

Imaging of Focal Liver Masses

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EXTRACT

In this article, focal liver masses will be discussed and divided as following:

1. Focal benign lesion
2. Benign liver tumors
3. Malignant liver tumors

Key words : focal, liver mass

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- 1. Focal benign lesions**
 - a. Focal fatty liver
 - b. Focal fatty sparing
 - c. Hepatic cyst
- 2. Benign liver tumors**
 - a. Hepatic cavernous hemangioma
 - b. Focal nodular hyperplasia (FNH)
 - c. Hepatic adenoma
 - d. Biliary cystadenoma
- 3. Malignant liver tumors**
 - a. Hepatocellular carcinoma (HCC)
 - b. Fibrolamellar carcinoma (FLC)
 - c. Cholangiocarcinoma

- d. Biliary cystadenocarcinoma
- e. Hepatic metastases

Focal Fatty Liver (Figure 1)

Diffuse fatty liver is a common condition resulting from metabolic complication of toxic, ischemic or infectious insults to the liver. Focal fatty infiltration is not as common as diffuse form and can present as a hepatic incidentaloma⁽¹⁾ mimicking a true neoplasm.

Focal Fatty Sparing (Figure 2)

Diffuse fatty liver is sometimes heterogeneous with focal areas of relatively normal parenchymal sparing. Focal fatty sparing can also mimic a true liver mass.

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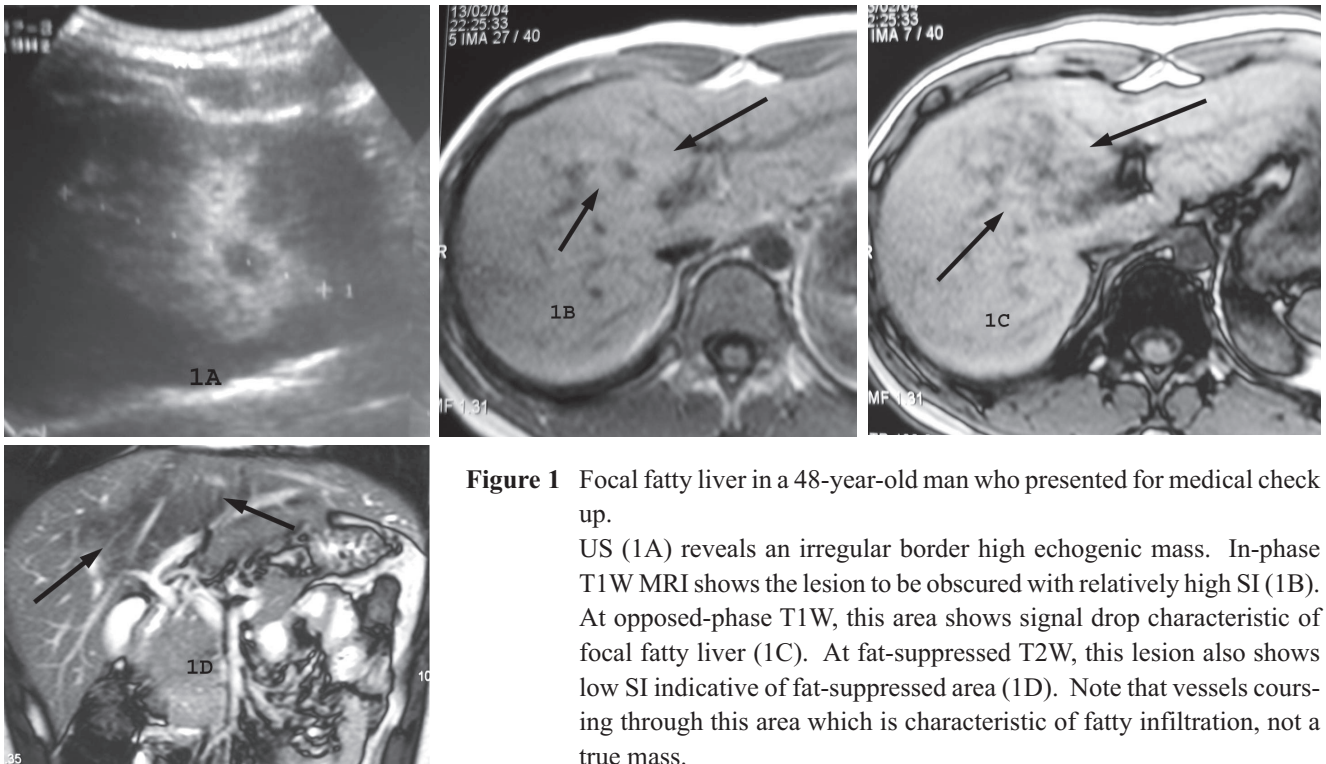


Figure 1 Focal fatty liver in a 48-year-old man who presented for medical check up. US (1A) reveals an irregular border high echogenic mass. In-phase T1W MRI shows the lesion to be obscured with relatively high SI (1B). At opposed-phase T1W, this area shows signal drop characteristic of focal fatty liver (1C). At fat-suppressed T2W, this lesion also shows low SI indicative of fat-suppressed area (1D). Note that vessels coursing through this area which is characteristic of fatty infiltration, not a true mass.

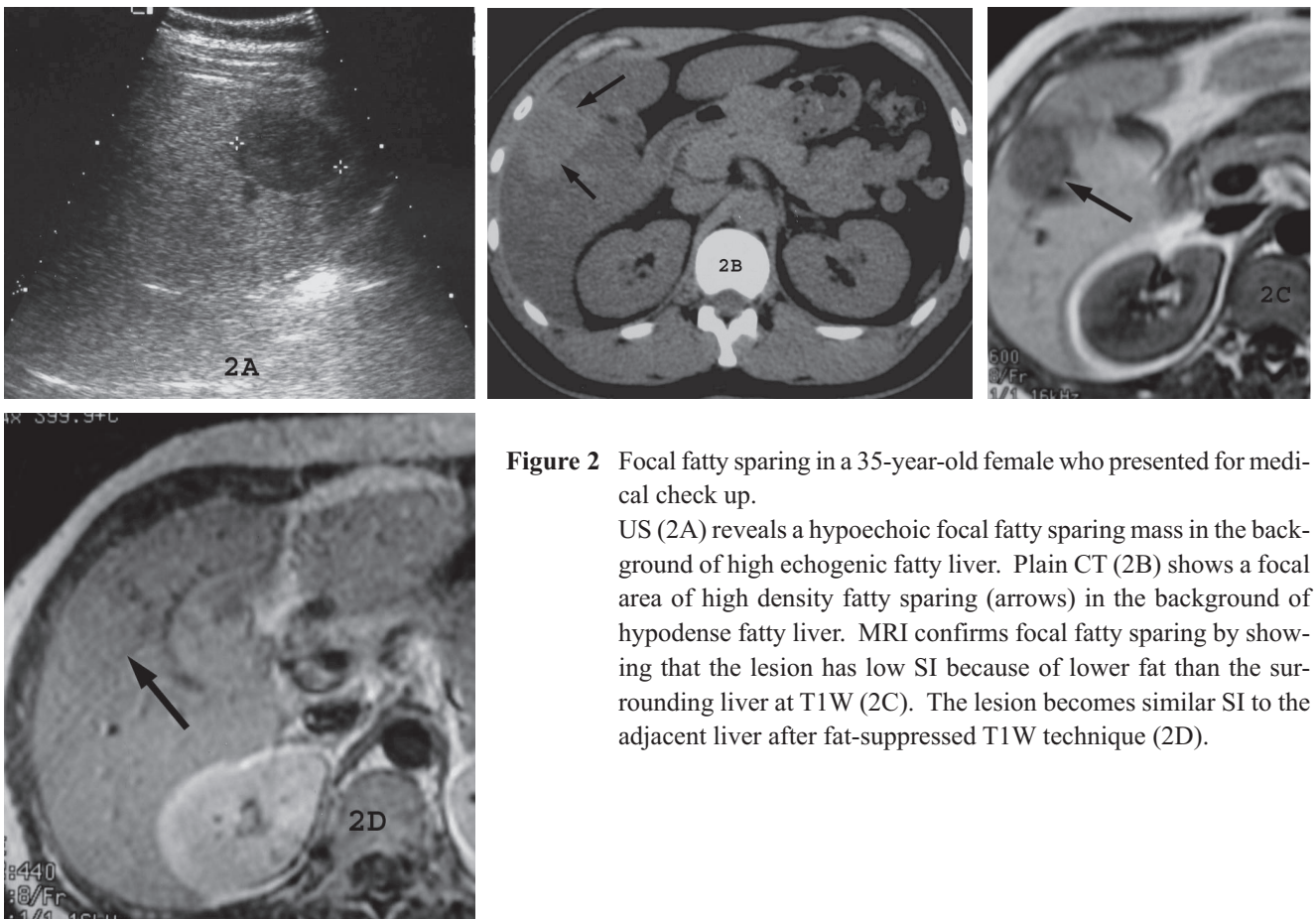


Figure 2 Focal fatty sparing in a 35-year-old female who presented for medical check up. US (2A) reveals a hypoechoic focal fatty sparing mass in the background of high echogenic fatty liver. Plain CT (2B) shows a focal area of high density fatty sparing (arrows) in the background of hypodense fatty liver. MRI confirms focal fatty sparing by showing that the lesion has low SI because of lower fat than the surrounding liver at T1W (2C). The lesion becomes similar SI to the adjacent liver after fat-suppressed T1W technique (2D).

Hepatic Cyst (Figure 3)

Liver cyst is a benign congenital developmental lesion believed to derive from biliary epithelium. Simple cysts are usually solitary, although multiple cysts occasionally occur and may relate to autosomal dominant polycystic liver disease (ADPLD).

Hepatic Cavernous Hemangioma (Figure 4)

Hemangioma is a benign tumor composed of multiple vascular channels lined by a single layer of endothelial cells. It is the most common benign tumor of the liver. Hemangioma can be solitary or multiple and found more commonly in postmenopausal female than male (F:M, 5:1).

Focal Nodular Hyperplasia (FNH) (Figure 5)

FNH is a second most common benign liver tumor. It is believed to cause by hyperplastic response to a localized vascular abnormality⁽²⁾. It is usually a solitary mass and may associate with hemangioma.

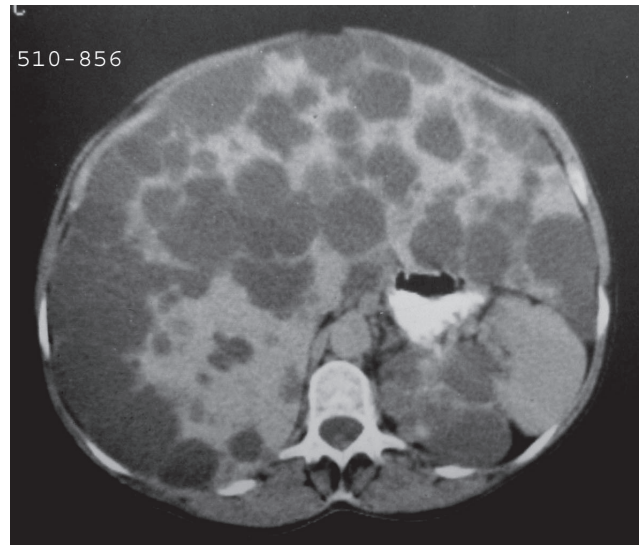


Figure 3 Hepatic cysts in a 27-year-old female with autosomal dominant polycystic liver disease (ADPLD). CT shows multiple cysts scattering throughout the liver. Note also multiple cysts within the left kidney, a common association.

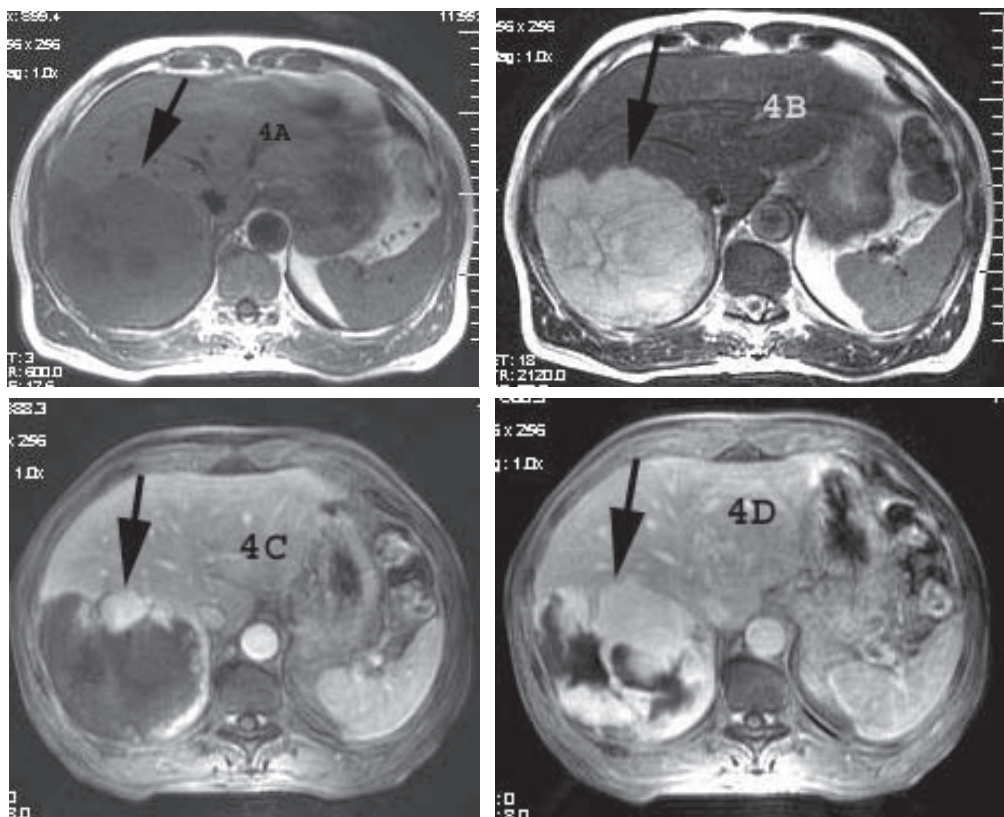


Figure 4 Hepatic cavernous hemangioma in a 50-year-old woman who presented with abdominal discomfort. MRI shows a giant hemangioma at segment 7 of right lobe liver. This mass shows low SI at T1W (4A), and very high SI at T2W (4B). After IV gadolinium, there is peripheral nodular enhancement at early arterial phase (4C), central filling in at portal venous phase with delayed wash-out (4D), characteristic of a hemangioma.

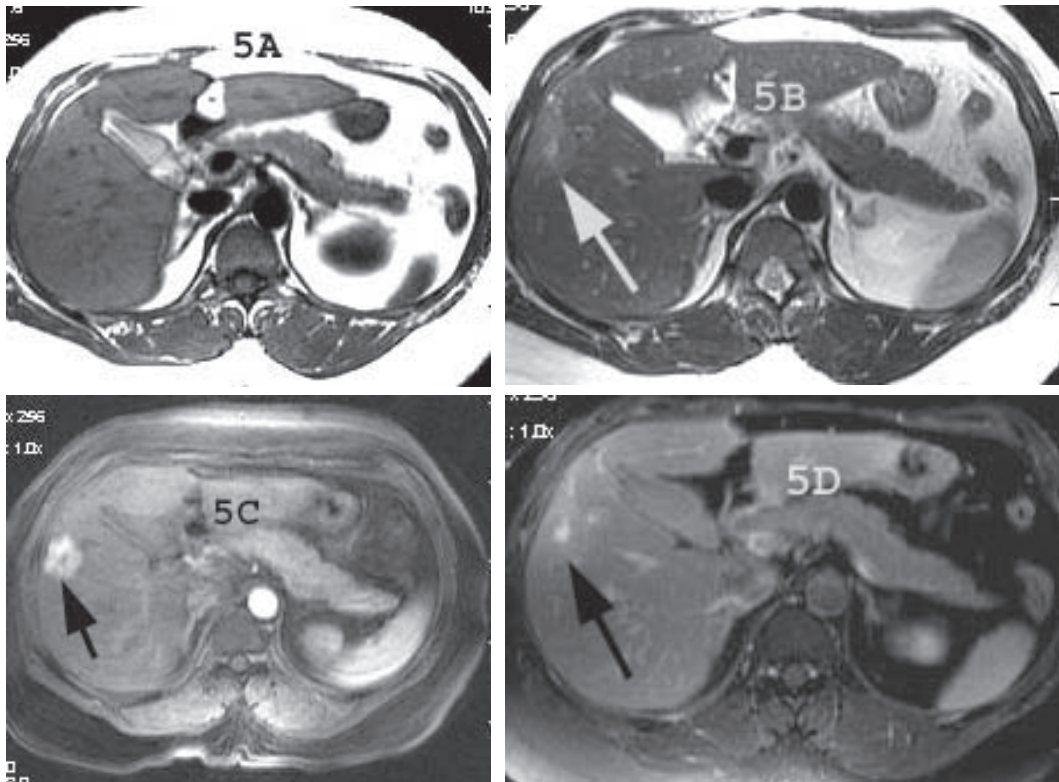


Figure 5 Focal nodular hyperplasia in a 35-year-old female whose check-up US showed a small liver mass. MRI shows no obvious mass at T1W (5A), which appears to be slightly hyperintense at T2W with obvious high SI central scar (5B). After IV gadolinium, there is homogeneous intense enhancement of the mass at early arterial phase, except the central scar (5C). The central scar shows delayed enhancement (5D). These findings are consistent with FNH.

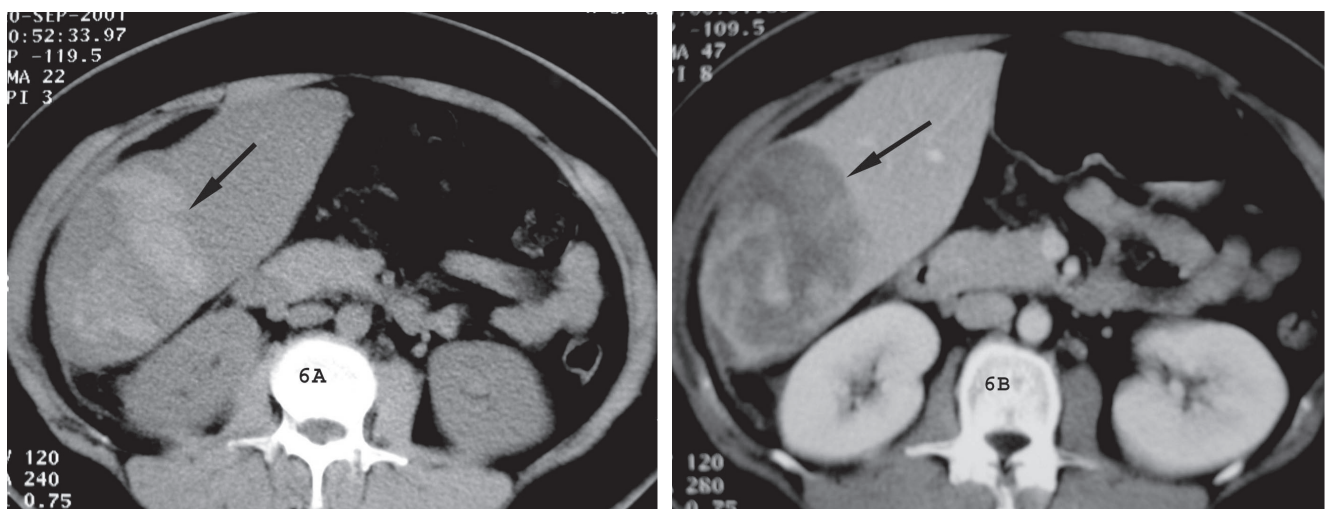


Figure 6 Hepatic adenoma in a 28-year-old woman with a history of using oral contraceptive pills. She presented with acute abdominal pain. Plain CT shows a hemorrhagic mass (6A) at segment 6 of right lobe liver. This mass shows heterogeneous enhancement after IV contrast medium (6B). Hemorrhage is a common presentation of hepatic adenoma.

Hepatic Adenoma (Figure 6)

Hepatic adenoma is quite rare and arises from hepatocytes. It is commonly occur in young women after use of oral contraceptive steroids. Hemorrhage is a common complication and patients may present with acute abdominal pain.

Biliary Cystadenoma/Cystadenocarcinoma (Figure 7)

Biliary cystadenoma is relatively uncommon benign tumor, which probably arises from primitive bil-

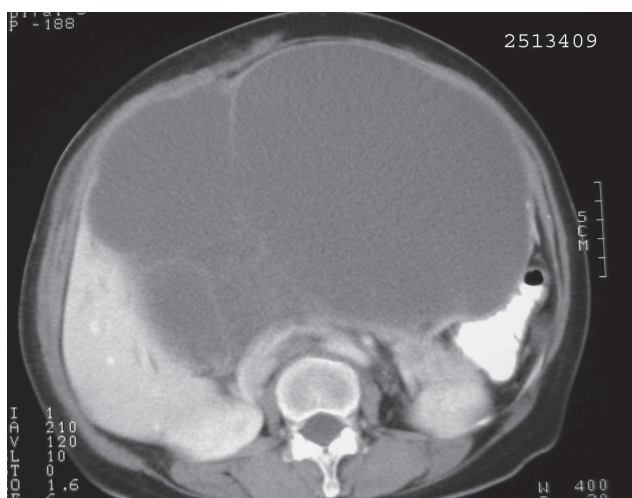


Figure 7 Biliary cystadenoma in a 45-year-old female who presented with abdominal distension. CT reveals a large cystic mass with fine internal septations, characteristic of biliary cystadenoma. Biliary cystadenoma is a premalignant condition that will eventually develop into biliary cystadenocarcinoma if left untreated.

iliary tissue. It is a premalignant tumor, which will eventually progress into biliary cystadenocarcinoma if left untreated⁽³⁾.

Hepatocellular Carcinoma (HCC) (Figure 8)

HCC is the most common primary malignant liver tumor usually arising from cirrhotic liver due to chronic viral hepatitis or alcoholism. There are 3 major patterns of HCC, which are single/unifocal, nodular/multifocal, and diffuse/infiltrative types.

Fibrolamellar Carcinoma (FLC) (Figure 9)

FLC is rather uncommon primary malignant liver tumor. It is now believed to be a distinct tumor, totally different from HCC. It usually occurs in young adults of less than 40 years of age without sex predilection. Cirrhosis is not a risk factor and alpha-fetoprotein is not elevated in FLC⁽⁴⁾.

Cholangiocarcinoma (Figure 10)

Cholangiocarcinoma is the second most common primary malignant liver tumor, secondary to HCC. It arises from intra-hepatic or extra-hepatic bile duct epithelium.

Hepatic Metastases (Figure 11)

Common primary malignancies that commonly metastasize to the liver include GI tract carcinoma, pancreatic carcinoma, lung carcinoma, breast carcinoma, endocrine tumors, and malignant melanoma. The lesions are usually multiple but solitary liver metastasis is not uncommon.

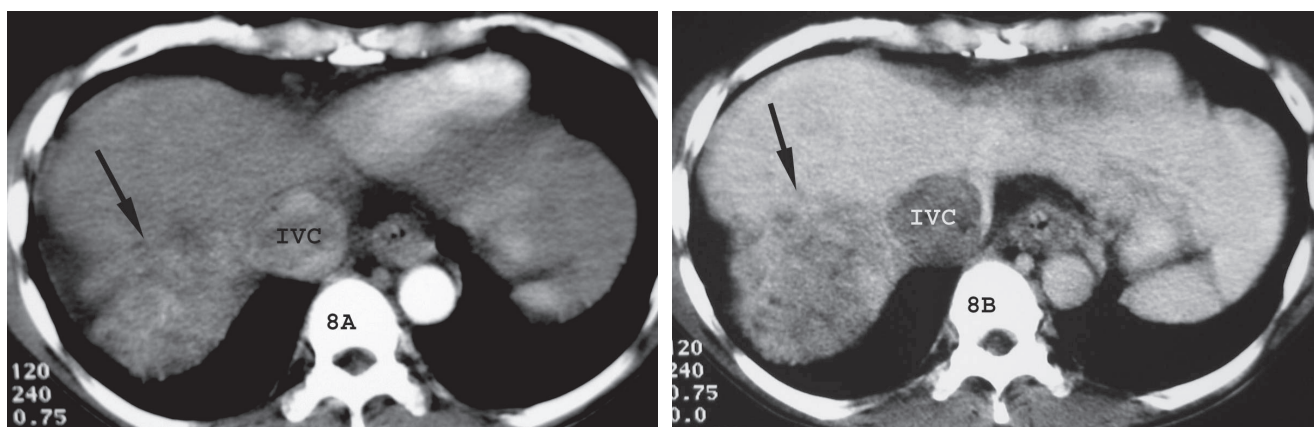


Figure 8 Hepatocellular carcinoma in a 48-year-old man with underlying chronic hepatitis B. CT scan, arterial phase, shows a hypervascular mass with IVC invasion (8A). At the portal venous phase, the mass shows rapid washout of the contrast (8B). Vascular invasion is characteristic for HCC.

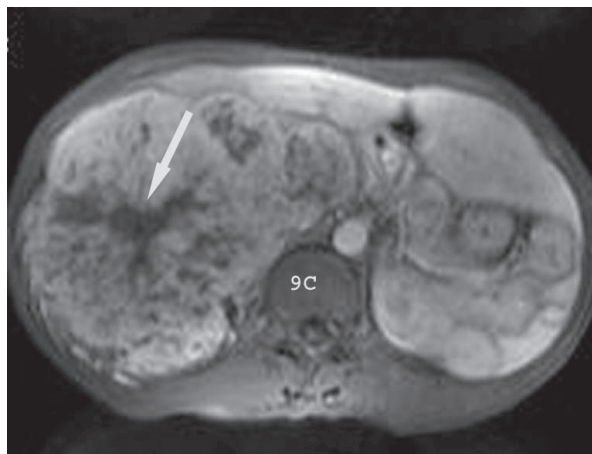
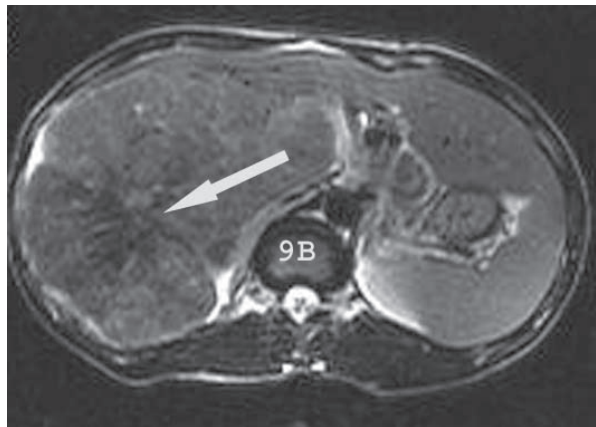
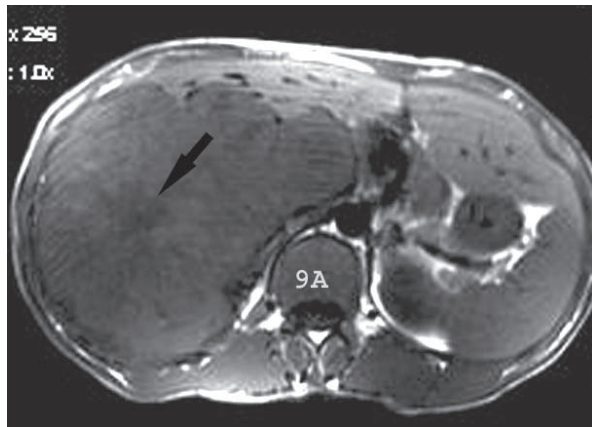


Figure 9 Fibrolamellar carcinoma in a 35-year-old male who presented with abdominal discomfort and weight loss. MRI shows a large low SI mass with low SI central scar at both T1W and T2W, indicative of fibrosis (arrows, 9A-B). The tumor shows intense enhancement except for its central scar (arrow, 9C). These findings are characteristic of FLC.

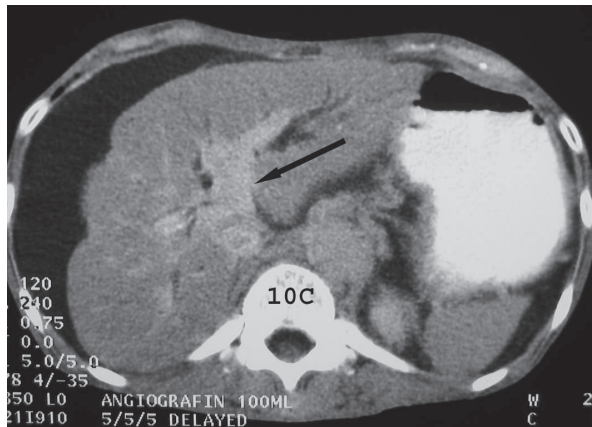
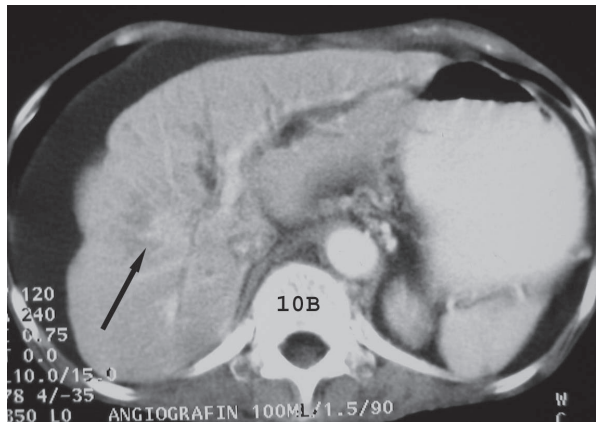


Figure 10 Cholangiocarcinoma in a 57-year-old man who presented with jaundice. Plain CT shows ill-defined infiltrative low density mass at the confluence of left and right hepatic bile ducts (10A). At portal venous phase, there is minimal enhancement (10B) with evidence of intra-hepatic bile duct dilatation. At delayed 5 min phase, there is more enhancement along the confluent area (10C), characteristic of cholangiocarcinoma, infiltrative Klatskin type.

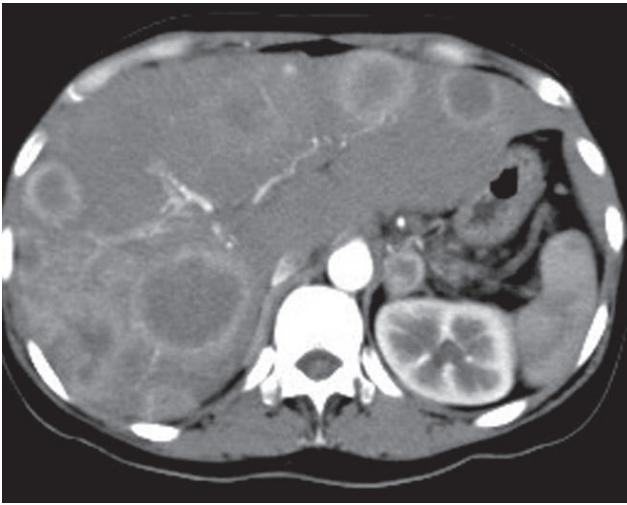


Figure 11 Hepatic metastasis in a 56-year-old man with a known CA colon.

CT reveals multiple rim enhancing masses scattering throughout the liver. Multiplicity is a common finding for metastasis.

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