

AMSER Case of the Month: June 2018

64 year old male undergoing evaluation for liver transplant



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Patient Presentation

- HPI: 64 year old male presents for workup pursuant to a liver transplant due to alcoholic cirrhosis
- PMH: bleeding esophageal varices, chronic Hepatitis C – treated and cured 9 years ago
- PSH: noncontributory
- An MRI is ordered to screen for hepatocellular carcinoma as part of the transplant workup

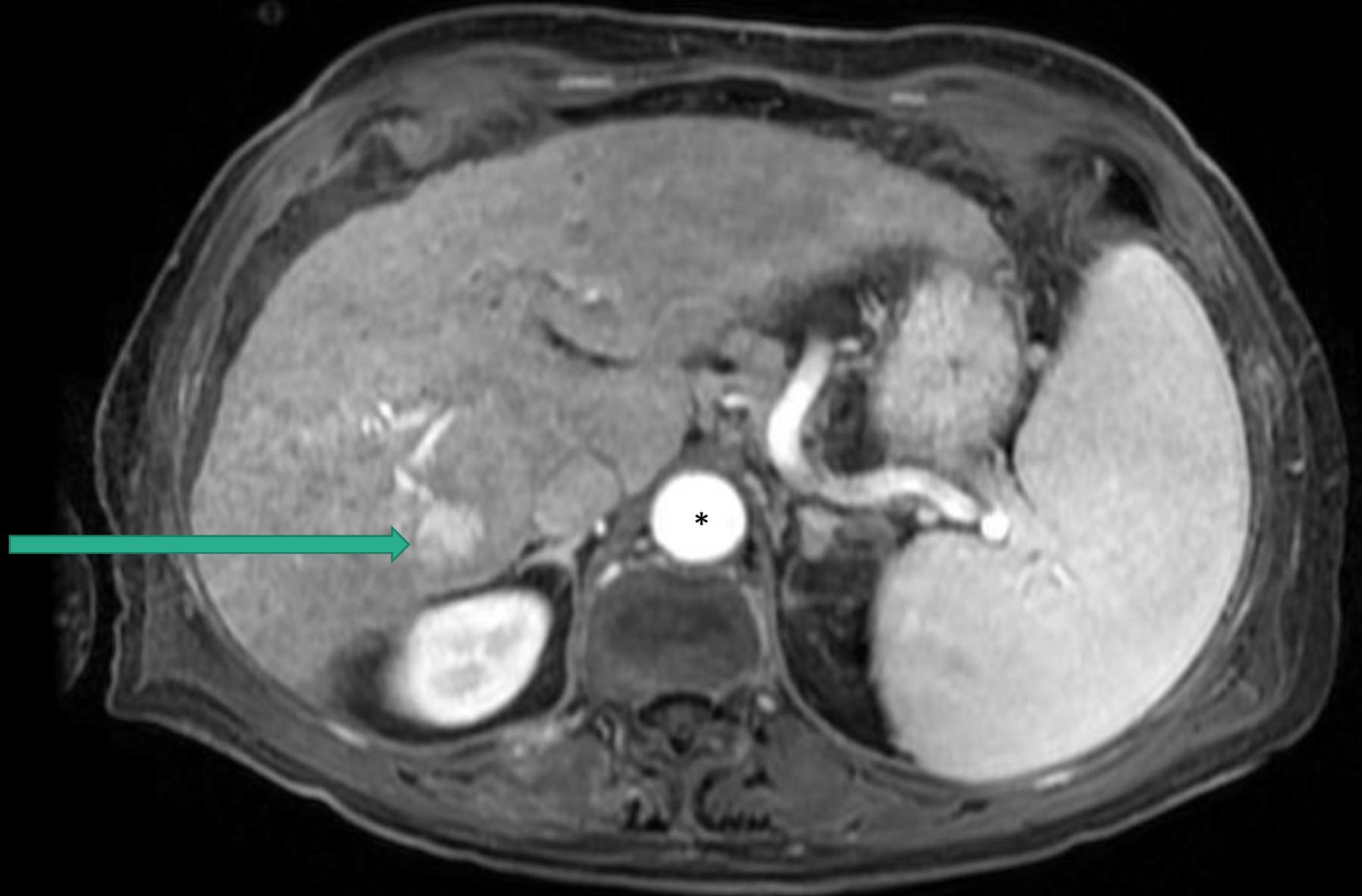
Imaging - MRI



Imaging - MRI

- The image is a post contrast T1 arterial phase image, specifically useful in identifying hypervascular liver lesions. Note the enhancement of the aorta (*)

Cirrhotic liver
Hyperenhancing 2.1 cm
lesion in segment VI of liver.
LI-RADS 4/5 – probably HCC



What is the next step?

ACR Appropriateness Criteria

American College of Radiology
ACR Appropriateness Criteria®

Clinical Condition: Radiologic Management of Hepatic Malignancy

Variant 1: Hepatocellular carcinoma: Solitary tumor <3 cm.

Treatment/Procedure	Rating	Comments
Systemic chemotherapy	3	
Resection	8	
Transplantation	9	
Chemical ablation	5	
Thermal ablation	8	
Stereotactic body radiotherapy (SBRT)	5	
Transarterial embolization (TAE)	5	
Transarterial chemoembolization (TACE)	5	
Selective internal radiation therapy (SIRT)	5	

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

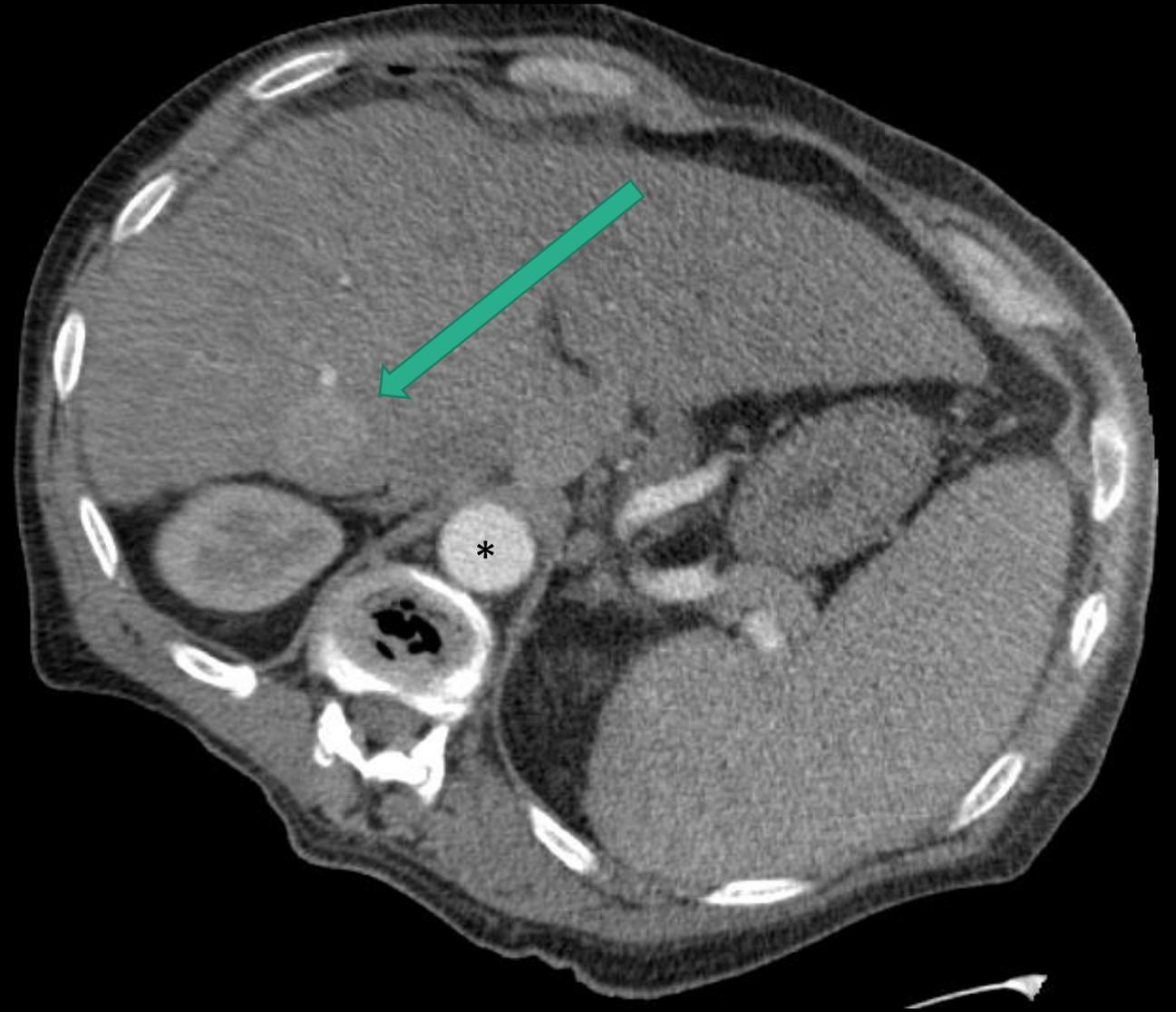
- Three treatment options are considered “usually appropriate” by the ACR for a solitary HCC measuring under 3 cm: transplantation, resection, and thermal ablation.
- The patient is already in the midst of preparation for a liver transplant, but a donor is not readily available.
- Thermal ablation is chosen over resection for patient convenience.

Diagnosis and Treatment Plan

- Hepatocellular carcinoma based on LI-RADS imaging criteria
- CT guided microwave ablation was planned for this lesion. However, due to poor visualization of the lesion on contrast-enhanced CT, the procedure was cancelled.

Imaging- CT with contrast

- Arterial phase images clearly demonstrate the lesion (arrow)
- Note the enhancement of the aorta (*), indicating arterial phase

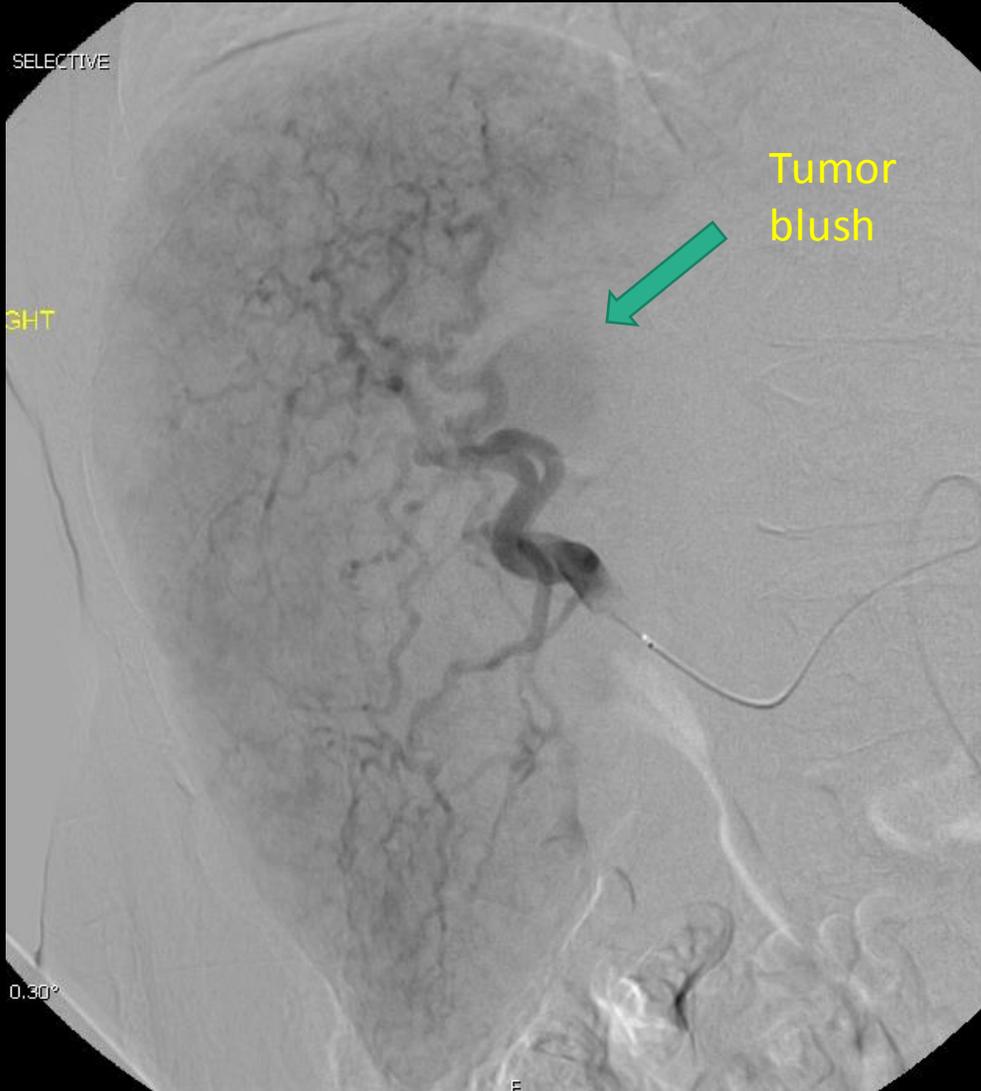


Imaging- CT with contrast

- Delayed phase images: the lesion is isodense to the rest of the liver, making CT guided therapy impossible
- Note the contrast being excreted through the collecting system in the right kidney (arrow) and that the aorta (*) is now isodense



Interventional Radiology - Localization



- Right hepatic artery segmental catheterization using femoral artery access
- Angiogram shows tumor neovascularization

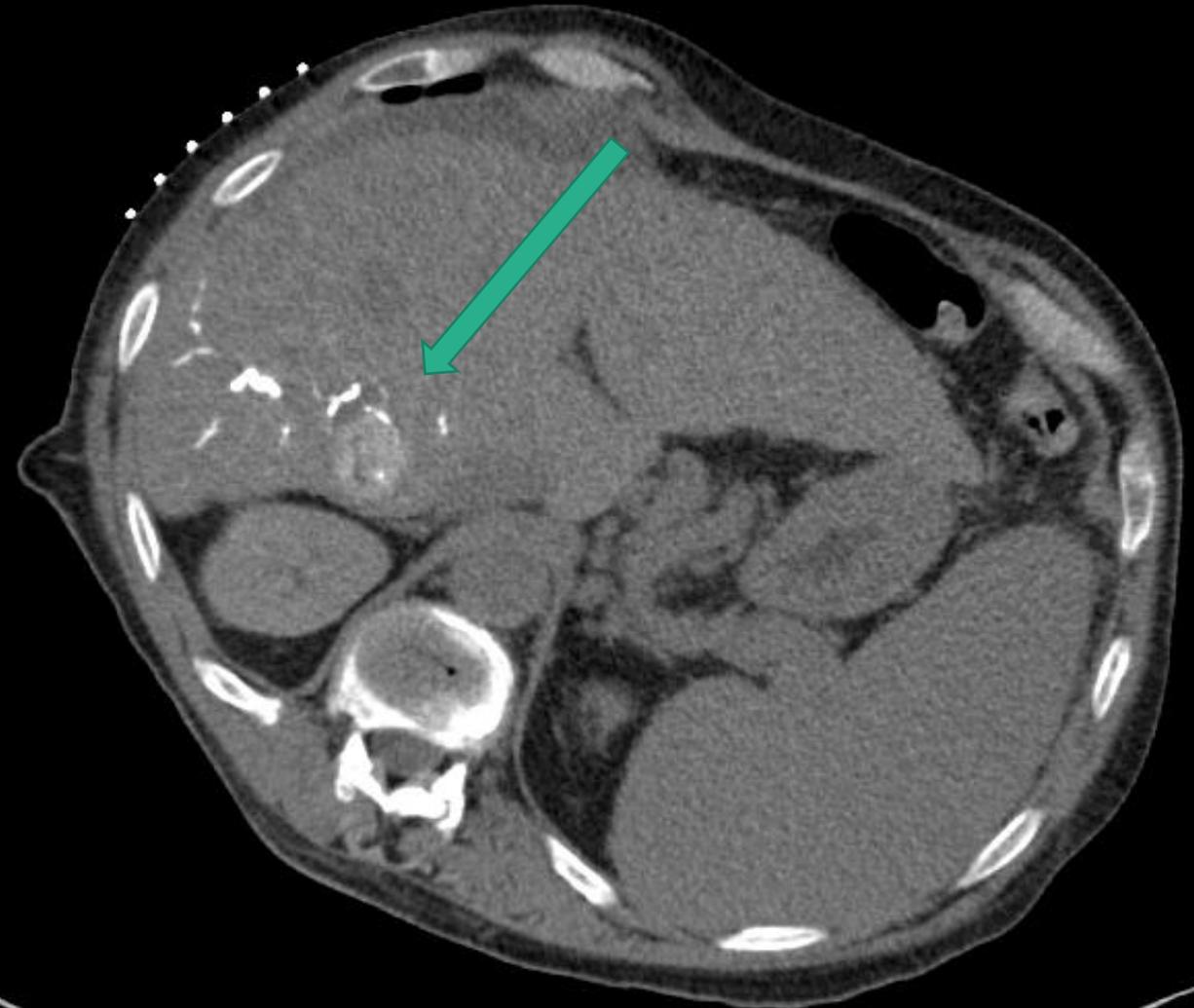
Interventional Radiology - Localization



- 70-150 micron LUMI Beads mixed with Iovue 300 contrast were administered at this point.
- LUMI Beads are radiopaque embolic beads (polyvinyl alcohol coupled with iodine) that create the appearance of a permanent arterial phase on CT in the targeted vessels.
- Note reduced capillary filling after embolization

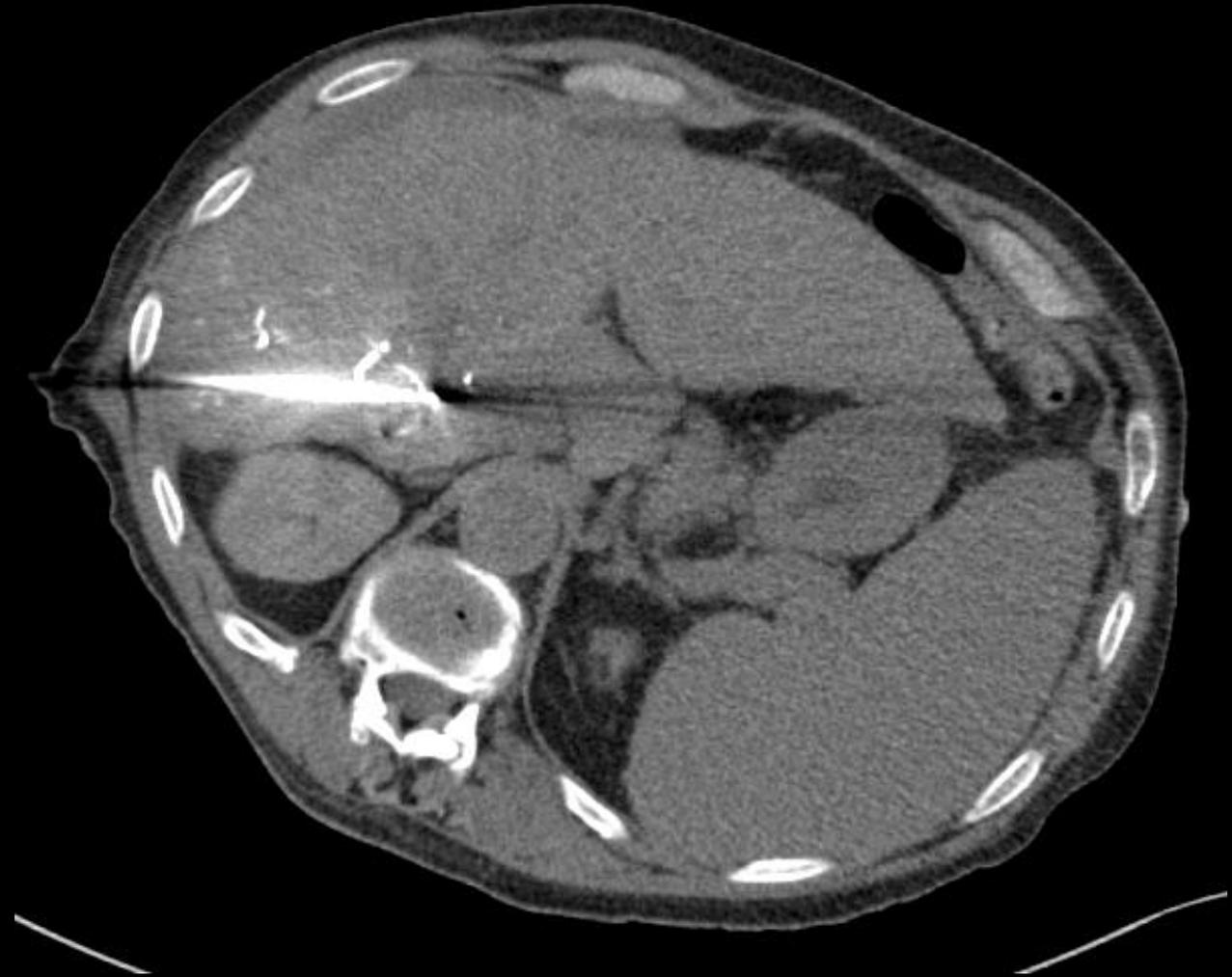
Interventional Radiology- Ablation

- CT guided microwave ablation was reattempted after LUMI bead placement.
 - Note the lack of IV contrast
- The lesion's visibility is now stable over time.



Interventional Radiology- Ablation

- Microwave emitting antenna was inserted under CT guidance and the lesion was ablated.



Hepatocellular Carcinoma

- 90% of HCCs develop as sequela to cirrhosis of any etiology.
- Risk factor modification for cirrhosis will also modify risk for HCC.
- Main risk factors include alcohol related cirrhosis, Hepatitis B and C, NASH, and smoking.
- Main cause of death in patients with cirrhosis
- Often discovered by screening patients with risk factors

Imaging of HCC

- Patients with cirrhosis should have a screening liver ultrasound every 6 months.
- CT: Use a four phase scan. HCC classically appears as a hyper-attenuating lesion in the arterial phase that disappears quickly (rapid washout).
- MRI: HCC classically appears as hyperintense on T1 images in arterial phase, again with rapid washout.
- MRI is superior to CT in terms of sensitivity for detecting HCC.
- LUMI beads were only necessary in this case for treatment, not diagnosis.
 - Like other embolotherapy treatments, LUMI beads can result in nontarget embolization and subsequent necrosis due to the fact that they do not degrade over time.

Diagnosis and Treatment of HCC

- Biopsy of liver lesions under 2cm belies the expectation of diagnosis of HCC with a false negative rate up to 40%. Therefore characterization by imaging bears the burden of diagnosis in these early, small lesions.
- Ablation and surgery are competing treatment options for HCC lesions less than 3cm in diameter. Difference in recurrence rates after ablation or surgery is negligible.

Microwave Ablation

- As electromagnetic energy is oscillated through the probe, water molecules attempt to align to the field, but are always lagging behind the field state due to its rapid oscillation. This causes absorption of energy.
- Microwave ablation is particularly effective in liver tissue because of its high water content.
- Microwave ablation is gaining support as superior to radio frequency ablation due to better local tumor control, larger ablation footprint, and shorter procedure time.
- Ablation does lose some effectiveness when used on lesions close to the liver hilum; the Vena Cava can act as a heat sink, drawing energy away from the target tissue.
- The energy delivered by the probe is significant. In this case, the probe created temperatures up to 242 degrees Fahrenheit in the targeted tissue.

References

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