Radiofrequency Ablation for Percutaneous Treatment of Malignant Renal Tumors

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Summary. We review our early experience with radiofrequency (RF) ablation of malignant renal tumors. Sixteen malignant renal tumors in 12 patients were treated. These tumors included 15 renal-cell carcinomas (RCCs) and one metastatic tumor of the retroperitoneal leiomyosarcoma. Tumor size ranged from 7 to 35 mm (mean, 24 mm). No tumor had a cystic component. Thirteen tumors were exophytic, and the other 3 tumors showed parenchymal localization. All procedures were performed with computed tomographic (CT) fluoroscopic guidance in an Interventional CT System Suite in our hospital. On the basis of the size and location of the lesion on CT scans, overlapping ablations were performed by repositioning the needle to ablate the entire tumor. In one patient whose RCC was incidentally discovered during the survey of metastatic lesions of esophageal carcinoma, transcatheter arterial chemoembolization of RCC was performed before the start of radiotherapy and chemotherapy of the esophageal carcinoma. Technical success was defined as the absence of enhancement in any area of tumor on CT or magnetic resonance (MR) images. In 15 of 16 tumors (94%), technical success was achieved. We could not achieve a complete ablation in one RCC of parenchymal localization adjacent to the renal sinus. No patient showed significant renal dysfunction after RF ablation procedures. Complications, including macro- or microhematuria, subcapsular hematoma, and pneumothorax, required only conservative observation, and all were resolved without any treatment. RF ablation for renal malignant tumor is a minimally invasive and effective treatment.

Keywords. Radiofrequency ablation, Renal-cell carcinoma, Malignant renal tumor, CT guidance, CT fluoroscopy

Percutaneous image-guided ablation with the use of radiofrequency (RF) has recently received much attention as minimally invasive therapy for solid malig-
nancies [1–4]. Although other thermal energy sources, such as microwaves, high-intensity ultrasonography, cryotherapy, and lasers, are also used clinically, RF seems to be the most popular source, probably because of its high utility and feasibility. It has been available for treatment of primary or metastatic hepatic tumors since the early 1990s [5–7]. Recently, percutaneous RF ablation with the use of image guidance for treating tumors of the lung, bone, and kidney has been reported [8–19].

Small malignant renal tumors are being discovered with increasing frequency. They are usually discovered incidentally by abdominal ultrasound and/or computed tomography (CT). Although radical nephrectomy has been considered standard treatment for renal-cell carcinoma (RCC), partial nephrectomy is being performed increasingly as an alternative to radical nephrectomy [20, 21]. Increase in the incidence of small, incidentally found tumors has changed surgical techniques to spare normal renal parenchyma. RF ablation seems to represent a less invasive technique for treating small renal tumors while preserving renal parenchyma. In this article, we review our early experience with RF ablation of small renal malignant tumors to evaluate its efficacy.

Materials and Methods

Patients

An institutional review board approved a clinical trial of percutaneous RF ablation with CT guidance of renal malignant tumors at Okayama University Hospital in May 2002. Between May 2002 and October 2003, 12 patients, who provided informed consent, were enrolled in this study.

Sixteen malignant renal tumors in 12 patients (7 men and 5 women; mean age, 57 years; range, 23–83 years) were treated. These tumors included 15 RCCs and one metastatic tumor of the retroperitoneal leiomyosarcoma. Tumor size ranged from 7 to 35 mm (mean, 24 mm). No tumor had a cystic component. Thirteen tumors were exophytic, and the other 3 tumors showed parenchymal localization.

The indications for RF ablation were conditions that rendered surgery highly risky because of pulmonary or cardiovascular diseases, absence of response to chemotherapy or immunotherapy, presence of a solitary kidney, or von Hippel-Lindau disease (VHL). The latter group of patients often present with RCCs at a young age and develop multiple and bilateral RCC tumors that result in multiple resections, total nephrectomy, and finally the need for dialysis [22]. Two board-certified interventional radiologists in collaboration with one experienced urologist evaluated all patients to determine their suitability for RF ablation. Thus, five patients with a solitary kidney and two patients with VHL were included in this study. In all patients, preoperative routine examination showed that the prothrombin time, partial thromboplastin time, and complete blood count were within normal limits.