International Journal of Surgery 6 (2008) S31–S35

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.theijs.com

Percutaneous radiofrequency thermal ablation of renal cell carcinoma: Is it possible a day-hospital treatment?

Gianpaolo Carrafiello [a,*], Domenico Laganà [a], Andrea Ianniello [a], Monica Mangini [a], Federico Fontana [a], Elisa Cotta [a], Laura Concollato [a], Alberto Marconi [b], Chiara Recaldini [a], Gianlorenzo Dionigi [c], Francesca Rovera [c], Luigi Boni [c], Salvatore Cuffari [d], Carlo Fugazzola [a]

[a] Department of Radiology, University of Insubria, Varese, Italy
[b] Department of Urology, Hospital of Varese, Varse, Italy
[c] Department of Surgical Sciences, University of Insubria, Varese, Italy
[d] Service of Anaesthesiology, Hospital of Varese, Varese, Italy

ARTICLE INFO

Article history:
Available online 14 December 2008

Keywords:
Renal cell carcinoma
Percutaneous treatment
Radiofrequency thermal ablation of renal cell carcinoma

ABSTRACT

Purpose: The aim of this study is to evaluate the feasibility of the procedure in day-hospital and discuss prognostic factors, efficacy and complications of percutaneous radiofrequency ablation in the treatment of renal cell carcinoma.

Materials and methods: Between January 2003 and August 2008, 26 patients (mean age 79, range 70–87 years, 15 men and 11 women) affected by 27 kidney tumoral lesions, 25 RCC and two renal oncocitome (one patient was affected by two RCC), undergo 29 treatments of RFA (three patients underwent two treatments due to residual tumor at the CT performed 1 month after the first treatment). Three out of 26 patients had only one kidney due to progressed nephrectomy because of RCC; three/26 patients were carriers of oncological comorbidity while four/26 patients were carriers of medical comorbidity. The remaining 16/26 patients refused the surgical option. The lesions had a diameter between 1 and 4 cm (average diameter 2.4 cm). Seventeen of the 27 lesions were exophytic, five/27 parenchymal, three/27 was central while two/27 was mixed. All the lesions had been characterized either by CT or MRI. On the basis of the same investigation the feasibility of the radiofrequency procedure was verified. For all the procedures the RF type 3000® radiofrequency generator system was used together with the LeVeen® ago-electrode. Twenty-one lesions out of 27 were treated under ultrasound guidance while six/27 lesions under the CT guide. After the procedure a US control was performed to exclude early complications and the same day the patients were discharged from hospital: the procedure was performed in day-hospital.

Results: The technical success of the procedure was obtained in all cases (100%). After the procedure, 18 patients, without complications and comorbidity, were discharged from hospital the same day, seven patients with comorbidity were kept under observation for one night while one patient was hospitalized. The primary success of the treatment, rated with CT or MRI after 1 month, was obtained in 25/27 of the cases. In two/27 lesion, an incomplete ablation was obtained; for this reason these patients underwent a second treatment and after 6 month of a regular follow-up, no more neoplastic tissue was identified. During the follow-up there were no signs of disease in any patients. No major peri-procedural complications were recorded; only one patient had to be assisted for the appearance of a peri renal liquid (urinoma) and a thin pneumothorax layer that resolved completely in few days after the procedure.

Conclusions: Preliminary results with RFA of RCC are promising. Radiofrequency thermal ablation could prove to be a useful treatment for patients who are unsuitable for surgery; in this study we demonstrate the feasibility of the treatment in day-hospital for selected patients.

1. Introduction

Renal cell carcinoma (RCC) is the most common primary parenchymal malignancy of the kidney and accounts for 2% of all new cancers annually in the United States.[1]

* Corresponding author. Vascular and Interventional Radiology, Department of Radiology, University of Insubria, 21100 Varese, Italy. Tel.: +39 033 227 8770; fax: +39 033 227 8656.
E-mail address: gcarraf@tin.it (G. Carrafiello).

1743-9191/$ – see front matter © 2008 Surgical Associates Ltd. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.ijsu.2008.12.034

Renal cell carcinoma is frequently discovered incidentally because of the increasing use of imaging techniques.[2,3] In almost two thirds of cases, RCC currently diagnosed are incidental findings in asymptomatic patients.[2]

The traditional standard treatment for localized RCC is partial or radical nephrectomy, but this method is not ideal for treating all tumors because some patients are unable or unwilling to undergo surgery or would have limited or no functional renal tissue remaining after standard therapy. One possible alternative treatment for such patients is radiofrequency ablation (RFA).

We reviewed our experience with 26 patients who underwent RFA for renal neoplasm to evaluate prognostic factors, efficacy and complications of treatment.

2. Materials and methods

Between January 2003 and August 2008, 26 patients (mean age 79, range 70–87 years, 15 men and 11 women) affected by 27 kidney tumoral lesions, 25 RCC and two renal oncocitome (one patient was affected by two RCC), undergo 29 treatments of RFA (two patients underwent two treatments due to residual tumor at the CT performed 1 month after the first treatment).

All patients were unsuitable to the surgical treatment.

Three out of 26 patients had only one kidney due to progressed nephrectomy because of RCC; three/26 patients were carriers of oncological comorbidity (pulmonary carcinoma, gastric carcinoma) while four/26 patients were carriers of medical comorbidity (aortic aneurysm in two cases and chronic renal insufficiency in the other two patients). The remaining 16/26 patients refused the surgical option.

The lesions had a diameter between 1 and 4 cm (average diameter 2.4 cm). In one patient, two lesions were treated in one single session.

In accordance with the classification proposed by Gervais,[4,5] 17/27 lesions were found to be exophytic, five/27 parenchymal, three/27 central while two/27 was mixed.

Seventeen lesions were situated on the left kidney, and 10 on the right one.

The lesions had been characterized by CT (LightSpeedPlus® / GE / Milwaukee / USA or Aquilion 64 / Toshiba / Tokyo /Japan) in 25/26 patients while in one/26 patients, was performed MRI (Eclipse / Picker-Marconi /1.5 T). On the basis of the same investigation the feasibility of the radiofrequency procedure was verified. For all tumors with a diameter $\leq$3 cm was performed renal biopsy by means of an 21 Gauge needle (Biomodl); in two cases was performed renal biopsy by means of an 18 Gauge needle, which confirmed the diagnosis of renal oncocitome.

For the other patients, no biopsy was carried out in consideration of the risks connected with the puncture (bleeding, seeding, artero/venous fistulas).

In seven cases was utilized contrast enhancement to visualize the lesions (SONOVUE).

Twenty-one lesions out of 27 were treated under ultrasound (US) guidance (Technos MPX®, Esaote, Genova, Italy; iU22 Philips, Eindhoven, The Netherlands), 5/27 lesions were treated under CT guidance (Aquilion 64 / Toshiba / Tokyo/ Japan).

For all devices, the skin at the site of the planned needle puncture was anaesthetized with 1% lidocaine. The patients were treated under deep sedation according to the principles of "monitored anaesthesia care" receiving propofol (50–120 mg), alfentanyl (0.5–1 mg) and mydazolam (1–3 mg). All patients received oxygen during the procedures. Continuous monitoring of heart rate, electrocardiographic tracing, oxygen saturation, and respiratory rate were obtained, and blood pressure was determined every 4 min.

For all procedures the RF type 3000® radiofrequency generator system was used together with the LeVeen® ago-electrode (Fig. 1).

In one case the LeVeen 4 cm needle was used, in 10 cases the LeVeen 3.5 cm needle was used, and in 12 cases was the LeVeen 3 cm, and in four cases the LeVeen 2 cm needle was used.

At the end of the procedure a US control was performed to exclude major complications [1 – require therapy or minor hospitalization (<48 h); 2 – require major therapy, unplanned increase in the level of care, prolonged hospitalization (>48 h); 3 – permanent adverse sequelae; and 4 – death] and minor complications [1 – no therapy, no consequence; and 2 – nominal therapy, no consequence; includes overnight admission for observation only].[6] The patients with major complications were kept under observation in hospital for at least one night; the others patients without complications and clinical or oncological comorbidity were discharged from hospital the same day of the procedure.

We defined the technical success as the correct positioning of the needle inside the lesion.

The patients were then taken through a follow-up visit by means of CT or MRI at 1, 3, 6 and 12 month intervals after the procedure and then once per year. Primary success was defined as no enhancement or enlargement of the treated lesions, and this finding is consistent with local control; any focal enhancement in the ablated lesion was be considered indicative of residual or recurrent tumor. The patients with clinical and oncological comorbidity (6) were kept under observation in hospital. During the follow -up period major complications and minor complications are scheduled.

3. Results

The technical success of the procedure was obtained in all cases (100%).

The primary success of the treatment, assessed when CT or MRI completed after 1 month, was obtained in 25/27 of the cases in which no enhancement or enlargement of the treated lesion was observed (Figs. 2 and 3). In two/27 lesions, an incomplete ablation was obtained; for this reason this patient underwent a second treatment and after 6 months of a regular follow-up, no more neoplastic tissue was identified.

No major peri-procedural complications were recorded; only one patient had to be assisted for the appearance of a perirenal fluid collection (urinoma) and a thin pneumothorax (PNX). Subsequent examinations (US of the abdomen and X-ray film of the chest in two

Fig. 1. LeVeen® ago-electrode.