sex.
- General measures – discontinue estrogen and maintain ideal body weight

➢ Females with lesions < 5cm/ asymptomatic:
- Observe and repeat MRI in 6 months. If no growth repeat MRI annually. If 20% increase or > 5cm, remove surgically

➢ Females with symptoms or lesions > 5 cm:
- Surgical resection

➢ Males:
- Surgical resection regardless of size due to risk of transformation to hepatocellular carcinoma.
References


