

# Right Atrium Invasion of Tumor Thrombus from Hepatocellular Carcinoma Incidentally Found on Transthoracic Echocardiogram

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## Abstract

Hepatocellular carcinoma (HCC) is a highly aggressive malignancy in which tumor thrombus can invade portal and hepatic veins in late stages. However, an antemortem diagnosis of right atrial invasion by tumor thrombus is very rare and confers a poor prognosis. We report a patient with antemortem diagnosis of tumor thrombus in the right atrium incidentally found by transthoracic echocardiogram which was later confirmed with CT scan of abdomen with IV contrast. The patient was also noted to have an acute increase in alpha-fetoprotein (AFP). Our case suggests the importance of imaging studies and monitoring AFP levels in patients with long standing HCC.

## Keywords

Hepatocellular carcinoma, hepatoma, tumor thrombus, transthoracic echocardiogram

## Abbreviations

AFP: Alpha-fetoprotein

AKI: Acute kidney injury

CT: Computed tomography

HCC: Hepatocellular carcinoma

IV: Intra venous

MRI: Magnetic resonance imaging

TACE: Trans-arterial chemoembolization

## Introduction

Worldwide, more than 780,000 cases of new primary liver cancer arise yearly and about 70 to 90 percent of the primary liver cancers are due to hepatocellular carcinoma (HCC).<sup>1</sup> Globally, primary liver cancer is the second leading cause of cancer mortality among men.<sup>1</sup> Age-adjusted incidence rates for primary liver cancer in the United States (U.S.) have tripled over the past three decades due to increasing chronic hepatitis C infections.<sup>1</sup> More importantly, Hawai'i has one of the highest age-adjusted HCC rates among all states in the U.S.<sup>2</sup> HCC is a highly aggressive malignancy in which tumor thrombus is known to invade portal and hepatic veins in late stages.<sup>3,4</sup> Rarely, tumor thrombus can extend into the right atrium conferring a poor prognosis.<sup>3-7</sup> Massive bilateral pulmonary emboli attributable to tumor thrombi have also been reported at the time of autopsy in previous studies.<sup>8</sup> Another study found that 4.1% of patients with HCC had thrombi that extended into and invaded the right atrium at the time of autopsy.<sup>6</sup> Therefore, premortem diagnosis of HCC with intra-atrial invasion is very rare. We report a case with rare antemortem diagnosis of tumor thrombus into the right atrium incidentally found by transthoracic echocardiogram.

## Case Report

A 72-year-old Japanese woman with a history of HCC secondary to long-standing autoimmune hepatitis presented with generalized weakness, dyspnea, abdominal distention, cachexia, and bilateral lower extremities edema. The patient was diagnosed with HCC 12 years prior to presentation and was treated with sorafenib, two courses of radiofrequency ablation, and 3 courses of trans-arterial chemoembolization (TACE). The patient was off sorafenib at the time of presentation. Three weeks prior to admission, alpha-fetoprotein (AFP) level was 13,182 ng/mL (reference range: 0.0 to 9.0 ng/mL) which increased from 3,232 ng/mL eleven weeks prior to admission. MRI with and without IV contrast obtained 4 weeks prior to admission showed interval increase in hepatic lesion, new right portal vein thrombosis, and right hepatic vein thrombosis. Initially, ultrasound guided paracentesis was performed, however, only minimal fluid was found. Ascitic fluid analysis was unremarkable. Due to the recent MRI result of the portal vein, extension of tumor thrombus was suspected. The patient had acute kidney injury (AKI) which precluded the use of IV contrast for a CT scan. Instead we obtained Doppler ultrasound of the liver and transthoracic echocardiogram. Doppler ultrasound showed main and bilateral portal vein thromboses, right hepatic vein thrombosis, thrombus in the inferior vena cava (IVC), and small volume ascites. Echocardiogram showed a large (at least 4.0 x 3.3 cm) mass nearly obliterating the right atrial cavity which extended to the level of the tricuspid valve (Figure 1) with mild tricuspid regurgitation. The IVC mass or thrombus was also noted on the echocardiogram. After resolution of AKI, CT scan of abdomen and lower chest with IV contrast was obtained and confirmed a large tumor thrombus extending from the IVC into the right atrium (Figure 2). Intra-atrial tumor thrombus extended adjacent to the tricuspid valve (Figure 3). In addition, interval progression of multifocal HCC throughout the liver was noted.

## Discussion

Acute progression of HCC tumor thrombus can present with non-specific complaints, even when the right atrium is involved. Ascites due to cirrhosis is common with about 10 percent of patients with cirrhosis also having ascites.<sup>9</sup> Therefore, it was our initial suspicion that the patient's symptoms were due to severe ascites as her clinical presentation mimicked severe ascites. As heart failure can also explain the patient's symptoms, it was important to assess global cardiac function with an echocardiogram. To achieve the correct diagnosis, two important tests were performed, imaging studies and AFP levels.

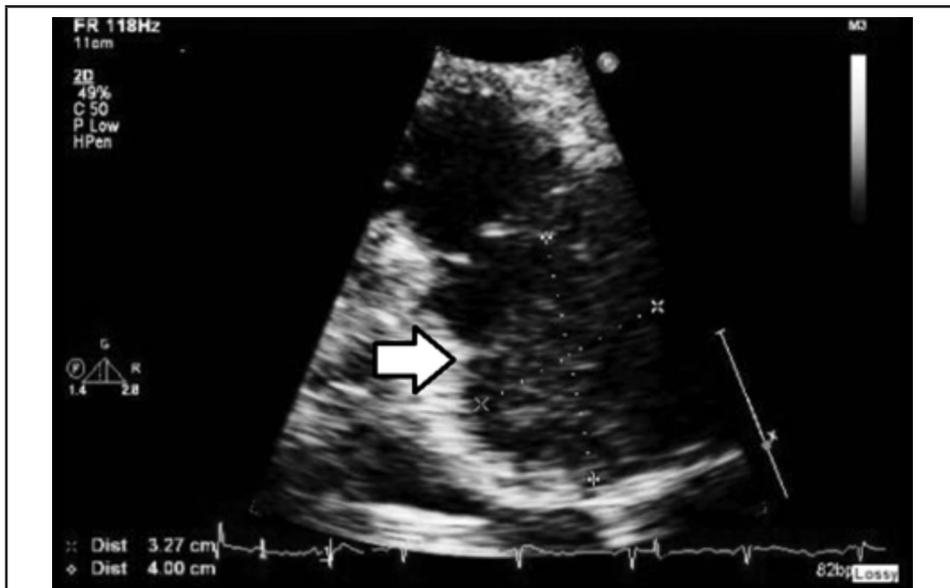


Figure 1. Transthoracic echocardiographic image of right atrium shows 4.0 x 3.27 cm mass (arrow) nearly obliterating the right atrial cavity.



Figure 2. Coronal image of CT scan of abdomen and lower chest with contrast shows large tumor thrombus extending from the IVC into the right atrium which appears to occlude or nearly occlude the IVC and atrial junction (arrow).

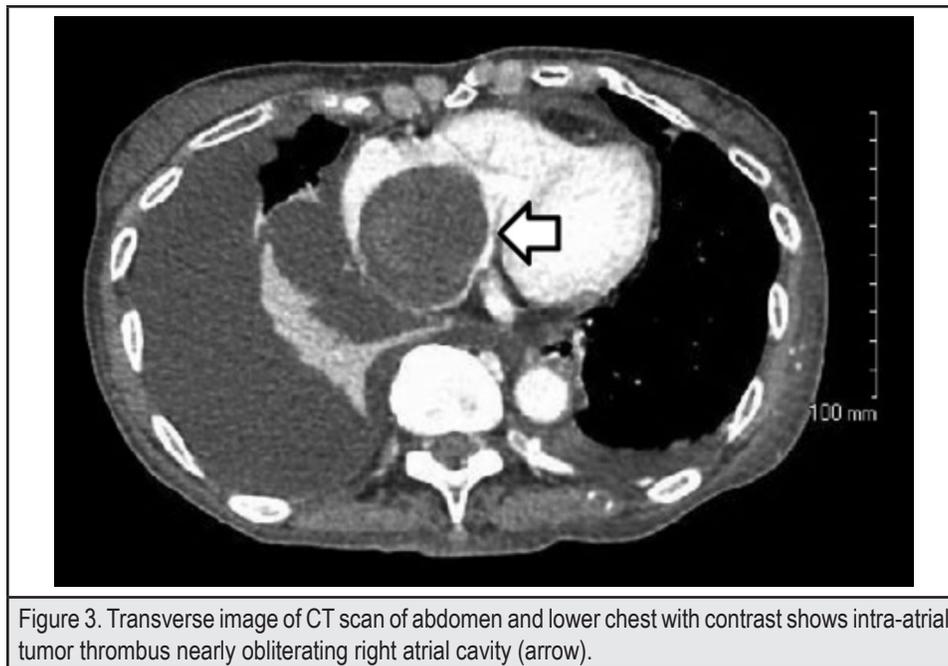


Figure 3. Transverse image of CT scan of abdomen and lower chest with contrast shows intra-atrial tumor thrombus nearly obliterating right atrial cavity (arrow).

An abdominal ultrasound quickly ruled out large volume ascites. Abdominal CT scan with IV contrast was a good study to evaluate tumor thrombus, but initial evaluation with transthoracic echocardiogram was helpful in diagnosing tumor thrombus invading into the right atrium. This can be helpful in patients with contraindications to CT scanning with IV contrast.<sup>3,5</sup> As long-term survival rates of patients with autoimmune hepatitis increase, so too may incident cases of resultant HCC.<sup>10-13</sup> HCC is a highly aggressive malignancy, and known to invade the vasculature at late stages. Therefore, increasing numbers of aggressive tumor thrombus invasion may be reported in the future.<sup>3,4</sup>

Our case also noted the importance of routine AFP monitoring. A previous case noted that sudden increase in AFP was observed in rapidly progressive HCC in an autoimmune hepatitis patient despite the regular HCC imaging surveillance.<sup>11</sup>

Previous case reports suggested that optimal management of HCC with extensive tumor thrombus included removal with hepatic resection.<sup>3,14-19</sup> Because of recent acute extension of tumor thrombus with rapidly increasing AFP, large size of atrial tumor thrombus, and progression of primary HCC lesion despite the use of sorafenib, radiofrequency ablation, and TACE, the patient was a poor surgical candidate. Therefore, the patient decided to pursue hospice care.

Our case highlights the importance of echocardiography and CT scanning of the abdomen and chest with contrast in advanced HCC patients with any suspicion for intracardiac involvement by tumor thrombus. Routine echocardiography in advanced HCC patients with rapidly increasing AFP may be beneficial in early detection of intracardiac involvement.

### Conflict of Interest

None of the authors identify a conflict of Interest.

### Disclosure

Informed consent was not obtained for this case report because the patient died and we were unable to contact the next of kin. No identifiable data was presented in this case. This case report was approved by the Queen's Medical Center's Institutional Review Board.

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