# AMSER Case of the Month February 2025

## 12-year-old male with abdominal pain

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# Patient Presentation

- HPI: A 12-year-old male presents as a transfer to the emergency department with acute abdominal pain following blunt trauma. While playing soccer, he collided with another player, who then landed on his abdomen. On arrival to the ED, he was febrile, tachycardic, and endorsing diffuse abdominal tenderness to palpation. He had no recent fevers, cough, congestion, nausea, vomiting, night sweats, or weight loss. He denied recent travel.

# Patient Presentation (continued)

- Medical History: None
- Surgical History: None
- Social History: Emigrated from Afghanistan to the United States 2 years prior; lived near a rural area with exposure to stray dogs and livestock
- Medications: None
- Vitals: Febrile to 38.9C, tachycardic to the 130s, otherwise within normal limits
- Exam: Abdomen is soft and flat, diffusely tender to palpation without guarding

# Pertinent Labs

- CBC: Mild leukocytosis of 13.6 K/mcL
- Liver function tests: Within normal limits
- GGT: Within normal limits
- Lipase: Within normal limits
- ESR: Mildly elevated at 24
- CRP: Mildly elevated at 1.9

# What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

**Variant 4:** **Acute nonlocalized abdominal pain. Not otherwise specified. Initial imaging.**

| Procedure | Appropriateness Category | Relative Radiation Level |
|---|---|---|
| CT abdomen and pelvis with IV contrast | Usually Appropriate | ☢☢☢ |
| CT abdomen and pelvis without IV contrast | Usually Appropriate | ☢☢☢ |
| MRI abdomen and pelvis without and with IV contrast | Usually Appropriate | O |
| US abdomen | May Be Appropriate | O |
| MRI abdomen and pelvis without IV contrast | May Be Appropriate | O |
| CT abdomen and pelvis without and with IV contrast | May Be Appropriate | ☢☢☢☢ |
| Radiography abdomen | May Be Appropriate | ☢☢ |
| FDG-PET/CT skull base to mid-thigh | Usually Not Appropriate | ☢☢☢☢ |
| WBC scan abdomen and pelvis | Usually Not Appropriate | ☢☢☢☢ |
| Nuclear medicine scan gallbladder | Usually Not Appropriate | ☢☢ |
| Fluoroscopy upper GI series with small bowel follow-through | Usually Not Appropriate | ☢☢☢ |
| Fluoroscopy contrast enema | Usually Not Appropriate | ☢☢☢ |

Ordered by Attending Physician at outside hospital's ED

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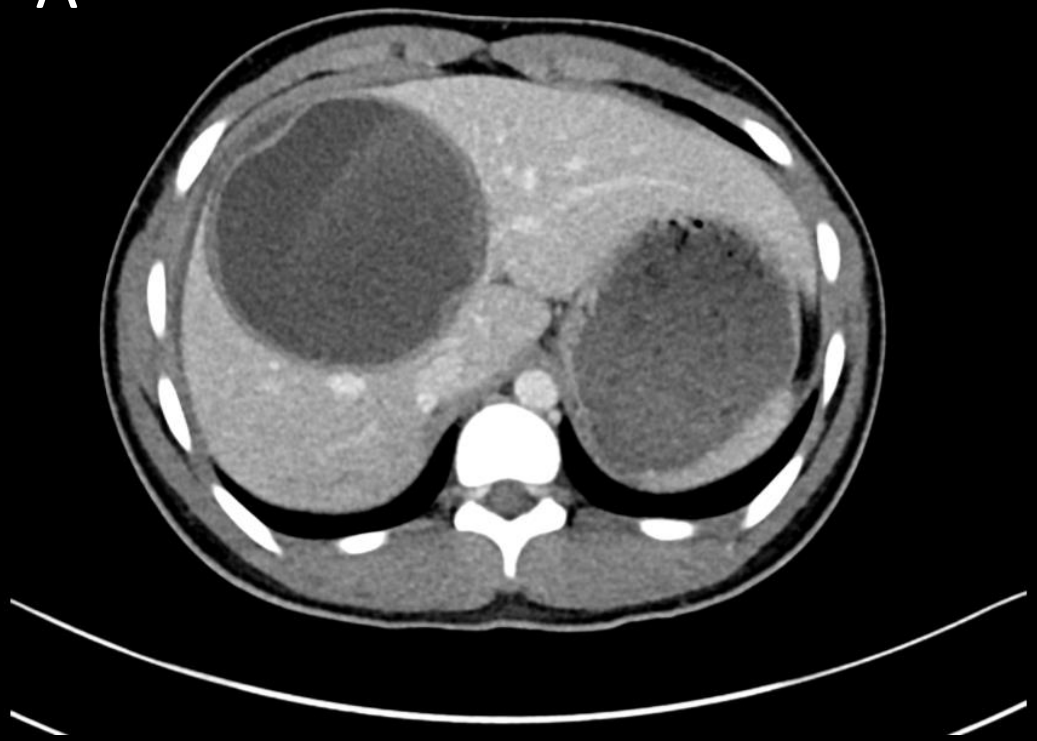
# Findings: CT A/P (unlabeled)

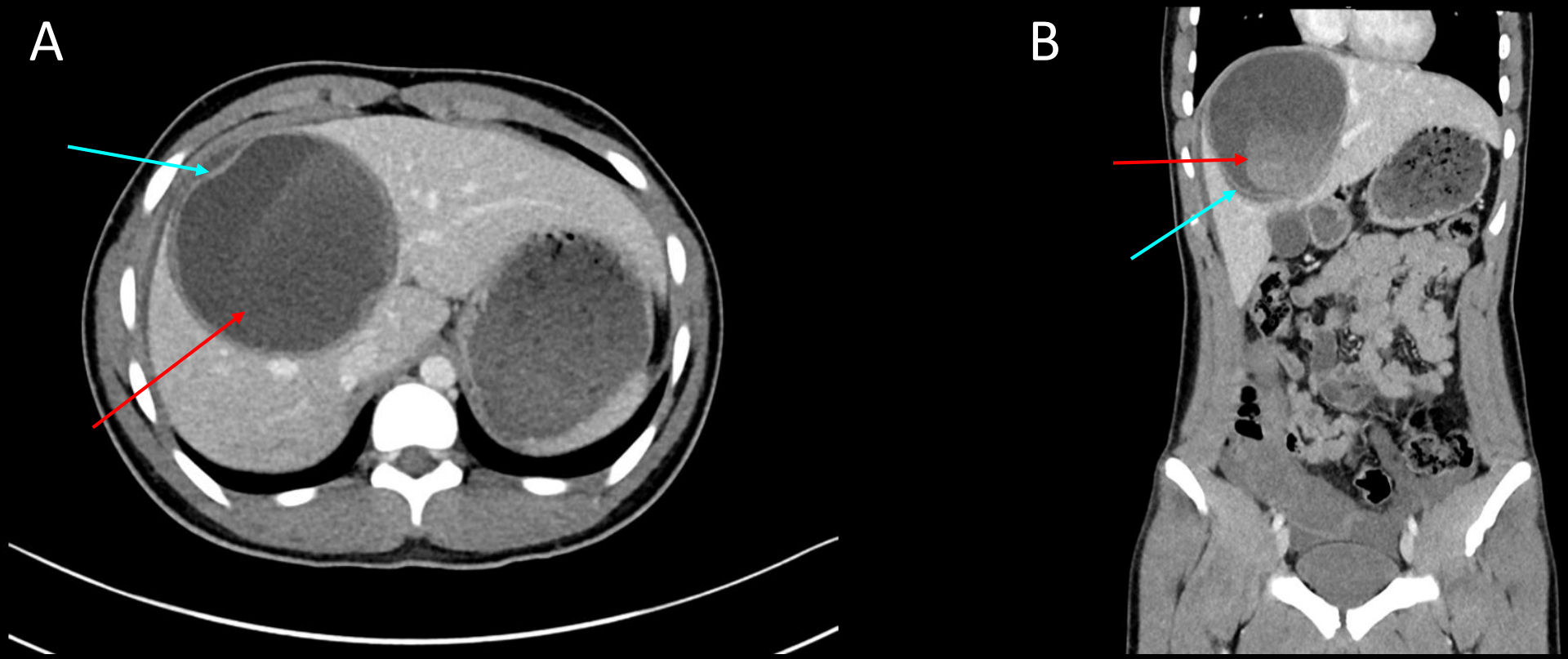
A



B

Axial (*A*) and coronal reformatted (*B*) post-contrast CT abdomen/pelvis

# Findings: CT A/P (labeled)




Axial (*A*) and coronal reformatted (*B*) post-contrast CT A/P demonstrating a cystic lesion in the liver with a thin peripheral membrane (*blue arrow*) and internal hyperdense material (*red arrow*)

# What Imaging Should We Order Next?

# Select the applicable ACR Appropriateness Criteria

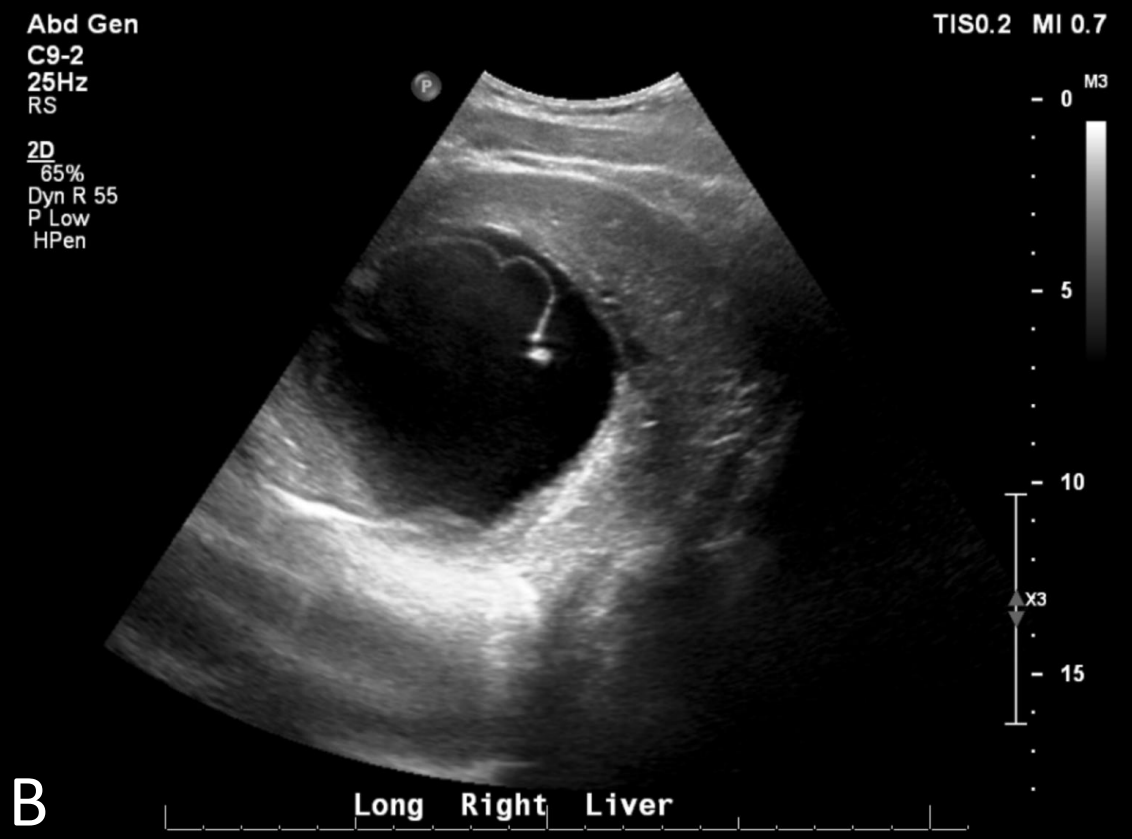
**Variant 2:** **Indeterminate, greater than 1 cm liver lesion on initial imaging with CT (noncontrast or single-phase) or noncontrast MRI. Normal liver. No suspicion or evidence of extrahepatic malignancy or underlying liver disease.**

| Procedure | Appropriateness Category | Relative Radiation Level |
|---|---|---|
| MRI abdomen without and with IV contrast | Usually Appropriate | O |
| CT abdomen with IV contrast multiphase | Usually Appropriate | ☢☢☢ |
| US abdomen | May Be Appropriate (Disagreement) | O |
| US abdomen with IV contrast | May Be Appropriate | O |
| Image-guided biopsy liver | Usually Not Appropriate | Varies |
| Liver spleen scan | Usually Not Appropriate | ☢☢☢ |
| RBC scan abdomen and pelvis | Usually Not Appropriate | ☢☢☢ |
| CT abdomen without and with IV contrast | Usually Not Appropriate | ☢☢☢☢ |
| DOTATATE PET/CT skull base to mid-thigh | Usually Not Appropriate | ☢☢☢ |
| FDG-PET/CT skull base to mid-thigh | Usually Not Appropriate | ☢☢☢☢ |
| Octreotide scan with SPECT or SPECT/CT chest and abdomen | Usually Not Appropriate | ☢☢☢☢ |

Ordered by Attending Physician on admitting service

# Findings: US Abdomen (unlabeled)


A




B

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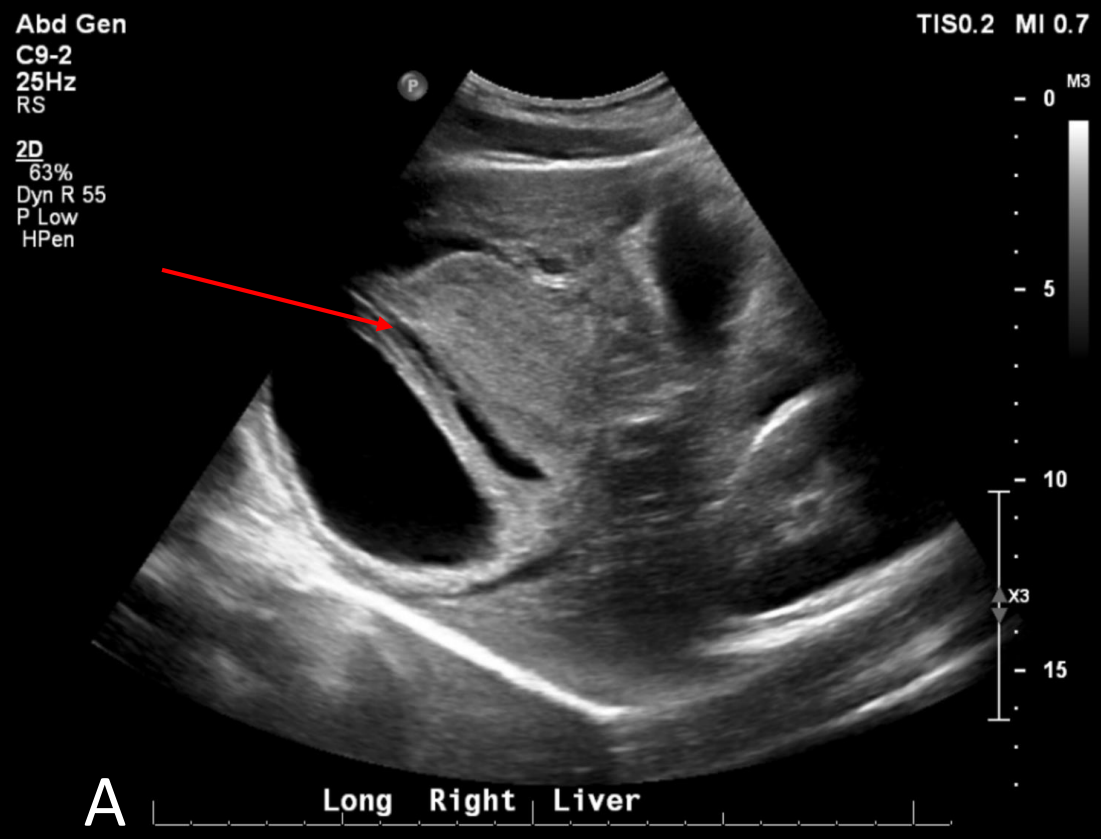
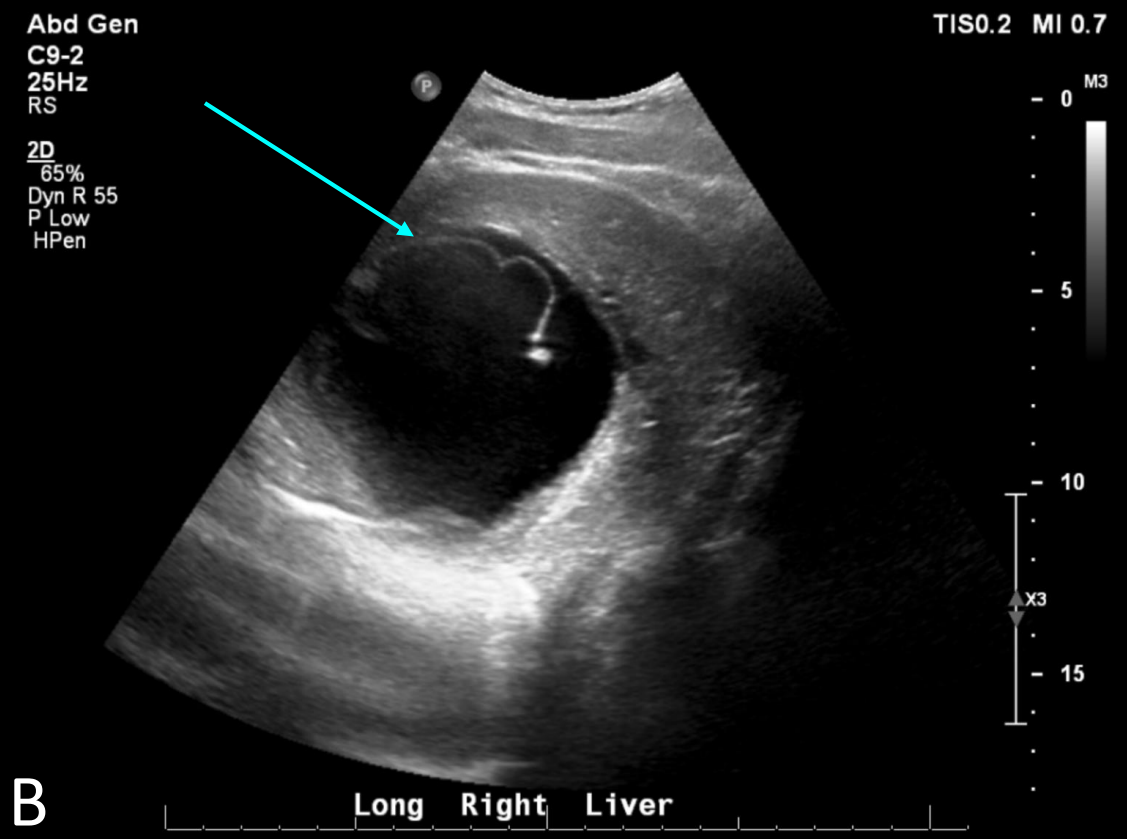
# Findings: US Abdomen (labeled)




A

Echogenic debris within the hepatic cystic lesion, likely reflecting hemorrhagic products




B

Thin peripheral membrane within the cyst, corresponding to the “water lily” sign

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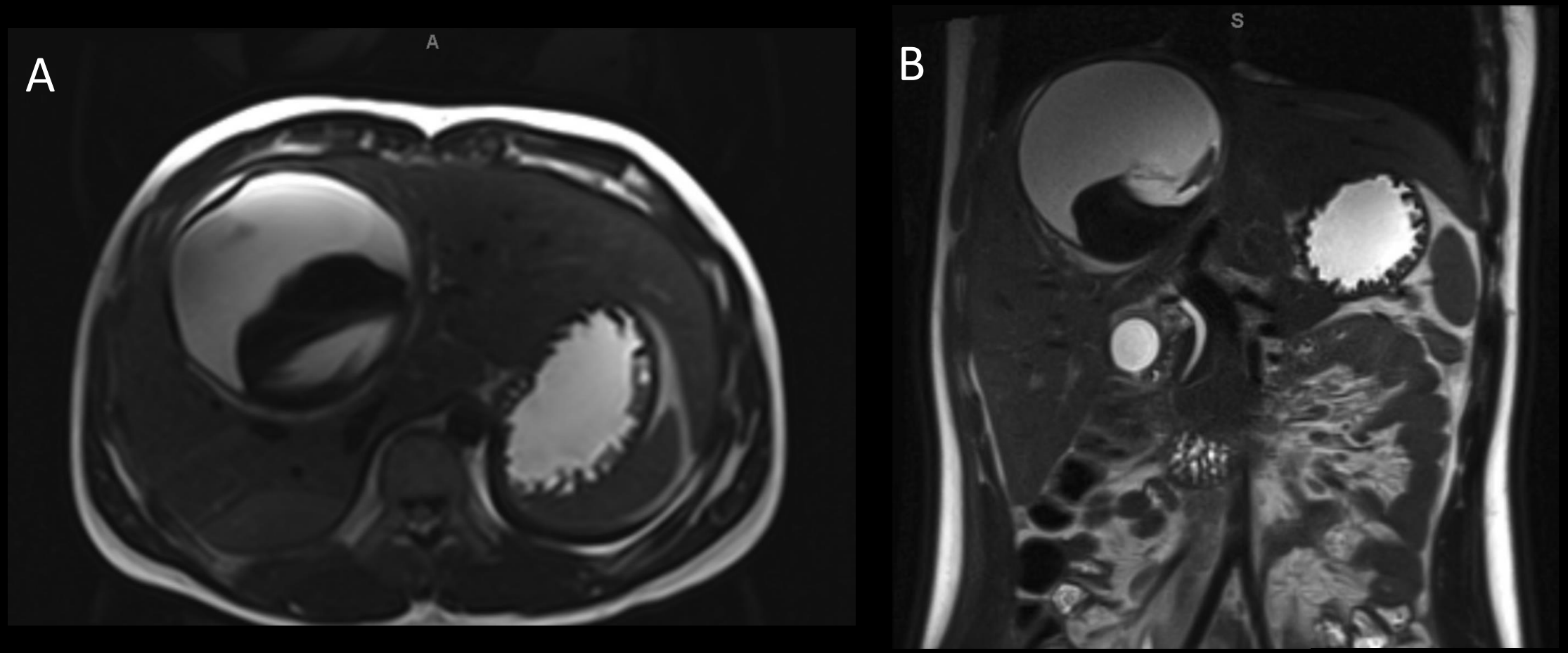
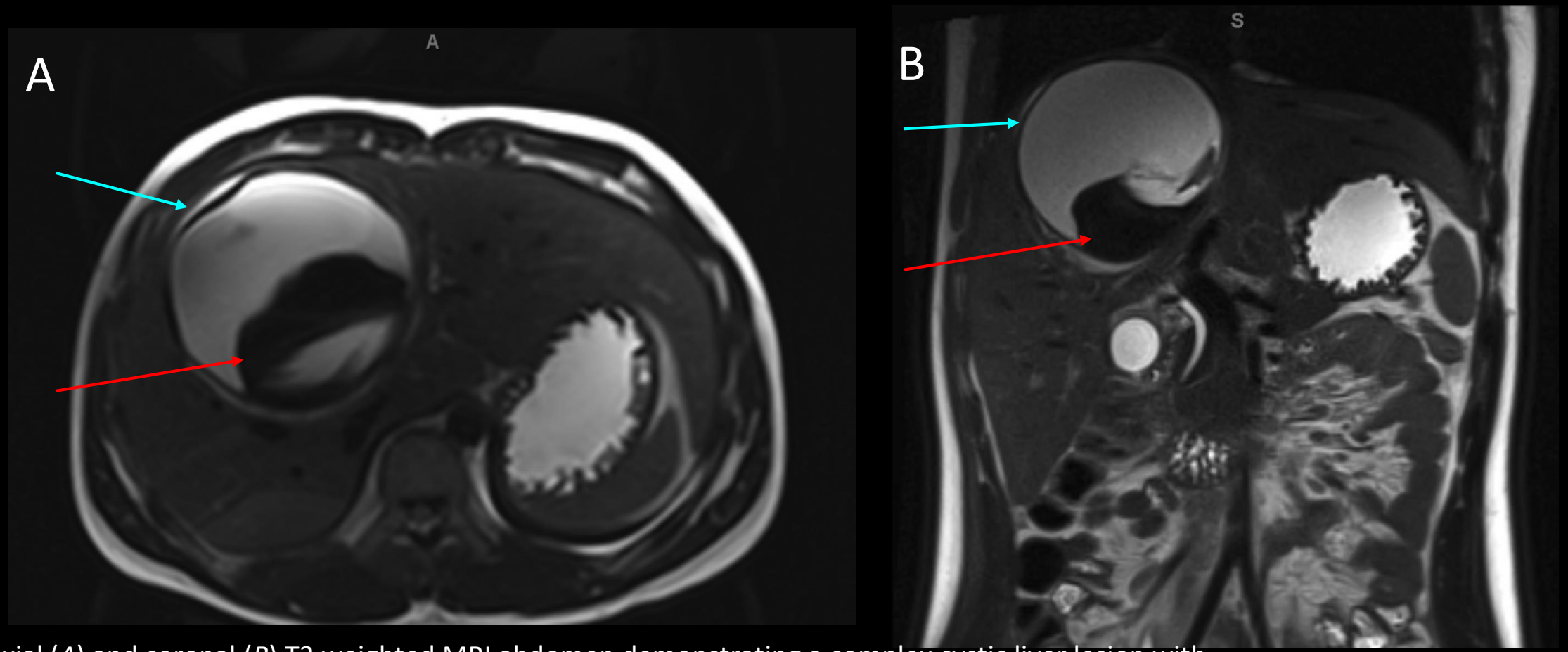
# Findings: MRI Abdomen (unlabeled)




Axial (*A*) and coronal (*B*) T2 weighted MRI abdomen

# Findings: MRI Abdomen (labeled)




Axial (*A*) and coronal (*B*) T2 weighted MRI abdomen demonstrating a complex cystic liver lesion with heterogeneous T2 hypointense material within cyst, likely reflecting blood products (*red arrow*). Internal peripheral membrane is once again noted, corresponding to the “double wall” sign (*blue arrow*).

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# Final Dx:

Hydatid Cyst of the Liver

# Case Discussion

- Etiology:
  - Caused by a larval infection with the tapeworm *Echinococcus granulosus*
  - Sheep are the primary host, dogs are a secondary host, humans are an incidental host
- Epidemiology:
  - *Echinococcus granulosus* is found globally, but endemic to the Middle East, North Africa, South America, Australia, and Eastern Europe
  - In endemic areas, prevalence can be as high as 10%
- Clinical Features:
  - Cysts most commonly seen in the liver (75%) and lungs but can affect other organs
  - Patients may be asymptomatic for years, presenting only when a cyst ruptures; alternatively, patients may have abdominal pain, distension, hepatomegaly, and decreased appetite

# Case Discussion

- Imaging Findings: The disease is staged based on an ultrasound classification per 2001 WHO guidelines
  - CE1: Unilocular anechoic cyst, “double line sign,” fine echoes representing “hydatid sand” sign (active)
  - CE2: Multiple septations, “rosette” or “honeycomb” appearance (active)
  - CE3a: Unilocular cyst with daughter cysts, detached membrane representing the “water lily” sign (transitional)
  - CE3b: Cyst with daughter cysts in solid matrix (transitional)
  - CE4: Cyst with hyper- and hypoechoic contents, giving a “ball of wool” sign, no daughter cysts (inactive)
  - CE5: Cyst with calcified wall +/- internal matrix calcification (inactive)

# Case Discussion

- Management: Based on symptoms, stage, size, location, and complications
  - Watch and wait
    - Interval ultrasound monitoring for inactive degenerating CE4 and CE5 cysts
  - Medical therapy
    - Medical therapy alone can be used for CE1 and CE3a cysts <5 cm
    - Albendazole 10-15 mg/kg/day q12h
    - No consensus on duration, but may treat for months
  - Percutaneous therapy
    - PAIR therapy (Puncture, Aspiration, Injection, Re-aspiration) for CE1 and CE3a cysts <10 cm
    - Standard catheterization for CE1 and CE3a cysts >10 cm
    - MoCat (Modified Catheterization Technique) for CE2 and CE3b cysts >10 cm
  - Surgical therapy
    - Radical: total cystectomy and hepatic resection
    - Conservative: partial cystectomy with aspiration and use of a scolicidal agent

# References:


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3. Govindasamy A, Bhattari P, John J. Liver cystic echinococcus: a parasitic review. *Sage Journals.* 2023 May 11. https://journals.sagepub.com/doi/10.1177/2049936123117147 8
4. Polat P, Selcuk Atamanalp S. Hepatic Hydatid Disease: Radiographic Findings. *Eurasian Journal of Medicine.* 2009 Apr; 41(1):49-55. https://pmc.ncbi.nlm.nih.gov/articles/PMC4261660/
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