A Case of Multiple Metastatic Renal Cell Carcinoma in an Adult Patient Presenting with Ventricular Tachycardia

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ABSTRACT

Cardiac metastases of renal cell carcinomas are rare, and usually clinically silent. A case of a 53-year-old man without a significant medical history, who presented with ventricular tachycardia, which resulted in a cardiac mass of the right ventricle is reported. On chest X-ray, echocardiography, CT scanning, esophagogastroduodenoscopy and MRI, multiple metastatic masses were observed in both lungs, and the kidneys, adrenal, stomach and right ventricle. The kidney mass and the gastric polyp were revealed on biopsy to be a renal cell carcinoma mixed with sarcomatoid and conventional types. (Korean Circulation J 2005;35:341–344)

KEY WORDS : Ventricular tachycardia; Right ventricular mass; Renal cell carcinoma.

Introduction

Renal cell carcinomas are characterized by a lack of early warning signs and clinically manifestations, which result in a high proportion of patients with metastases. Cardiac metastases from a renal cell carcinoma are rare, and usually clinically silent. However, the symptoms and signs could be related to the lesion size, extension or location. The most common mechanism of cardiac metastasis is that of the extension of a tumor column to the vena cava as a luminal mass, with growth along the caval wall into the right heart chambers. Other possible mechanisms are that tumor cells from the kidney may disseminate to the heart by retrograde lymphatic or lymphohematogenous spread through the thoracic duct into the superior vena cava, or by the hematogenous spread of embolic cells.

Herein, a case of ventricular tachycardia due to a right ventricular mass, which supposedly metastasized hematogenously from a renal cell carcinoma, but without contiguous vena caval involvement, is reported.

Case

The patient was a 53-year-old man, without a significant medical history, with the exception of a 9 kg weight loss in one month, who visited the local emergency department complaining of chest discomfort. He was noted to have unsustained ventricular tachycardia, so was transferred to our department. The patient smoked 20 packets of cigarettes per year, but did not drink. On admission, his blood pressure was 110/80 mmHg, a heart rate of 200 bpm, but was mentally alert. On a chest examination, his breathing sound was clear and heart rapid, but without murmur. Electrocardiography (Fig. 1A) revealed ventricular tachycardia, which remained on intravenous administration of lidocaine, but was observed to reverse to sinus rhythm by DC cardioversion of 50J (Fig. 1B). A chest X-ray (Fig. 2) demonstrated multiple irregular opacities in the bilateral lung field. A transthoracic echocardiography (Fig. 3) was performed, which revealed an ejection fraction of 42%, a large right ventricular mass and akinesia of the inferior and inferoseptal segments from the base to the apex. Chest and abdominal CT (Fig. 4) demonstrated a mass in the right ventricle, but without contiguous vena caval involvement, multiple metastases in both lungs and a large mass within the upper pole of the left kidney. An ultrasound-guided renal biopsy (Fig. 5A) showed a conventional renal cell carcinoma. 99mTc-sestamibi SPECT presented a persistent perfusion
defect of the entire inferior and inferoseptal wall, with left ventricular dysfunction. However, the coronary angiography was normal, and the cardiac enzyme level was within normal limits. On esophagogastroduodenoscopy, performed due to indigestion, a gastric polyp was revealed with clear cell infiltration in the deep mucosal layer (Fig. 5B). Although a biopsy of right ventricular mass was not performed, as the patient refused, a secondary metastatic cardiac tumor of renal cell carcinoma was suspected considering the multiple metastases in both lungs and the stomach. A left nephrectomy and immunotherapy was recommended, but the patient refused. He expired one month after discharge due to cardiac arrest.

Discussion

Although primary cardiac tumors are rare, cardiac metastases are not infrequent, with autopsy series ha-
ving reported a 5 to 20% incidence of metastatic carcinomas to the heart and pericardium in patients dying of malignancies. The most common tumors associated with cardiac metastases are those of the lung and breast, as well as melanomas, leukemia, lymphomas and sarcomas.1)2)

Cardiac metastases from renal cell carcinomas are rare, with incidences ranging from 1.3 to 4.2%; however, endocardial invasion by metastatic renal cell carcinomas is virtually unknown. The extension of a tumor column to the vena cava as a luminal mass, with the growth along the caval wall into the right heart chambers, has been well documented as the most common mechanism of cardiac metastasis.3)4) Additionally, tumor cells from the kidney may disseminate to the right ventricle by retrograde lymphatic or lymphohematogenous spread through the thoracic duct into the superior vena cava, or by hematogenous spread of embolic cells.5)

A cardiac tumor is suspected when symptoms or signs that could be related to a lesion of a particular size, extension or location appear. The location and size of a tumor may be such that the cardiac function is altered due to obstruction of the blood flow through a cardiac chamber, such as with a left atrial myxoma, or by interfering with the valve function, as with a rhabdomyoma, or by causing cardiac failure like with a rhabdomyosarcoma. A strategically located tumor, which occludes a coronary artery, may alter the electrocardiography and produce patterns of a current injury, such as a myocardial infarction, arrhythmia or abnormal conduction.6)9) Tachyarrhythmia may result from valvar interference of the tumor mass or re-entry about its border with the myocardium. Accessory bundles resulting in ventricular pre-excitation have been seen in certain patients.10)11) Our patient had palpitation during ventricular tachycardia, which was supposed may have resulted from re-entry about the right ventricular mass.

Renal cell carcinomas account for 2% of all cancers and 80 to 85% of malignant kidney tumors. They occur in men nearly twice as often as in women. Patients are

Fig. 4. A: chest CT demonstrates a cardiac mass attached to the interventricular septum protruding into the right ventricle, but without contiguous vena caval involvement, and multiple metastases in both lungs. B: abdominal CT shows a large mass in the upper pole of the left kidney.

Fig. 5. A: the renal biopsy shows a clear type renal cell carcinoma (H & E stain, ×100). B: the gastric mucosal biopsy of the polyploid mass reveals clear cell infiltration (arrow) in the deep mucosal layer (H & E stain, ×40).
generally older than 40 years on diagnosis, with the disease predominantly occurring in the seventh and eighth decades of life. Five types of carcinoma have been distinguished: clear-cell, chromophilic, chromophobic, oncocytic and collecting-duct tumors. Clear cell carcinomas make up 75 to 85% of these tumors, and a higher nuclear grade or the presence of a sarcomatoid pattern correlate with a poorer prognosis. Chromophilic carcinomas comprise approximately 14% of renal cancers and chromophobic carcinomas approximately 4%, but renal oncocytomas and collecting-duct carcinomas are rare.\(^1\)\(^2\) In our patient, the pathology was that of a conventional clear cell renal cell carcinoma. mixed with sarcomatoid.

The signs and symptoms of renal cell carcinomas are usually nonspecific. The most common presentations are a hematuria in 50 to 60% of patients, abdominal pain in 40% and a palpable mass in the flank or abdomen in 30 to 40%. These three symptoms occur in combination (classic triad) in less than 10% of patients.\(^3\) One to 3% of tumors are bilateral and 25 to 30% of patients have overt metastases on initial presentation. Frequent sites include: the lung parenchyma in 50 to 60% of patients with metastases, bone in 30 to 40% and the brain in 5%. A broad range of paraneoplastic syndromes have been in less than 5% of patients, including erythrocytosis, hypercalcemia, hepatic dysfunction and amyloidosis.\(^4\)

Finally, if no definite cause can be found for the onset of cardiovascular symptoms in patients with a known malignancy, the symptoms may be due to cardiac metastasis.

REFERENCES