

Isolated metastasis of hepatocellular carcinoma in the right ventricle

A case report

Su Bin Kim, MD^a, Yoon Cheol Shin, MD, PhD^b, Sung Uk Kwon, MD, PhD^{a,*}

Abstract

Metastatic hepatocellular carcinoma (HCC) of the right ventricle is very rare and difficult to diagnosis.

A 79-year-old man who underwent right hemi-hepatectomy for HCC was admitted to our hospital for chest pain, severe dyspnea, and orthopnea. The echocardiogram showed a tumor located in the right ventricle. A biopsy was obtained, and histopathological findings confirmed metastatic HCC. Palliative resection of the tumor was performed.

There is no standard treatment for metastatic HCC into the right ventricle. Thus, treatment should be individualized to the patient, and a multidisciplinary approach should be used.

Abbreviations: CT = computed tomography, HCC = hepatocellular carcinoma, MRI = magnetic resonance imaging, PET = positron emission tomography, RV = right ventricular, RVOT = right ventricular outflow tract.

Keywords: HCC, right heart failure, RVOT obstruction

1. Introduction

The incidence of metastatic hepatocellular carcinoma (HCC) in the right heart cavity with cephalad extension through the inferior vena cava has been reported to be less than 6% in an autopsy series. However, the diagnosis of metastasis of HCC into the cardiac cavity can be overlooked, as the symptoms are neither apparent nor specific. Moreover, reports of isolated intracavitary metastatic HCC of the right ventricle without right atrium and inferior vena cava involvement are very rare.^[1,2] Here, we describe a patient with isolated metastasis of HCC into the right ventricular (RV) outflow tract (RVOT).

2. Case presentation

The patient provided consent to publish his case. A 79-year-old man was admitted to our hospital for chest pain, severe dyspnea (New York Heart Association grades 3–4), and orthopnea. Ten years earlier, he underwent right hemi-hepatectomy for a HCC (T3N0M0 according to the American Joint Committee on Cancer classification). Subsequently, he has been assessed

regularly at another general hospital specializing in cancer, and he had a disease-free status for 10 years. The latest α -fetoprotein level was 1.4 ng/mL (normal range, less than 7.0 ng/mL).

First, we considered ischemic heart disease or pulmonary thromboembolism due to cancer. Results of the laboratory test showed no significant abnormal value; even the hepatic and cardiac enzymes were within normal range. A plain chest radiograph indicated cardiomegaly. However, the echocardiogram showed a visible, huge RV mass with partial RVOT obstruction (maximum velocity: 1.3 m/s, maximum pressure gradient: 7.5 mm Hg) and hypokinesia of the RV wall from the mid to apex (Fig. 1). We performed contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI) to obtain more precise characteristics about the mass. These images showed a tumor located in the right ventricle. In addition, the tumor was enhanced heterogeneously on the CT scan (Fig. 2). The MRI showed that the tumor was isointense on the T1-weighted image and had slightly high intensity on the T2-weighted image (Fig. 3). The coronary artery workup was also performed using contrast-enhanced CT. There was no significant stenosis or plaque, including signs of myocardial ischemia. Thus, we thought the patient's symptoms occurred owing to RVOT obstruction, which decreased the pulmonary artery flow. To determine whether the tumor was malignant, and if it had metastasized to other sites, we performed F-fluorodeoxyglucose positron emission tomography (PET). The PET scan showed an abnormal intake of 18-fluoro-2-deoxyglucose in the right ventricle (Fig. 4). There was no tumor in the right atrium, inferior vena cava, liver, and any other site (Fig. 5).

A transjugular cardiac biopsy was performed. Histopathological findings with hematoxylin and eosin staining demonstrated that the tumor had a trabecular pattern with central sinusoid space, and we confirmed metastatic HCC by performing hepatocyte antigen immunohistochemistry analysis (Fig. 6).

Palliative resection of the tumor was performed through right atriotomy and ventriculotomy. During the operation, a huge,

Editor: Ludovico Abenavoli.

The authors have no conflicts of interest to disclose.

^a Division of Cardiovascular Medicine, Department of Medicine, ^b Department of Thoracic and Cardiovascular Surgery, Inje University Ilsan Paik Hospital, Goyang, Republic of Korea.

* Correspondence: Sung Uk Kwon, MD, PhD, 170, Juhwa-ro, Ilsanseo-gu, Goyang-si, Gyeonggi-do, Republic of Korea (e-mail: prof.mdkso@gmail.com)

Copyright © 2016 the Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the Creative Commons Attribution-NoDerivatives License 4.0, which allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to the author.

Medicine (2016) 95:51(e5544)

Received: 6 August 2016 / Received in final form: 11 November 2016 /

Accepted: 14 November 2016

<http://dx.doi.org/10.1097/MD.0000000000005544>



Figure 1. Transthoracic echocardiogram of the tumor (4.97 cm × 3.22 cm).

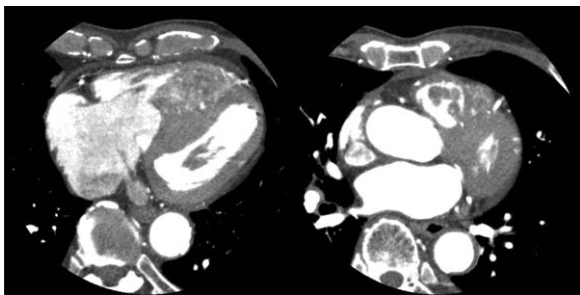


Figure 2. Contrast-enhanced computed tomography scans (axial view). A multilobulated, polypoid, isodense to hypodense, soft tissue mass was found in the right ventricular chamber.

yellowish, dark purple tumor with extensive involvement of the RV free wall and outflow tract extension was observed (Fig. 7).

Postoperatively, he felt more comfortable, as the chest pain and dyspnea had been resolved. Then, we evaluated him regularly through the outpatient department. Later, we found a multifocal arterial enhanced lesion suggestive of a new HCC in the left hepatic lobe on a 3-phase abdominal CT scan (Fig. 8), as well as an increased protein induced by vitamin absence level (10,973 mAU/mL [normal range, less than 40 mAU/mL]). Thus, we are considering radiotherapy or chemotherapy.

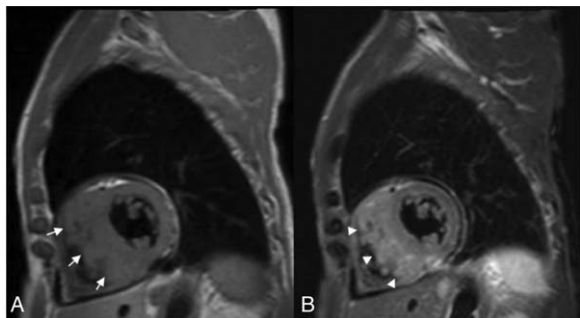


Figure 3. Cardiac magnetic resonance images using the black-blood and fat subtraction technique. The right ventricular mass with a multilobulated surface was an isointensity lesion on the T1-weighted image and a slightly high intensity lesion on the T2-weighted image ([A] arrows indicate the isointensity; [B] arrowheads indicate the high intensity area).

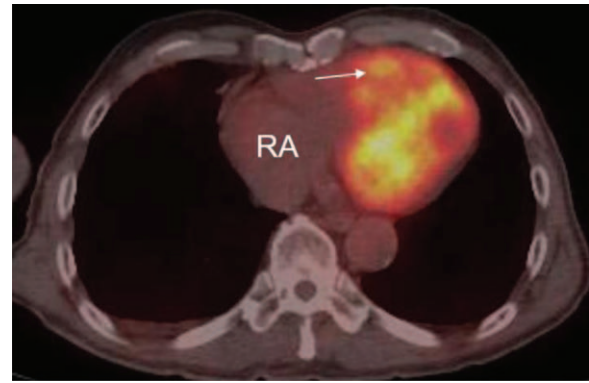


Figure 4. Positron emission tomography-computed tomography image. The arrow indicates the thickened right ventricular free wall with abnormal uptake of 18-fluoro-2-deoxyglucose (standardized uptake value, 5.5). RA = right atrium.

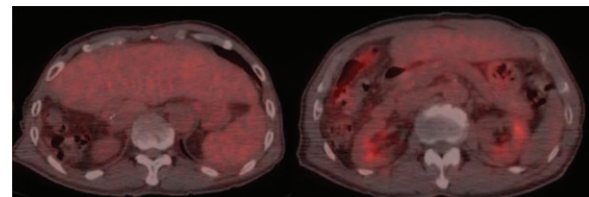


Figure 5. Positron emission tomography-computed tomography images. There was no abnormal uptake of 18-fluoro-2-deoxyglucose in the liver.

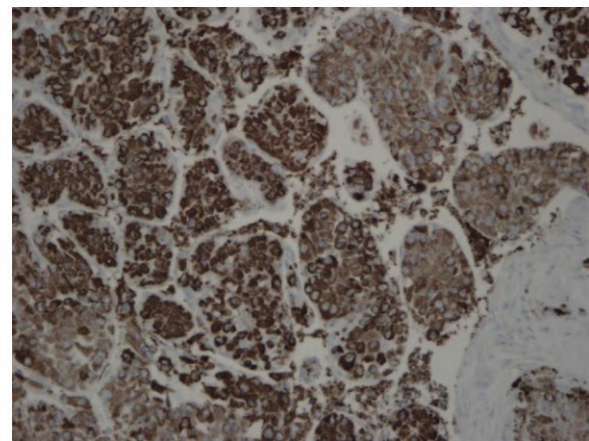


Figure 6. Results of the hepatocyte antigen immunohistochemistry analysis. The immunochemical finding from hepatocyte antigen immunohistochemistry analysis is specific for the neoplastic or nonneoplastic hepatocyte antigen. A special stain was performed with immunohistochemistry (3,3'-diaminobenzidine, ×200).

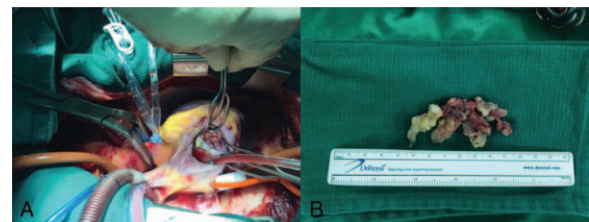


Figure 7. Photographs showing the palliative mass resection. (A) A huge mass was found during right atriotomy. (B) The gross specimen showing a yellowish, dark purple polypoid mass.

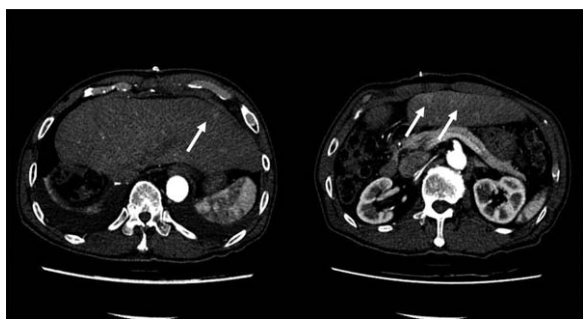


Figure 8. Three-phase abdominal computed tomography images. The arrows indicate multifocal arterial enhanced lesions suggestive of a new hepatocellular carcinoma in the left hepatic lobe.

We advised the patient that his case is very rare, and there is no standard treatment.

3. Discussion

On the basis of the findings from imaging studies and the patient's medical history, we confirmed isolated metastasis of HCC in the right ventricle. Several reports have described cardiac tumor metastasis, and its incidence is approximately 10% in patients with HCC.^[1,2] However, such metastases usually invade the heart through the vascular system or by infiltrating the heart from neighboring organs. HCC with RV metastasis without inferior vena cava and right atrium metastasis is rarely reported,^[3] and it may be caused by the hematogenous spread of cancer cells.^[4] Patients who present with right cardiac cavities with tumor invasion are difficult to be diagnosed. Yet, even with a diagnosis,

effective treatment has not been well established. Presently, there is no standard treatment for metastatic HCC with invasion into the right ventricle. Palliative resection may be necessary owing to hemodynamic compromise, but the prognosis remains very poor.^[5] After partial surgical resection, we recommended radiotherapy in our patient; however, we were uncertain of the treatment effect, and the patient refused this treatment recommendation. Until recently, only a few large-scale clinical studies of patients with HCC extending into the heart have been published. Thus, more cases need to be accumulated.^[6]

The present report describes an unusual case of isolated metastasis of HCC in the right ventricle. In similar cases, treatment should be individualized to the patient, and a multidisciplinary approach, including surgery, radiotherapy, and chemotherapy, should be used.

References

- [1] Kato Y, Tanaka N, Kobayashi K, et al. Growth of hepatocellular carcinoma into the right atrium. Report of five cases. *Ann Intern Med* 1983;99:472-4.
- [2] Chieng SH, Lin CH, Lu MJ, et al. Intracavitary metastatic hepatocellular carcinoma of the right ventricle. *Thorac Cardiovasc Surg* 2005;53:123-5.
- [3] Vlasseros I, Tapanlis E, Katsaros A, et al. Metastatic hepatocellular carcinoma into the right atrium and ventricle: echocardiographic diagnosis and follow-up. *Echocardiography* 2003;20:387-8.
- [4] Masci G, Magagnoli M, Grimaldi A, et al. Metastasis of hepatocellular carcinoma to the heart: a case report and review of the literature. *Tumori* 2004;90:345-7.
- [5] Chu MW, Aboguddah A, Kraus PA, et al. Urgent heart surgery for an atrial mass: metastatic hepatocellular carcinoma. *Ann Thorac Surg* 2001;72:931-3.
- [6] Chun YH, Ahn SH, Park JY, et al. Clinical characteristics and treatment outcomes of hepatocellular carcinoma with inferior vena cava/heart invasion. *Anticancer Res* 2011;31:4641-6.