

Sonographically Guided Percutaneous Radio Frequency Ablation of a Renal Cell Carcinoma in a Transplanted Kidney

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Radio frequency ablation is an effective treatment for focal renal cell carcinoma (RCC).^{1,2} We report a patient with RCC in a transplanted kidney that was successfully treated with percutaneous sonographically guided radio frequency ablation.

Abbreviations

CT, computed tomography; MRI, magnetic resonance imaging; RCC, renal cell carcinoma

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Case Report

A 50-year-old man had a cadaveric renal transplant in 1975 after a failed living related renal transplant 1 year earlier. The donor organ was from a 20-year-old male trauma victim. For more than 24 years, the patient had excellent renal allograft function, with a serum creatinine level ranging between 0.9 and 1.1 mg/dL (reference range, 0.89–1.2 mg/dL). In 1999, the patient's serum creatinine level began to increase gradually to 1.5 mg/dL. Also, his creatinine clearance rate declined from 109 mL/min per 1.73 m² in 1997 to 54 mL/min per 1.73 m² in 2001. During this period, he had myocardial infarction and several episodes of congestive heart failure. Despite coronary angioplasty and stenting, the patient still had baseline exertional angina and poor cardiac output.

At our institution, initial evaluation of the allograft included a renal sonographic examination that showed renal artery stenosis and a 2.2-cm solid renal mass indicative of RCC (Fig. 1). The mass was further confirmed with contrast-enhanced magnetic resonance imaging (MRI; Fig. 2). The MRI and sonographic examinations showed no evidence of metastatic disease. Because of the need for tissue diagnosis, percutaneous

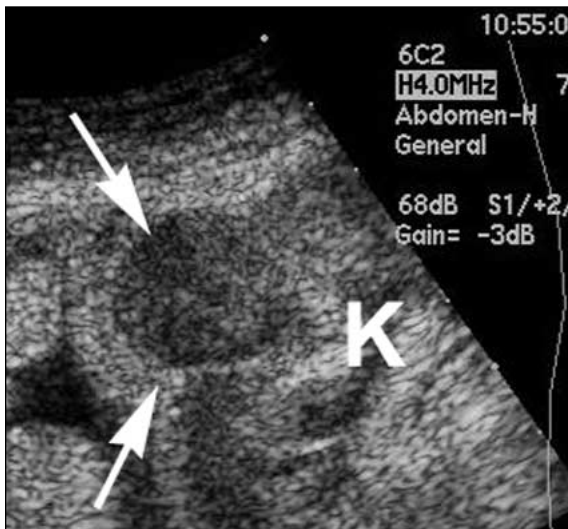
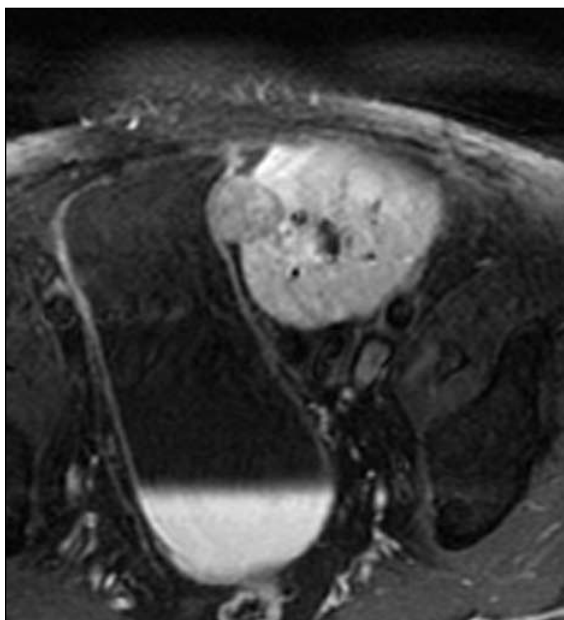


Figure 1. Transverse sonogram of the transplanted kidney (K) showing a partially exophytic, solid mass (arrows) arising from the medial aspect of the kidney.

biopsy was performed on the mass under direct sonographic visualization by a coaxial technique to avoid any theoretical seeding of the biopsy needle tract. Pathologic analysis revealed grade 2 RCC, papillary type.

Because of his cardiac status, the patient was a poor candidate for a nephron-sparing operation or total transplant nephrectomy. The patient and

Figure 2. Axial gadolinium-enhanced magnetic resonance image before ablation showing the medially located, partially exophytic enhancing mass abutting the distended urinary bladder.



his physicians decided that percutaneous sonographically guided radio frequency ablation of the RCC would be performed in an outpatient setting. On the day of the procedure, a Foley catheter was placed to decompress the urinary bladder, which was adjacent to the medially located RCC. No intestine was adjacent to the RCC in any of the images. General anesthesia was used without complications. With the use of a sterile technique and direct sonographic visualization, a radio frequency needle (RITA Medical Systems, Mountain View, CA) was advanced into the tumor (Fig. 3). After a 10-minute radio frequency ablation was performed, the needle was repositioned within the mass, and a second 10-minute ablation was performed. The needle tract was ablated as the needle was removed. Mepivacaine (20 mL) was injected into the region of the ablated tumor bed to assist in postoperative anesthesia. The patient tolerated the procedure well, without acute complications. Two hours after the procedure, contrast-enhanced computed tomography (CT) showed no enhancement of the mass, consistent with successful ablation. There was no evidence of hemorrhage, a urine leak, or damage to adjacent structures. Four hours after the procedure, the patient was dismissed to home. His serum creatinine level did not increase appreciably after the procedure.

Follow-up sonography, CT, and MRI at 6 and 14 months revealed a decrease in the size of the mass to 1.7 cm in maximal diameter. Importantly, on CT and MRI examinations with contrast material, there was no enhancement within the mass, indicating necrosis (Fig. 4).

Figure 3. Sonogram of the percutaneously placed radio frequency electrode within the mass. The prongs of the electrode (arrows) are extended to encompass the extent of the tumor. K indicates transplanted kidney.



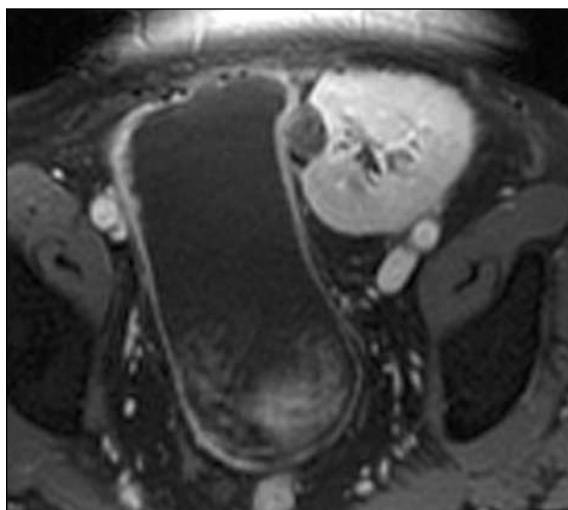


Figure 4. Follow-up axial gadolinium-enhanced magnetic resonance image 14 months after radio frequency ablation showing that the mass has decreased in size, and there is no enhancement in the mass, indicating necrosis.

Discussion

Compared with the general population, transplant recipients are at an increased risk of cancer. Renal cell carcinoma in native kidneys of postrenal transplant patients is reported to occur more frequently than in the general population. Renal cell carcinoma arising within a transplanted kidney is much rarer; only 24 cases were listed in the Cincinnati Transplant Tumor Registry when its data were published in 1995.³

Our patient's allograft RCC developed 26 years (312 months) after transplantation. According to our review of the literature, this is longer than any previously reported delay between renal transplantation and development of an allograft RCC. Park et al⁴ reported a case in which RCC developed in a renal allograft 21 years after transplantation. The mean interval from transplantation to the appearance of RCC is 3.5 years (42 months).³

Options for treating renal transplants containing RCC have included surgical en bloc removal of the transplant with discontinuation of immunosuppression.⁵⁻¹⁰ Typically, en bloc removals have been performed for tumors larger than 4.5 cm in diameter; however, in 1 case the transplant was removed for chronic pyelonephritis, and histologic analysis showed a 1-cm RCC arising in a cyst.¹⁰

More recently, to preserve the function of a solitary or transplanted kidney, partial nephrectomy with a nephron-sparing operation has been used.^{4,11-16} This has been possible with smaller, well-demarcated lesions, although lesions of up to 8 cm also have been treated successfully.^{11,13,15}

Laparoscopic or limited open cryoablation of lesions within native kidneys had excellent early results in 2 patients.^{17,18} Long-term follow-up in these cases was expected. The mean diameters of the tumors ablated were 2.3 and 2.2 cm, respectively.^{17,18} The procedures were well tolerated, with minimal complications. No cases of cryoablation of a transplanted kidney were found in our literature search.

This report describes our case of percutaneous image-guided radio frequency ablation for a lesion in a transplanted kidney. Radio frequency ablation has been used as a nephron-sparing alternative to native nephrectomy, with good early results.^{1,2} These results suggest that the procedure is more effective for patients with smaller and exophytic RCCs, as in our case. The superficial location of the transplanted kidney also aids in sonographically guided therapy.

Our patient tolerated this outpatient procedure well, with no acute complications, and was able to be dismissed to home 4 hours after the procedure. As expected, there was no acute change in his transplant function, and early follow-up has shown successful ablation of the lesion. Treatment of the allograft renal artery stenosis identified on MRI has been delayed until after the patient's follow-up visits.

In conclusion, we treated an RCC in a transplanted kidney by radio frequency ablation. The results of contrast-enhanced CT and MRI at 14 months indicate that the lesion was likely destroyed. Although RCC in a transplanted kidney is rare, our initial experience with percutaneous sonographically guided radio frequency ablation has shown it to be technically feasible and a safe alternative to more conventional nephron-sparing surgical approaches.

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