

HCC: The Atypical, Unusual, and Variants

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Hepatocellular carcinoma (HCC) is the most common primary malignancy of the liver. Typical imaging findings include masses showing arterial enhancement, and rapid venous washout. The liver background may show cirrhotic change with portal hypertension. Invasion of the vascular structure is a hallmark of HCC. Atypical and unusual or variant HCCs are uncommon, but not rare. Recognizing these patterns is important for correct diagnosis and management. In this article, four patterns will be described, as following:

1. Fatty HCC

2. Ruptured HCC
3. HCC mimicking hemangioma
4. HCC in NAFLD (Nonalcoholic fatty liver disease)

Fatty HCC (Figure 1, 2)

HCC with fatty metamorphosis is not uncommon in histopathology, found in about 20% of cases⁽¹⁾. However, detection at imaging is rather unusual and fatty HCC was reported to be present at approximately 2% of cases⁽¹⁾. Distinguishing fatty HCCs from

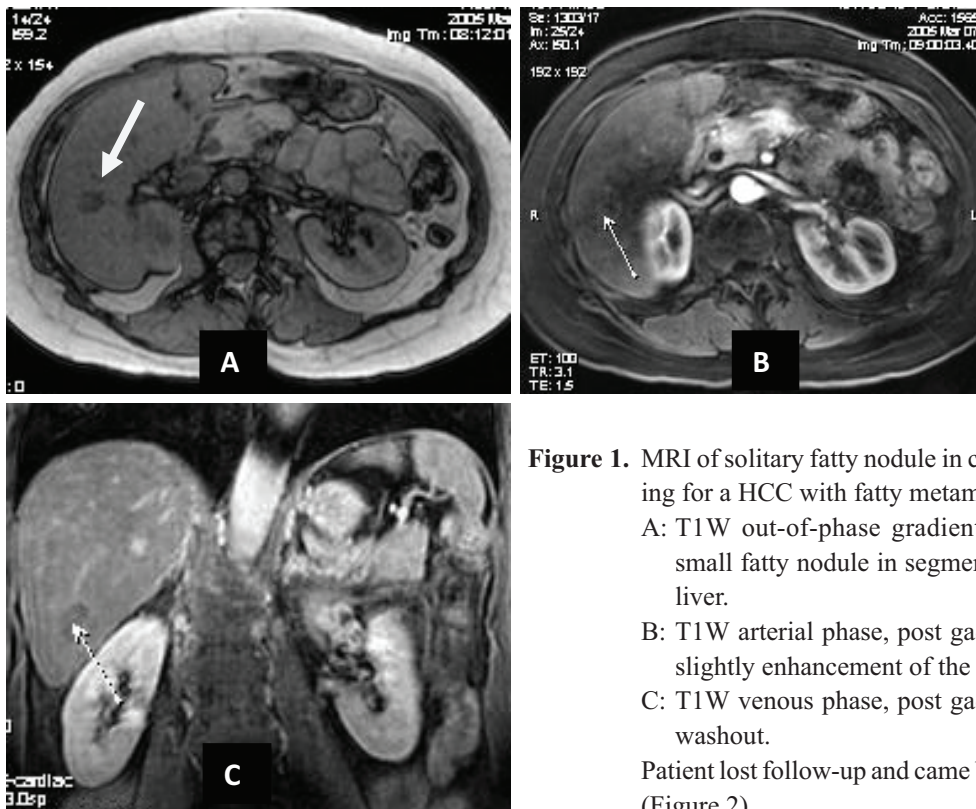


Figure 1. MRI of solitary fatty nodule in cirrhosis warranting for a HCC with fatty metamorphosis.

A: T1W out-of-phase gradient echo reveals a small fatty nodule in segment 6 of right lobe liver.

B: T1W arterial phase, post gadolinium reveals slightly enhancement of the nodule.

C: T1W venous phase, post gadolinium reveals washout.

Patient lost follow-up and came back 2 years later (Figure 2).

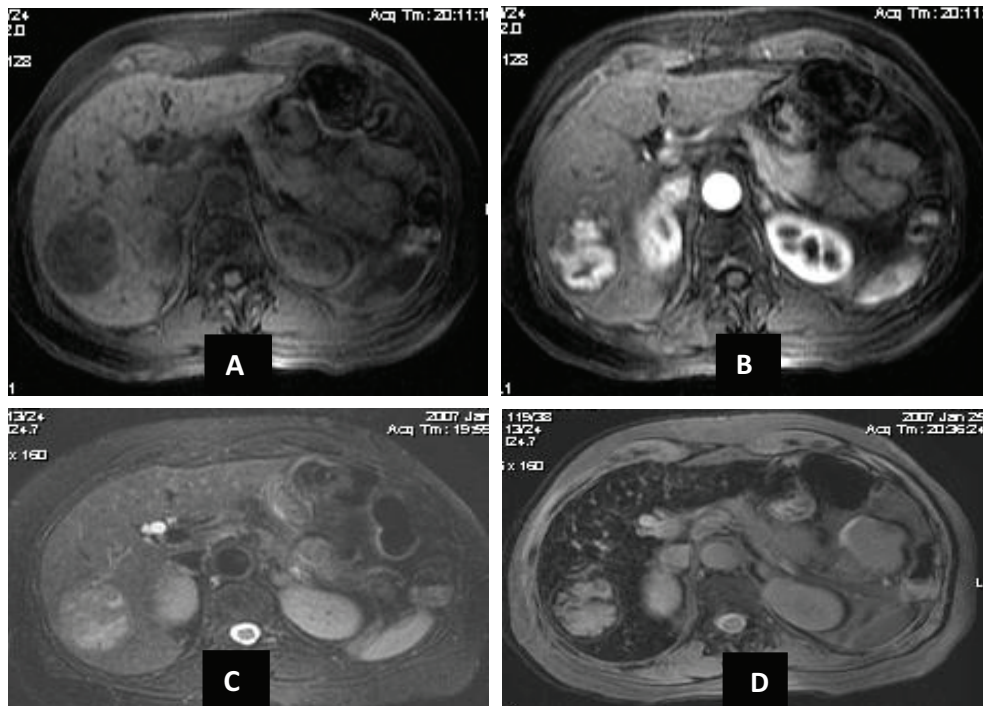


Figure 2. MRI of the same patient as Figure 1, but 2 years later. The mass shows interval growth and is characteristic for HCC. The fatty component is not visualized at this study, and is probably engulfed by the tumor.
 A: T1W pre-contrast shows a well-defined, low SI mass at segment 6 of right lobe liver
 B: T1W arterial phase, post gadolinium shows rapid arterial enhancement.
 C: T2W shows the mass to be relatively high SI.
 D: T2W, 20 min post-Resovist (kupffer cell specific contrast agent) shows bright SI of the mass compared to the background liver, indicative of no kupffer cells to uptake the contrast, characteristic for HCC.

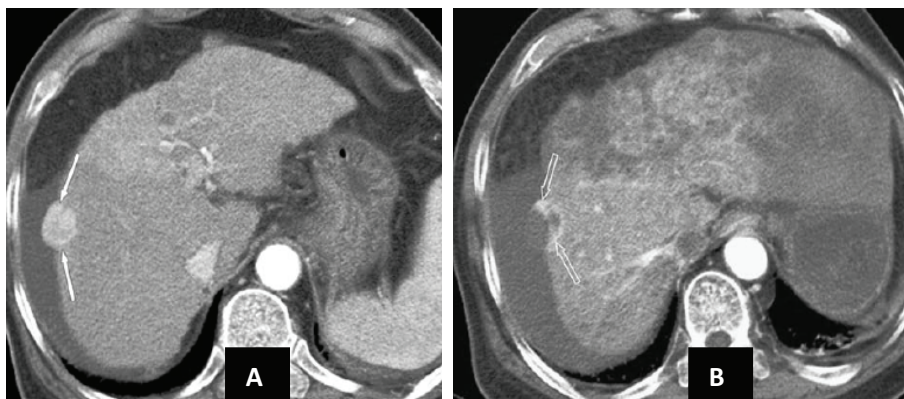


Figure 3. Enucleation sign of ruptured hepatoma
 A: CT arterial phase shows a small enhancing HCC, protruding from the liver surface.
 B: Three months later, the mass ruptured. CT arterial phase shows hematoma over the surface of a crescent-shaped enhancing nodule, giving the “enucleation sign”. Note high density perihepatic fluid, suggestive of hemoperitoneum.

steatotic regenerating nodules may sometimes be difficult. General, but not exclusive, rule is that single fatty nodule in cirrhotic liver is suggestive of malignant HCC or high grade dysplastic nodule. Benign steatotic regenerating nodules are usually multiple⁽²⁾.

Ruptured HCC (Figure 3, 4)

Spontaneous rupture is uncommon for HCC, and is found in only 3-15% of cases⁽³⁾. The mechanism is not clear, but many factors may contribute to the process. These factors include friable feeding arteries to

the mass, minimal trauma to the superficially located mass, increased pressure from vascular invasion, and associated coagulopathy. Imaging findings in CT and MRI include presence of hemoperitoneum, mass with perihepatic hematoma, active extravasation, tumor protrusion of tumor from hepatic surface, focal discontinuity of liver surface suggestive of rupture through capsule, and enucleation sign. Enucleation sign is hematoma surrounding the enhancing portion of the tumor, resembling the eye globe⁽⁴⁾.

HCC mimicking hemangioma

This type of HCC has been anecdotally reported in the literature⁽⁵⁾. CT showed a large mass with peripheral nodular enhancement and slowly central filling-in. However, the enhancement was not homogeneous and there was a large central scar. Nevertheless, findings were similar to a hemangioma. Such findings in patient with underlying chronic HBV should raise the possibility of unusual HCC. This particular mass was resected and pathology revealed numerous

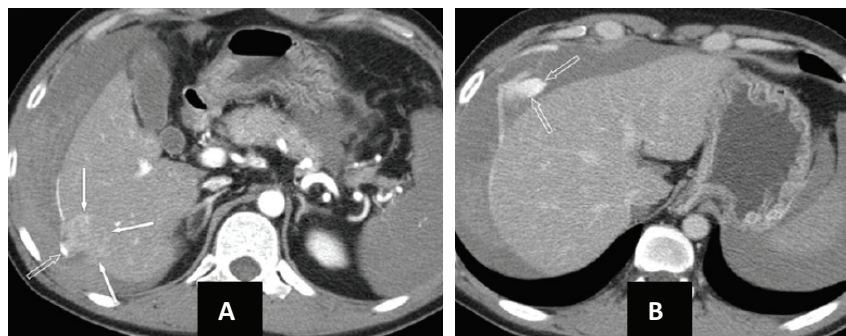


Figure 4. Ruptured HCC with extravasation
A: CT arterial phase shows enhancing small HCC at the surface of the liver. The dense linear high density along the liver capsule represents extravasation. Note high density perihepatic fluid indicative of hemoperitoneum.
B: CT arterial phase at the higher level than picture A shows accumulation of extravasated contrast.

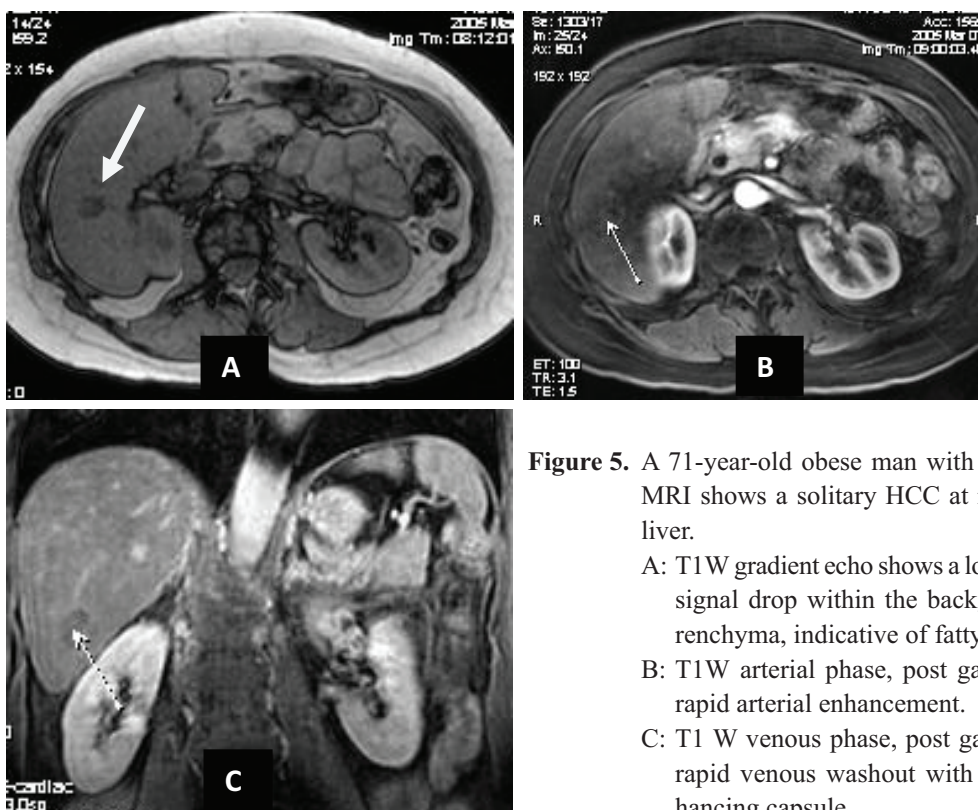


Figure 5. A 71-year-old obese man with diabetes type 2. MRI shows a solitary HCC at right lobe of the liver.
A: T1W gradient echo shows a low SI mass. Note signal drop within the background liver parenchyma, indicative of fatty change.
B: T1W arterial phase, post gadolinium shows rapid arterial enhancement.
C: T1 W venous phase, post gadolinium shows rapid venous washout with evidence of enhancing capsule.

dilated vascular spaces along with malignant hepatocytes, and pelioid HCC was diagnosed. The degree of peliosis within HCC may be the major factor determining the enhancement pattern. The more the peliosis, the longer the retention of the contrast medium with gradual filling-in, resembles a hemangioma.

HCC in NAFLD (Figure 5)

Recently, NAFLD has been recognized as one of the common causes of chronic liver disease. HCC in NAFLD-related chronic liver disease is about 18-27%⁽⁶⁾. However, there is evidence that HCC may develop in NAFLD before it has cirrhotic change⁽⁷⁾. NAFLD is strongly associated with obesity and diabetes type 2. Spreading of obesity means that millions of people will be at risk for chronic liver disease. Approximately 10% of obese people will develop cirrhosis⁽⁸⁾. Patients with diabetes type 2 will die from cirrhosis 2.5 times higher than general population⁽⁹⁾.

Imaging findings of HCC in NAFLD are similar to HCC in other causes of chronic liver disease. The dominant pattern is a solitary mass or a dominant mass with satellite nodules. Rapid arterial enhancement and rapid venous washout, characteristic for HCC, are usually present. Capsule formation and central necrosis are often visualized. Minority of cases have elevation of alfa fetoprotein. Background fatty liver should raise the possibility of HCC if the liver mass is detected.

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