

# Atypical imaging presentation of hepatocellular carcinoma - Case series



Divya S<sup>1</sup>, Geetha G<sup>2</sup>, Ashwin Kumar A<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, Department of Radiology, Barnard Institute of Radiology, Madras Medical College, <sup>3</sup>Associate Professor, Department of Radiology, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India

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## ABSTRACT

Hepatocellular carcinoma (HCC), the most common primary liver tumor, significantly contributes to cancer-related mortality worldwide. This case series investigated HCC imaging presentations, including portal vein tumor thrombus, multifocal HCC, cirrhotomimetic diffuse infiltrative HCC, metastasis to various organs, HCC with capsular rupture and hemoperitoneum, and unusual features like a fatty metamorphosis. Imaging plays a crucial role in HCC detection, diagnosis, staging, and posttreatment monitoring, and ultrasonography is recommended for screening and triple-phase computed tomography, which is essential for characterization and staging. Typical imaging features include arterial phase hyperenhancement, washout in later phases, and tumor capsule. Recognizing imaging presentations is vital for accurate diagnosis and management, as HCC complications indicate advanced disease and poor prognosis. This series highlights HCC's diverse imaging spectrum of HCC and emphasizes the importance of identifying atypical presentations for timely diagnosis and appropriate management.

**Key words:** Hepatocellular carcinoma; Atypical imaging presentations; Portal vein tumor thrombus

## INTRODUCTION

Hepatocellular carcinoma (HCC) is the most common form of primary hepatic tumor and ranks third in cancer mortality worldwide.<sup>1</sup> The most important risk factors include cirrhosis and hepatitis B and C viruses with a peak age of incidence of 50–70 years, and a male predominance of 4:1.<sup>2</sup> The typical imaging findings of HCC show a well-circumscribed hypoattenuating mass with or without the hypoechoic rim of a tumor capsule. On triple-phase computed tomography (CT), HCC shows early maximum enhancement in the arterial phase and becomes isodense in the portal venous phase of enhancement and washout in the equilibrium phase. Equilibrium phase CT could show a thin rim-enhancing tumor capsule with variable incidence, ranging from 10% to 80.7%.<sup>3</sup> Similar to CT, dedicated liver magnetic resonance imaging (MRI), including T2-weighted

imaging, T1-weighted in- and out-phase imaging, and diffusion-weighted imaging sequences are performed in order to assess ancillary features of HCC. Contrast MRI includes acquired at arterial, portal venous (60 s), and delayed venous (180 s) phases to demonstrate wash-in (during the late arterial phase) and washout (during portal venous and/or delayed venous phases). Typical HCC appears iso to hypointense on T1 and hyperintense on T2 with diffusion restriction and low ADC values. On contrast, they have a similar enhancement pattern as seen in CT.

Hemorrhage or calcification (~5%), central scar (~3%), or gross fat (~1.6%) may be observed within the HCC tumor, varying by series.<sup>4</sup> In noncirrhotic patients, HCC typically appears as a large solitary mass or a dominant mass with small satellite nodules, more often showing necrosis and central scar formation than in cirrhotic patients.<sup>5</sup> Imaging

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### Address for Correspondence:

Dr. Ashwin Kumar A, Associate Professor, Department of Radiology, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India.

**Mobile:** +91-9884765707. **E-mail:** ashgilli@gmail.com

is therefore essential for detecting, diagnosing, staging, and monitoring HCCs post-treatment. This case series presents various types of HCC and atypical presentations of HCC.

## CASE PRESENTATION

### Case 1

A 42-year-old female with abdominal pain and weight loss for 2 months. She presented a solitary mass lesion of size  $6.5 \times 7$  cm with areas of necrosis in the right lobe of the liver (Figure 1). On contrast, the lesion showed enhancement in the arterial phase and wash out in the delayed phase. There is also an enhancing tumor thrombus in the main portal vein, which shows intense enhancement to that of the lesion in the arterial phase and washout. This was a proven case of HCC with elevated alpha-fetoprotein (AFP) levels.

### Case 2

A 61-year-old male presented to emergency with acute abdominal pain with a deranged liver function test. Sonography showed no evidence of cirrhosis and multiple isoechoic lesions in the liver. Triple phase Figure 2. CT showed multiple enhancing lesions diffusely noted in the bilateral lobe of the liver, showing homogeneous hyperenhancement in the arterial phase and washout in the equilibrium phase, and there is no capsular enhancement. AFP level was within normal range. Possibilities of Multifocal HCC and hypervascular metastasis were given, and a biopsy confirmed HCC.

### Case 3

A 55-year-old female patient with a known case of chronic liver disease, and Hepatitis B positive presented with abdominal pain and distension. Blood investigation showed elevated of AFP – 718 ng/mL. Plain CT demonstrated cirrhotic liver. Arterial phase contrast-enhanced CT scan of the abdomen at the level of the main portal vein shows linear enhancement of the main portal vein, right and left portal vein, and washout in portal and equilibrium phase Figure 3. The entire liver shows heterogeneous pattern of hyperenhancement termed “Mosaic pattern” in the arterial phase and washout of enhancement in the equilibrium

phase scan. This is a case of cirrhotomimetic diffuse infiltrative type of HCC with enhancing tumor thrombus in the main portal vein, right, and left portal vein.

### Case 4

A 68-year-old male who is a chronic alcoholic with negative viral markers presented with acute abdominal pain and distension. He had a history of loss of weight and appetite. Contrast Enhanced Triple phase CT showed arterial phase hyperenhancing lesion in segments 7 and 5 of the right lobe of the liver showing minimal washout on the equilibrium phase. CT showed multiple large mildly enhancing retroperitoneal lymph nodes in the paraaortic and aorto caval region. Right epiphrenic lymph nodes and peripancreatic bulky lymph nodal enlargement were also seen; some of them showed the central area of necrosis (Figure 4). Chest CT revealed multiple subpleural nodules in both lobes of the lung. Biopsy taken from the retroperitoneal node confirmed the diagnosis of primary HCC in the liver with retroperitoneal lymph nodal metastasis and lung secondaries.

### Case 5

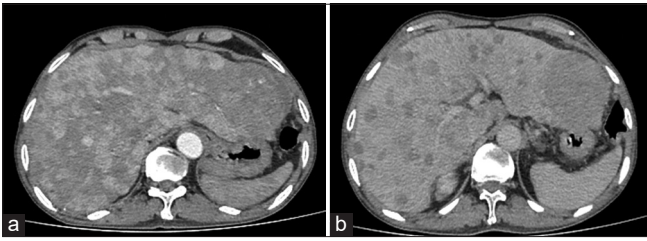
Another case presented with a bilateral large adrenal gland with a nodule in the right lobe of the lung in the posterobasal basal segment. This is a case of HCC in the left lobe of the liver and segment 5 of the right lobe of liver (Figure 5).

### Case 6

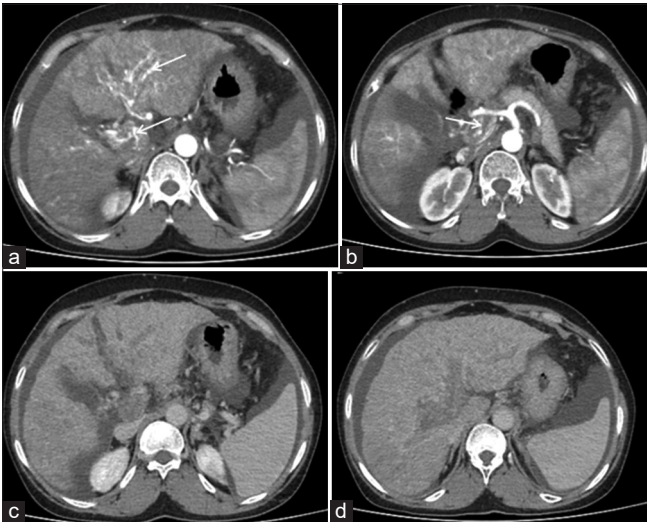
A 54-year-old female who is known non-alcoholic fatty steatohepatitis, ultrasound of the abdomen showed a cirrhotic liver with ascites. Plain CT showed a nodular liver surface and ill-defined isodense lesion in segment 6 of the right lobe of the liver. Triple-phase CT showed no enhancement on the late arterial phase and isodense on the equilibrium phase. Multiple enhancing subcapsular nodular deposits, peritoneal deposits, and mild peritoneal thickening with loculated ascites are also seen (Figure 6). Portal vein and inferior vena cava (IVC) appear normal. The possibility of ovarian malignancy was considered the primary diagnosis with peritoneal deposits and malignant ascites. However, the laboratory markers of Ovarian



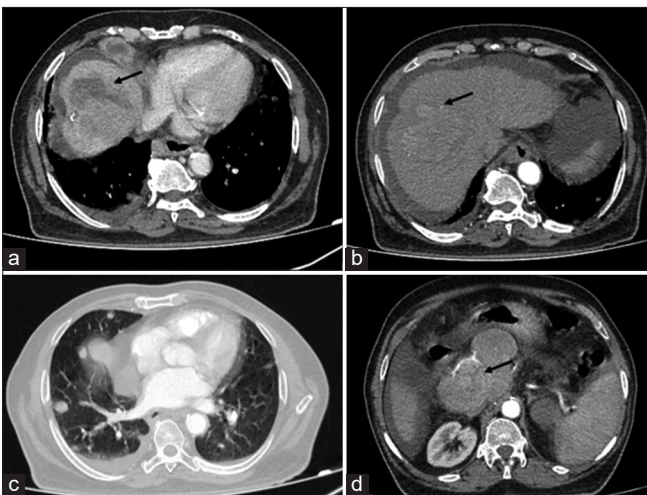
**Figure 1:** Enhancing lesion with wash out in venous phase (star in a and b) and tumor thrombus with expansion of the main (white arrow in a and b) and left portal vein (black arrow a)



**Figure 2:** Multiple nodular enhancing lesions diffusely noted in the bilateral lobe of liver showing homogeneous enhancement in the arterial phase (a) and wash out in portal phase (b)

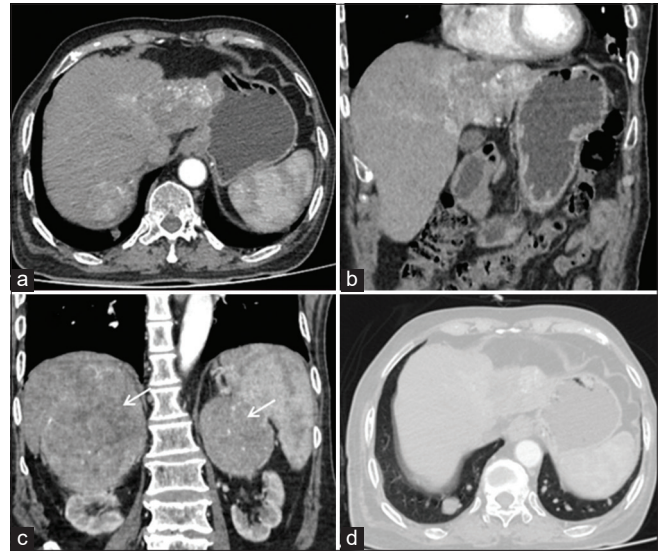


**Figure 3:** (a and b) Contrast-enhanced computed tomography arterial phase shows enhancing tumor thrombus in the main, left, and right portal vein (white arrow in a and b) with heterogenous mosaic pattern of enhancement of the liver diffusely involving both lobes of the liver showing wash out in portal and delayed venous phase (c and d)

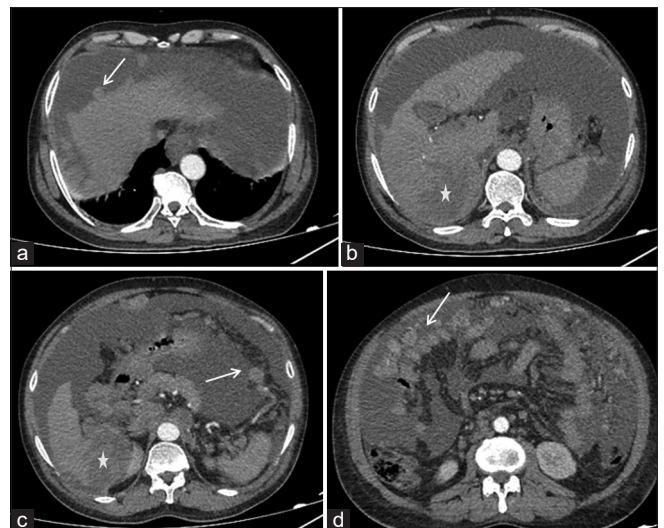


**Figure 4:** Heterogeneously enhancing lesion in segment 8 of the liver with wash out (black arrow in a and b) and lung metastasis (c) and retroperitoneal lymph nodes (black arrow in d)

malignancy were normal. Biopsy of the liver lesion suggested a Scirrhou type of HCC.



**Figure 5:** Contrast computed tomography showing heterogeneously enhancing lesions in both lobes of the liver (a) with wash out in portal phase (b) and showing large enhancing bilateral adrenals (arrow in c) and metastatic foci in the lung (d)

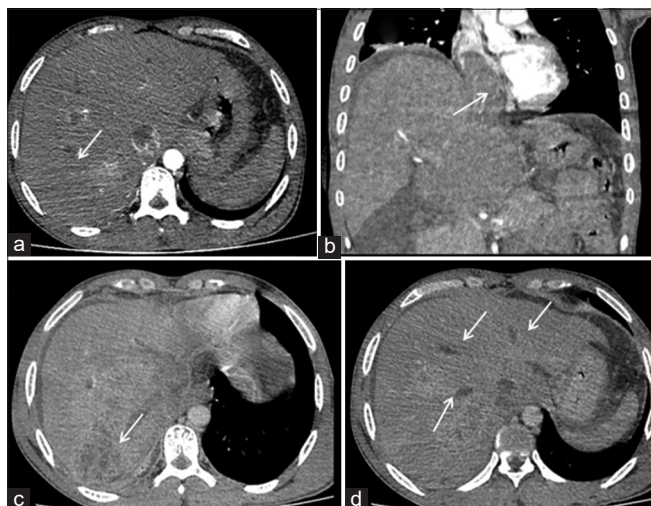


**Figure 6:** HCC with heterogeneously enhancing lesion in right lobe of liver (white star in b & c) with multiple peritoneal deposits (white arrow in a, c & d) and ascites on a cirrhotic background

### Case 7

A 45-year-old male presented with dyspnea and abdominal pain for the past 1 month. Plain CT abdomen revealed normal liver architecture. Contrast CT demonstrated a mosaic pattern of ill-defined arterial enhancement in both lobes of the liver, showing washout on the equilibrium phase. All 3 hepatic veins and IVC showed complete thrombosis with the mild enhancement of tumor thrombus on contrast and thrombus extension into the right atrium. Complete thrombosis of the portal vein and its branches is identified (Figure 7).





**Figure 7:** Hepatocellular carcinoma involving the RT lobe (white arrow in a and c) with IVC thrombus arrow extending to the right atrium (white arrow in b) with lt ,rt and middle hepatic vein thrombus (white arrows in d)

### Case 8

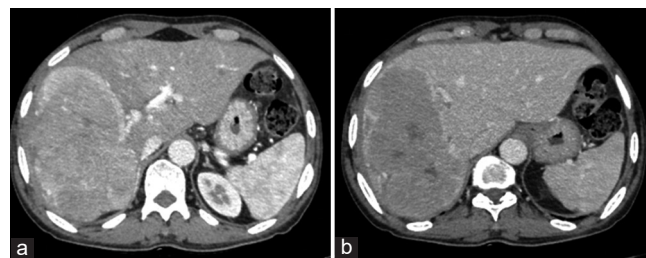
A 60-year-old male presented with acute abdominal pain and clinically high suspicion of HCC and elevated AFP  $\sim 580$  ng/mL referred for CT triple phase scan. Plain CT showed heterodense large solitary lesions in segments 8 and 5 of the right lobe of the liver (Figure 8). The lesion appears hypervascular on the late arterial phase and showed wash out on the delayed phase. The tumor shows thick rim-like capsular enhancement on the equilibrium phase and a thin subcapsular hyperdense lentiform collection adjacent to the lesion. Minimal hyperdense fluid is also seen in the right subhepatic space. Portal vein, hepatic veins, and IVC appear normal. The patient was diagnosed with HCC with capsular rupture and hemoperitoneum. The patient was taken for surgery. Right hepatectomy was done, and biopsy of the specimen confirmed moderately differentiated HCC.

### Case 9

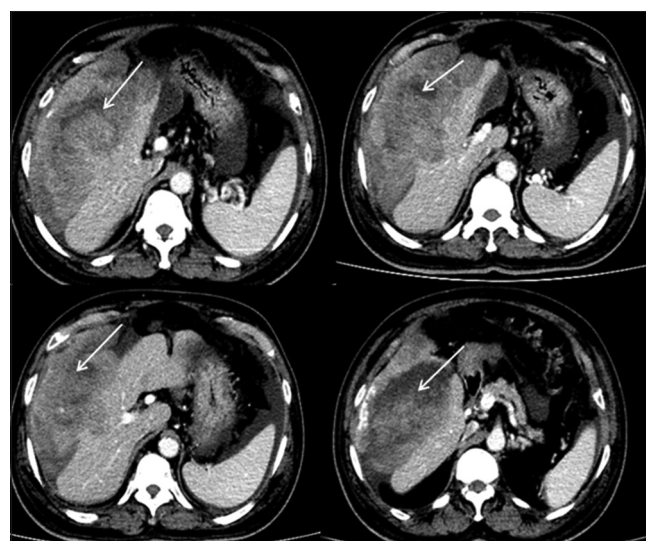
A 72-year-old proven case of HCC with a large heterogeneously enhancing lesion arising from the liver extending subhepatic in nature attached to the liver with a stalk and having predominately fatty component fatty metamorphosis in HCC (Figure 9).

## DISCUSSION

On imaging, HCC can present as a solitary mass, multifocal lesions, and diffuse infiltrative pattern. Multifocal HCC is defined by the presence of tumor nodules separated by intervening nonneoplastic normal parenchyma. The most common complication of HCC is portal vein thrombosis, and tumor spread along the portosystemic system. Variably, HCC may also invade the biliary duct system mimicking



**Figure 8:** Contrast computed tomography showing heterogeneously enhancing in arterial phase (a) with wash out in portal phase (b), there is a breach in the liver capsule at a focal point causing rupture of the lesion (black arrow in a)



**Figure 9:** Large heterogeneously enhancing lesion arising from the liver extending subhepatic in nature attached to the liver with a stalk and having predominately fatty component (arrow in the images) –fatty metamorphosis in hepatocellular carcinoma

cholangiocarcinoma. Fatty metamorphosis, Venous invasion, Spontaneous rupture, and metastasis are seen in advanced disease.

Intra-hepatic recurrence is more frequent, but pulmonary metastasis with a reported prevalence of 18–60%<sup>6</sup> is the chief site of extrahepatic spread, followed by regional and distant lymph nodes, musculoskeletal system, adrenal glands, kidneys, and bone marrow.<sup>7</sup> Most patients with HCC have cirrhosis, and it is widely reported that cirrhotic patients have benign enlarged abdominal lymph nodes with a frequency of 27–42%.<sup>8</sup> Direct invasion of the portal and hepatic veins was reported in 29–65% and 12–54% of cases, respectively, in three large autopsy series.<sup>9–11</sup> The mechanism of rupture of HCC is poorly understood. Several hypotheses have been postulated, and these include rapid tumor growth, venous hypertension, trauma, or compression by the respiratory movements of the diaphragm, coagulopathy, and thrombocytopenia.<sup>12,13</sup>

The “enucleation sign” is seen as a non-enhancing low attenuating lesion with peripheral rim enhancement (due to separation of tumor contents from the peripheral enhancing rim) and focal discontinuity of the hepatic surface during the arterial phase.<sup>14,15</sup> Fat metamorphosis is mostly found in well-differentiated HCC and becomes less common and more focal as the tumor progresses.<sup>16</sup> Sarcomatoid HCC, is a rare variant of HCC. These patients have been reported to have low or normal AFP levels. CT enhancement of sarcomatoid is mainly part of arterial phase hyperenhancement and delayed progressive enhancement.

## CONCLUSION

HCC is the most common form of primary hepatic tumor, and its incidence has increased in recent years. Tumors have a high mortality rate and rank third in cancer mortality worldwide, with varied types of typical and atypical presentations, as described in the above case series.

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### Authors Contribution:

**DS-** Study design, review manuscript; **GG-** Manuscript preparation, performed the procedure; **AKA-** Literature review, data collection, data analysis.

### Work attributed to:

Department of Radiodiagnosis, Barnard Institute of Radiology, Madras Medical College, Chennai.

### Orcid ID:

Dr. Divya S - <https://orcid.org/0009-0005-1550-6092>

Dr. Geetha G - <https://orcid.org/0009-0008-8639-1626>

Dr. Ashwin Kumar A - <https://orcid.org/0000-0001-5640-2656>

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