Case Reports

Renal Cell Carcinoma, Metastatic to the Left Ventricle

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Left ventricular metastases from renal cell carcinoma without vena caval or right atrial involvement are extremely rare. Herein, we present the case of a 69-year-old man who had undergone radical nephrectomy for renal cell carcinoma in 1984. Eighteen years thereafter, we discovered metastatic disease in his left ventricle.

When the metastasis was identified, the patient had no symptoms other than shortness of breath. He underwent surgical removal of a highly vascular mass from the left ventricular wall and resection of a nodule in the upper right pulmonary lobe. Upon pathologic examination, both tumors were metastatic renal cell carcinomas. The patient recovered uneventfully and was free of cardiac recurrence more than 6 years after the surgery. We describe our treatment of this patient and discuss some current approaches to the treatment of renal cell carcinoma that has metastasized to the heart. ***(Tex Heart Inst J 2009; 36(1):48-9)***

Cardiac tumors are extremely rare, and metastatic disease that involves the heart is 20 to 40 times more frequent than are primary cardiac malignancies.[1] The most common secondary tumors of the heart originate from leukemia, melanoma, lung cancer, breast cancer, and lymphoma. Cardiac metastases from renal cell carcinoma (RCC), which are extremely rare, usually occur in either of 2 circumstances. First, advanced RCC characteristically extends into the renal vein and the inferior vena cava in 5% to 15% of patients, and into the right atrium in about 1% of patients, thereby obstructing venous return to the heart (1).[2,3] Second, there can be a primary tumor that metastasizes to the heart, which occurs in 10% to 20% of patients who are dying of widespread, systemic RCC. However, in the absence of either direct vena caval extension or systemic disease, involvement of the heart is extremely rare, with only 1 known report thereof in the medical literature.[4] Here, we present the case of a 69-year-old man who experienced metastasis of RCC to the left ventricle and to the upper right lobe of the lung. We discuss our treatment of this patient, along with current surgical and therapeutic approaches to the treatment of RCC that has metastasized to the heart.

Key words: *Carcinoma, renal cell/complications/pathology/secondary/surgery; coronary disease/etiology/surgery; heart neoplasms/diagnosis/secondary; heart ventricles; neoplasm invasiveness; time factors; treatment outcome*

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Case Report

In 1984, a man was diagnosed with RCC and underwent a radical nephrectomy. In May 2002, the patient, by then 69 years of age, presented at our hospital with shortness of breath.

The patient exhibited no specific signs or symptoms of a cardiac ailment. Imaging studies revealed a lesion, 12 mm in diameter, in the upper right pulmonary lobe. It was determined that pathologic diagnosis of the lesion would require a thoracotomy and surgical excision. In view of the patient's age and risk factors for coronary artery disease, he was scheduled for preoperative cardiac catheterization. Coronary angiography revealed no significant coronary disease; however, it showed a well-circumscribed cardiac mass with multiple "feeding" vessels arising from the left anterior descending coronary artery (Fig. 1). The patient was admitted to the hospital for resection of the pulmonary and cardiac masses.

A highly vascular mass with clear margins was removed from the left ventricle and the upper lobe of the right lung. When the pericardium was opened, a large mass was noted to involve the left ventricular outflow tract between the left anterior descending coronary artery and the 1st diagonal branch. Removal of the mass required the institution of cardiopulmonary bypass, and the 1st diagonal branch had to be sacrificed in

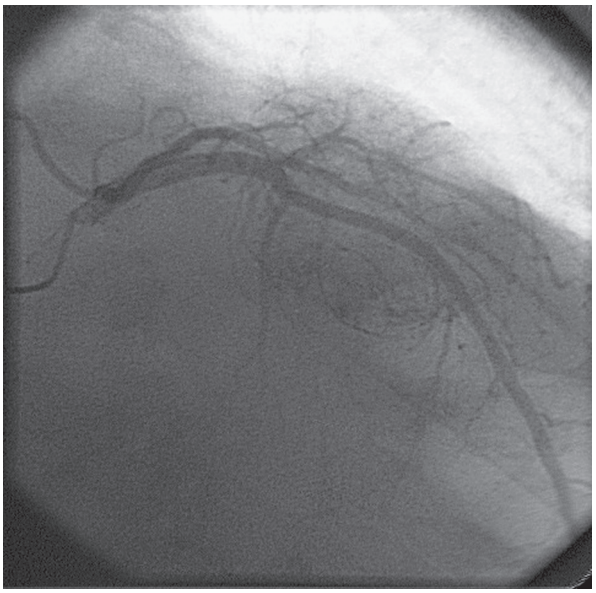

Fig. 1 *Cardiac angiogram shows collateral vessels from the left anterior descending coronary artery supplying a left ventricular wall mass.*

order to ensure that clear margins were achieved during resection of the tumor. Upon analysis, sections from the heart tumor and lung mass showed histopathologic features of a clear-cell RCC, and the microscopic margins were free of tumor. The patient recovered uneventfully and was discharged from the hospital. He has remained free of cardiac-tumor recurrence for more than 6 years since.

Discussion

During the past 20 years, important progress has been made in the understanding and treatment of metastatic RCC. Cardiac metastases from RCC in the absence of vena caval extension are extremely rare, and the tumors are often slow-growing, with the propensity to present many years after "curative" treatment. Every attempt should be made to resect these slow-growing metastatic lesions when they involve the heart. Coronary occlusion or compression from tumorous masses can lead to myocardial infarction, eventual heart failure, and death. A patient who had Castleman's disease experienced tumor involvement of the heart that led to a myocardial infarction from coronary compression, and heart transplantation was eventually required.[5]

Renal cell carcinoma can present as a solitary metastatic lesion or as widespread systemic disease. Solitary metastases eventually evolve into a systemic pattern of recurrent disease.[4] Despite advances in chemotherapy, the median survival period of patients with metastatic RCC is 6 to 12 months, and the 5-year survival rate is only 9%.[6] Metastatic RCC is highly resistant to cytotoxic agents, hormones, and radiotherapy. In order to improve the outcome in advanced RCC, different treatments have been investigated, including immunochemotherapy, anti-angiogenesis agents, and molecular targeting.[7] Despite these promising chemotherapeutic approaches, the treatment of metastatic RCC remains ineffective. Surgical resection can play an important role in the palliation of isolated, metastatic disease. Currently, combination therapy that includes surgery and chemotherapy affords the best chance of palliation and cure.

We have reported one of the few cases of isolated RCC that metastasized to the heart many years after an initial radical nephrectomy. Aggressive surgical treatment proved effective for our patient. This approach, in combination with chemotherapy, should be the treatment of choice for isolated metastatic disease.

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