

Giant right atrial thrombus in hepatocellular carcinoma: real-time characterization by cardiac magnetic resonance and real time three-dimensional echocardiography

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Abstract. – Hepatocellular carcinoma (HCC) with extension to the right atrium is an uncommon form of cardiac involvement. We report a case of a 67-year-old man admitted to our Department for the incidental findings of a mass in the right atrium. Physical examination revealed leg edema, distention of external jugular vein and ascites. The anamnestic collection revealed HCC occurred on post-alcoholic liver cirrhosis 3 years earlier. Transthoracic echocardiography revealed a dilated RA containing a mass, with superficial apposition of a thrombotic material. Bi-dimensional echocardiography is the most commonly used noninvasive tool for evaluating intracardiac masses. Although MRI is considered the gold standard, real-time three-dimensional echocardiography has the capability to obtain the entire volume reconstruction of an intracardiac mass, even with an irregular shape. Moreover, it permits an hemodynamic evaluation of the potential obstructive effects visualized from different angles and planes.

Key Words:

Hepatocellular carcinoma, Intracardiac mass, 3D echocardiography.

Case Report

We report a case of a 67-year-old man admitted to our Department for the incidental findings of a mass in the right atrium (RA) observed on a routinely computed tomography (CT). He had been diagnosed with hepatocellular carcinoma occurred on post-alcoholic liver cirrhosis 3 years earlier (Stage C according to BCLC Classification, and Stage B according Child Pugh Classification – Score 9) and treated with multiple em-

bolization procedures. He referred the onset of dyspnea (NYHA III) and asthenia since six months. Physical examination revealed leg edema, distention of external jugular vein and ascites. The pulse rate was 88 beats per minute with a blood pressure of 100/50 mmHg, axillary temperature was 37.1°C, respiration rate was 20 breaths per minute. Electrocardiography revealed a normal sinus rhythm, with a left bundle branch block. A chest radiograph showed cardiomegaly, a right pleural effusion, elevated right hemidiaphragm and bilateral pulmonary metastases. Transthoracic echocardiography revealed a dilated right atrium (RA) containing a 45.5 × 30 mm mass, with superficial apposition of a thrombotic material (Figure 1, panels A-B). Doppler ultrasound demonstrated flow around the mass, with evidence of mild tricuspid regurgitation. From subcostal view, the inferior vena cava (IVC) appeared dilated and partially filled with a mass extending to the RA. Real-time three-dimensional echocardiography (RT3DE, iE33, Philips, Eindhoven, MA, USA) confirmed this finding, the mass appeared attached to the atrial vestibolo, without tricuspid inflow obstruction during the cardiac cycle. The mass volume was calculated as 45 ml (Figure 1, panel C). The whole-body TC-Scan, performed to better define the mass, showed a thrombotic and vascularized apposition extending from the inferior vena cava to the right atrium. At this level it was demonstrated a parenchymal and vascularized mass with widely represented aspects of necrosis having a maximum diameter of 6.8 cm. A further thrombotic, vascularized and neoplastic apposition was noted inside the left branch of the portal vein, extend-

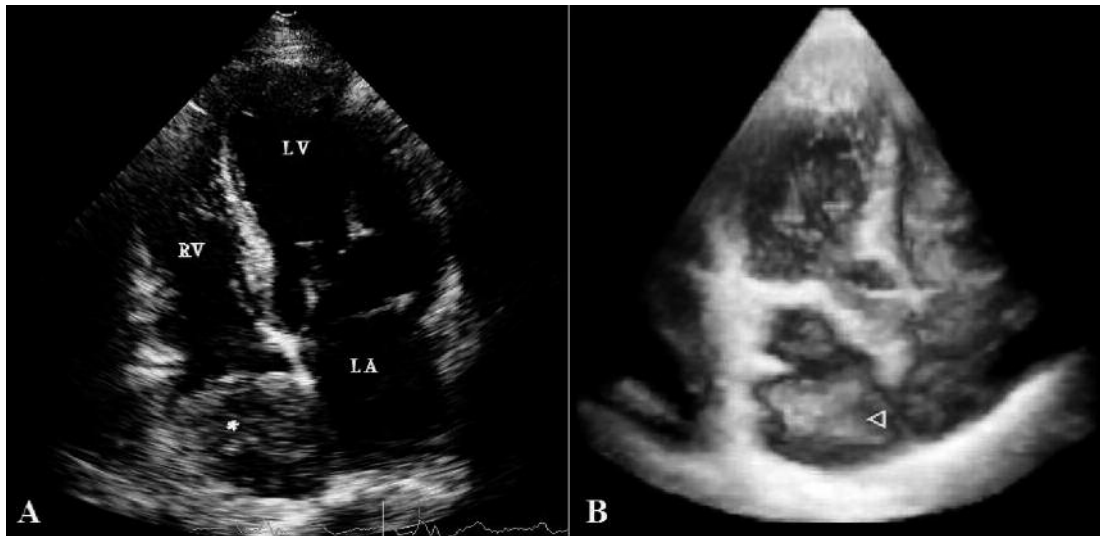


Figure 1. A, Four chamber Apical view (LV. Left Ventricle; LA. Left Atrium; RV. Right Ventricle; Asterisk. Right atrial mass). B, Real-time three-dimensional echocardiography (Arrow Head. The mass in the right atrium).

ing to the hepatic hilar vessels which resulted compressed (Figure 2). Cardiac Magnetic Resonance Imaging (MRI) evaluation was also performed with a 1.5 T scanner (Siemens Avanto, Erlangen, Germany) and T1 and T2 weighted images confirmed the presence of a thrombotic apposition originating from the IVC immediately after the confluence of the hepatic veins and extending longitudinally for almost 6 cm into the RA. The thrombus measured about 50 × 55 mm widely connected with the contralaterally displaced interatrial septum (Figure 3, panels A-B). This thrombotic apposition did not shows mobility during the cardiac cycle suggesting, in consid-



Figure 2. Whole-body TC-Scan (black asterisk, right atrial mass).

eration of metastatic HCC and the absence of hemodynamic impairment, a conservative approach with medical treatment.

Discussion

HCC usually metastasizes to the lymph nodes, lungs, and bone. Nevertheless, it can also be characterized by an intravascular extension. In ante-mortem series the prevalence of tumor invasion to the IVC in HCC ranges from 0.7% to 22%. These percentages increase in post-mortem series in which there is a more frequent intravascular involvement, including the portal vein in 26% to 80% of patients with HCC, the hepatic vein in 11% to 23%, the IVC in 9% to 26%, and the RA in 2.4% to 6.3%^{1,2}. The most common mechanism of intracavitary cardiac involvement (ICI) is the direct extension of the tumor with the associated thrombus via IVC into the RA.

The ICI of a thrombus includes a variety of cardiopulmonary and vascular complications ranging from heart failure, sudden cardiac death, tricuspid valve stenosis or insufficiency to pulmonary embolism, ventricular outflow tract obstruction and secondary Budd-Chiari Syndrome¹.

The prognosis of HCC with ICI is certainly poor with a median survival ranging from 1 to 4 months. The reason for this lies both in the aggressive and rapid growth of the mass and in the higher frequency of cardiopulmonary and life-threatening complications. The location of metastatic disease is fre-

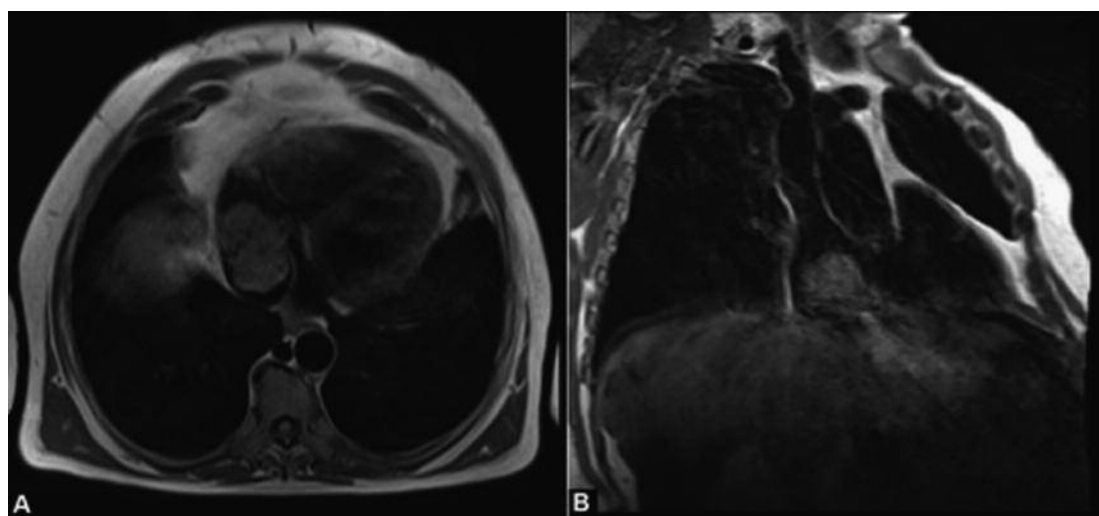


Figure 3. Cardiac Magnetic Resonance Imaging (MRI). A, Axial Scan. B, Coronal Scan.

quently in the pericardium and the pericardiocentesis with biopsy is essential for diagnosis, unless the prognosis is uniformly poor. The heart infiltration or the pulmonary embolization can occur and the vasoreactive substances, product by the metastatic tumour, may determine functional and structural alterations on the tricuspid and pulmonary valves, that can appear retracted, immobile and thickened.

Bi-dimensional echocardiography is the most commonly used noninvasive tool for evaluating intracardiac masses. The characterization of the mass is based on its location, shape, mobility, and associated cardiac condition³. RT3DE has the capability to obtain the entire volume reconstruction of an intracardiac mass, even with an irregular shape. Moreover, it permits an hemodynamic evaluation of the potential obstructive effects visualized from different angles and planes⁴. MRI is still considered the gold standard in cardiovascular imaging for depicting cardiac masses and providing an extremely accurate definition of anatomic and functional details allowing a better characterization of the cardiac mass. In contrast to MRI, RT3DE is cost-effective, quicker and it can be performed both at bedside and in the operating room with a better definition of the spatial relationships for a correct cardiac surgical planning^{5,6}. For a safer venous cannulation, it is crucial to evaluate the exact mass location and prevent fragmentation or embolization before bicaval cannulae positioning. According to Muller et al⁷ in the next future, it may be aus-

picable to integrate the pre-operative MRI evaluation with the intra-operative Real-Time 3D Transesophageal Echocardiography.

References

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