

## Single Case

# Clinically Silent Intracardiac Metastasis with Extremely Poor Prognosis in a Patient with Hepatocellular Carcinoma

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## Keywords

Hepatocellular carcinoma · Intracardiac involvement · Right-sided heart failure · Echocardiography · Inferior vena cava

## Abstract

Intracavitary cardiac extension remains an unusual site of extrahepatic metastasis in patients with hepatocellular carcinoma. While patients can present with signs and symptoms suggestive of right-sided heart failure, it may be totally asymptomatic, which is very rare with only a few cases reported so far. Also, cardiac metastasis is of great prognostic importance as patients with intracardiac metastasis can have an extremely poor prognosis. Here, we present the case of a 52-year-old male patient with advanced hepatocellular carcinoma, with an incidentally found tumor thrombus extending from the inferior vena cava to the right atrium, protruding through the tricuspid valve into the right ventricle, on routine echocardiography. The patient did not have any signs or symptoms of heart involvement and unfortunately died on the 18th day of the hospital stay.

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## Introduction

Hepatocellular carcinoma (HCC) is the most common primary malignancy of the liver with most tumors being diagnosed at a late stage. HCC is frequently diagnosed in a liver that is already compromised by chronic disease, most notably by hepatitis B virus or hepatitis C virus infection [1, 2]. Metastases of HCC to the lung, intraabdominal lymph nodes, adrenal glands, and bone have been well documented as the most common sites for extrahepatic metastases. Intracavitary cardiac extension remains an unusual site of extrahepatic metastasis. Several reports have described cardiac tumor metastases, and their incidence appears to be low in patients with HCC [3, 4]. The mechanism of tumor spread to the heart can be explained by different mechanisms: direct extension of tumor with thrombus (tumor thrombosis extending along the inferior vena cava to the heart chambers), tumor dislodgment resulting in freely circulating tumor emboli, and direct tumor invasion to the heart [4].

Literature review shows that most reported cases of HCC with cardiac metastasis present with signs and symptoms of cardiac involvement, such as dyspnea, orthopnea, or bilateral lower extremity edema. There are only one or two case reports so far describing patients with clinically silent right-sided heart involvement incidentally found on routine echocardiogram or other imaging modalities.

Here, we present a similar case of a patient with advanced HCC and metastasis to the right side of the heart, yet with no clinical signs or symptoms of heart involvement and extremely poor prognosis.

## Case Report

A 52-year-old Hispanic male patient presented with right upper quadrant abdominal pain and weight loss of 25 pounds in 2 months. On admission, the patient's vital signs showed a blood pressure of 140/95 mm Hg, pulse of 97 bpm, respiratory rate of 18 per min, and an oxygen saturation of 94% on room air. Patient was alert and oriented to time, person, and place, and the rest of the physical examination was significant for icteric sclera and moderately distended abdomen with right upper quadrant tenderness. There was no jugular venous distention, significant cardiac murmurs, or lower extremity edema. Laboratory workup showed deranged liver function tests (AST 413 U/L, ALT 146 U/L, ALP 1,256 U/L, total bilirubin 3.77 mg/dL, direct bilirubin 2.651 mg/dL, albumin 2.7 g/dL), INR of 1.23, WBC 11 k/ $\mu$ L, hemoglobin of 12.9 g/dL, Hct 39.5%, and platelet count of 233 k/ $\mu$ L. Basic metabolic profile showed sodium level (Na) of 140 mmol/L, potassium (K) 4.00 mmol/L, bicarb ( $\text{HCO}_3$ ) 25 mmol/L, BUN 13 mg/dL, and creatinine level of 0.7 mg/dL. Hepatitis panel was positive for chronic hepatitis B infection. Alpha-fetoprotein was 5,287 mg/mL.

Chest X-ray showed multiple nodules of various sizes in both lung fields without effusion (Fig. 1). Electrocardiogram was unremarkable. Computed tomography of the abdomen and pelvis revealed diffused heterogeneous lesions throughout the liver, moderate ascites, and gallbladder wall thickening. Computed tomography of the chest with contrast showed innumerable bilateral pulmonary nodules consistent with metastasis (Fig. 2).

Magnetic resonance imaging of the abdomen showed multiple heterogeneously T2 hyperintense, centrally necrotic round hepatic masses with internal neovascularity and avid peripheral enhancement. These included a 9.4 × 11.2 × 11.2 cm left hepatic lobe mass with invasion into the middle and left hepatic veins as well as into the inferior vena cava and right atrium. There was also invasion of the left portal vein and distal right portal vein. A 9.0 × 9.2

× 5.3 cm right hepatic lobe mass centered on segment 7, a 6.8 × 5.7 × 6.3 cm right hepatic lobe mass centered on segment 5, and a 4.0 × 3.5 × 6.7 cm contour-deforming mass within the anterior left hepatic lobe with foci of internal steatosis consistent with fatty metamorphosis were observed (Fig. 3). Multiple additional smaller masses were scattered throughout the liver. The liver had a nodular, lobulated contour. Magnetic resonance cholangiopancreatography showed multiple centrally necrotic round hepatic masses with internal neovascularity, avid peripheral enhancement, fatty metamorphosis, and invasion of portal veins, hepatic veins, inferior vena cava, and right atrium. Ultrasound of the liver showed portal vein thrombosis.

A routine echocardiography showed a huge homogeneous mass occupying the entire right atrium and prolapsing across the tricuspid valve into the right ventricle, with a normal left and right ventricular systolic function (Fig. 4).

Patient was started on 60 mg of Lovenox every 12 h because a possibility of superimposed intracardiac tumor thrombus could not be excluded. On day 2 of the hospital stay, patient was found to be hypoxic and was started on 3 L of O<sub>2</sub> per nasal cannula, with subsequent clinical improvement. Pulmonary embolism was ruled out. On day 12 of the hospital stay, patient developed altered mental status, with low blood pressure, tachycardia, tachypnea, and worsening hypoxia. Patient was afebrile, with no signs of heart failure at that time, and the patient's chest X-ray did not show any new infiltrates suggestive of pneumonia or pleural effusion. Patient was intubated; however, unfortunately he died on the 18th day of hospital stay.

## Discussion

HCC is one of the leading causes of cancer deaths throughout the world, and its incidence is on the rise. Although HCC has a strong propensity for vascular invasion and direct intravascular extension, extension of secondary tumor into the cardiac cavity is relatively rare [3]. Advanced HCC is a disease with poor prognosis and a median survival time of 4–7 months [5]. Extrahepatic metastasis of HCC may reach around 18%, and the most common sites of involvement are the lungs, lymph nodes, adrenal glands, and bones [6]. Intracardiac involvement rarely occurs in patients with HCC, and its frequency was found around 2% in various case series [7].

The prognosis of HCC with intracardiac metastasis is poor, with a median survival range of 1–4 months [8]. The most common causes of death in patients with HCC with intracardiac involvement are heart failure and sudden death, which account for 25% of the patients. Cardiac metastases in hepatocellular cancer can be symptomatically quiescent until the later stages. Autopsy series also reported more frequent and diverse vascular involvement, including the portal vein in 26–80%, the hepatic vein in 11–23%, the inferior vena cava in 9–26%, and the right atrium in 2.4–6.3% of patients with HCC [9].

Advanced-stage HCC has a very poor prognosis, and if there is metastasis to the right side of the heart, the prognosis becomes even worse. Most of the patients with right-sided metastasis will have signs and symptoms of right-sided heart failure, or they could be totally asymptomatic. Irrespective of the symptoms, when right-sided metastasis is present, it makes the prognosis extremely poor.

Our patient did not have any cardiac signs or symptoms despite of significant right-sided heart involvement. Also, this case shows that HCC with cardiac involvement has an

extremely poor prognosis. The clinicians should be aware of this fact, as it would definitely affect the overall management of the patients.

### Statement of Ethics

This study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

### Disclosure Statement

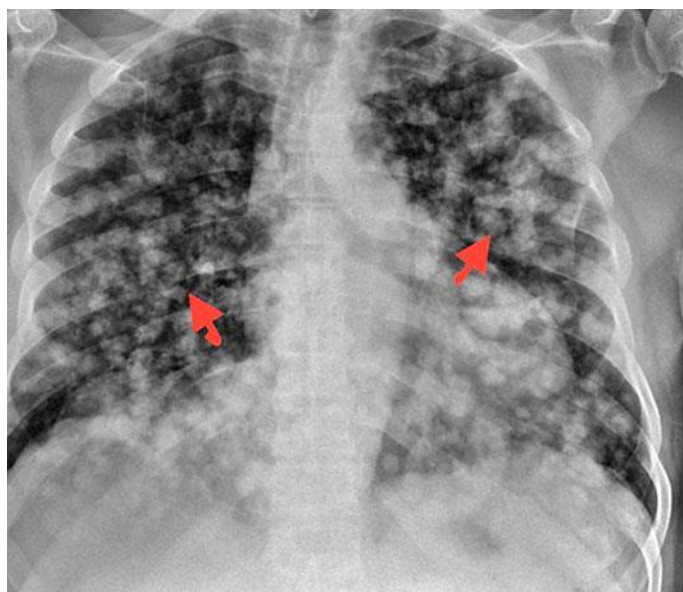
The authors declare that there is no conflict of interest regarding the publication of this paper.

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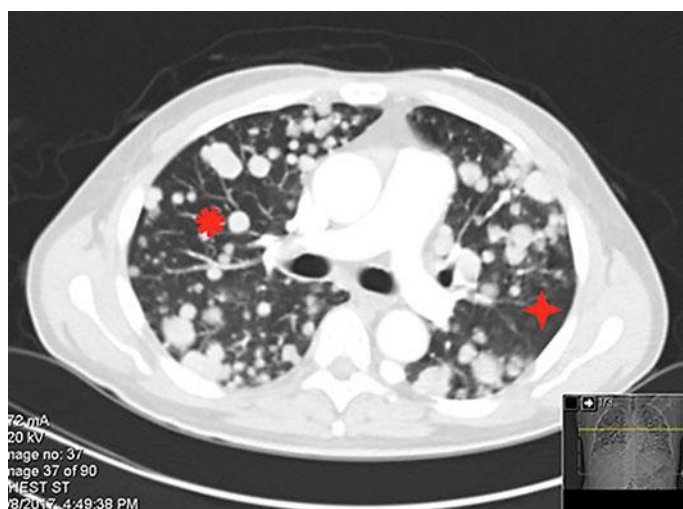
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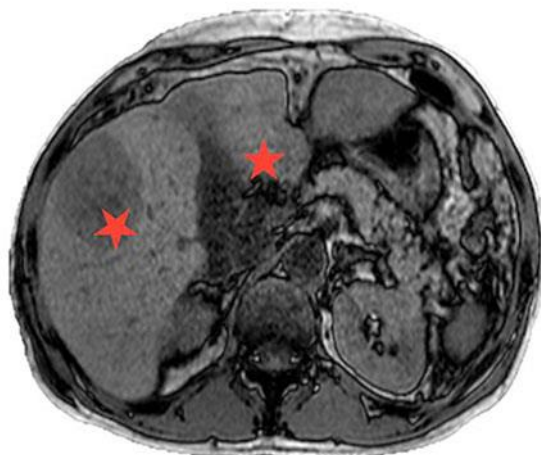
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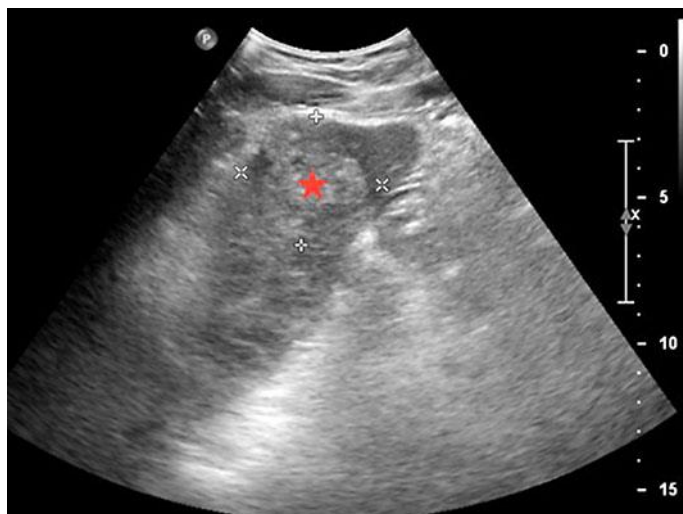
**Fig. 1.** Chest X-ray showing multiple nodules of various sizes in both lung fields.



**Fig. 2.** Computed tomography of the chest with innumerable bilateral pulmonary nodules consistent with metastasis.



**Fig. 3.** Magnetic resonance imaging of the liver showing a right hepatic lobe mass and a contour-deforming mass within the anterior left hepatic lobe.



**Fig. 4.** Echocardiography showing a large right atrial mass.