
CASE REPORT

Transcatheter Embolisation of a Renal Arteriovenous Fistula following Radiofrequency Ablation for Renal Cell Carcinoma

EMW Man, KY Lau

Department of Radiology, Pamela Youde Nethersole Eastern Hospital, Chai Wan, Hong Kong

ABSTRACT

Radiofrequency ablation is a promising minimally invasive therapy for patients with renal cell carcinoma who are not suitable for surgical therapy. The procedure has a low complication rate. This report is of a patient with delayed life-threatening haematuria requiring transcatheter embolisation of a bleeding intrarenal artery after radiofrequency ablation for renal cell carcinoma.

Key Words: Carcinoma, renal cell; Catheter ablation; Hematuria; Therapeutic embolizations

INTRODUCTION

Radiofrequency ablation (RFA) is a promising minimally invasive therapy for patients with renal cell carcinoma (RCC) who are not suitable for surgical therapy. Several published reports have shown the low complication rate for RFA.¹⁻⁵ This report describes a patient with delayed life-threatening haematuria requiring transcatheter embolisation of a bleeding intrarenal artery after RFA for renal cell carcinoma.

CASE REPORT

A 56-year-old woman with left RCC and liver metastasis attended the Pamela Youde Nethersole Eastern Hospital for RFA to the tumour. She was attending a private oncologist for the RCC. She was not taking anticoagulation therapy.

Positron-emission tomography computed tomography (PET-CT) demonstrated a 3.8- x 4.5- x 3.6-cm exophytic tumour in the lower pole of the left kidney, with infiltration to the perinephric fat. No intraluminal thrombus was detected in the renal veins or the inferior vena cava. The patient underwent RFA after the PET-CT scan.

Follow-up PET-CT scan 3 months later, performed at a private hospital, showed a marked decrease in tumour

vascularity and a slight decrease in tumour size. No PET-CT evidence of tumour recurrence was noted.

Six months after the RFA, the patient was admitted to the Pamela Youde Nethersole Eastern Hospital because of massive painless haematuria for 2 weeks. She was in shock at admission, and her haemoglobin level was 53 g/L (normal range, 120-150 g/L). Seven units of packed cells and 6 units of platelet concentrate were transfused.

Urgent plain CT scan with renal colic protocol was performed. Contrast was not injected so as not to overload the patient in case angiogram became necessary. An ill-defined heterogenous mass measuring 4.6 cm was seen in the lower pole of the left kidney (Figure 1a). The mass showed no significant interval change in size compared with the previous measurement. A central component of the RCC adjacent to the inferior aspect of the renal sinus was noted. Hyperdensity was seen inside the prominent left pelvicalyceal system, compatible with acute bleeding (Figure 1b). Emergency angiography and embolisation was performed.

Abdominal aortogram was performed via a right femoral approach using a 5-F vascular sheath and 5-F pigtail catheter (Cook, Inc, Bloomington, USA). Selective cannulation of the left renal artery was performed using a 5-F Cobra 1 catheter (Cook, Inc). Superselective cannulation of the interlobar artery towards the lower pole of the left kidney was done using a 3-F high-flow Renegade catheter (Boston Scientific, Cork, Ireland).

*Correspondence: Dr EMW Man, Department of Radiology, Pamela Youde Nethersole Eastern Hospital, Chai Wan, Hong Kong.
Tel: (852) 2595 6172; Fax: (852) 2975 0432;
E-mail: drmanmanwai@yahoo.com.hk*

Submitted: 28 Nov 2008; Accepted: 14 Jul 2009.

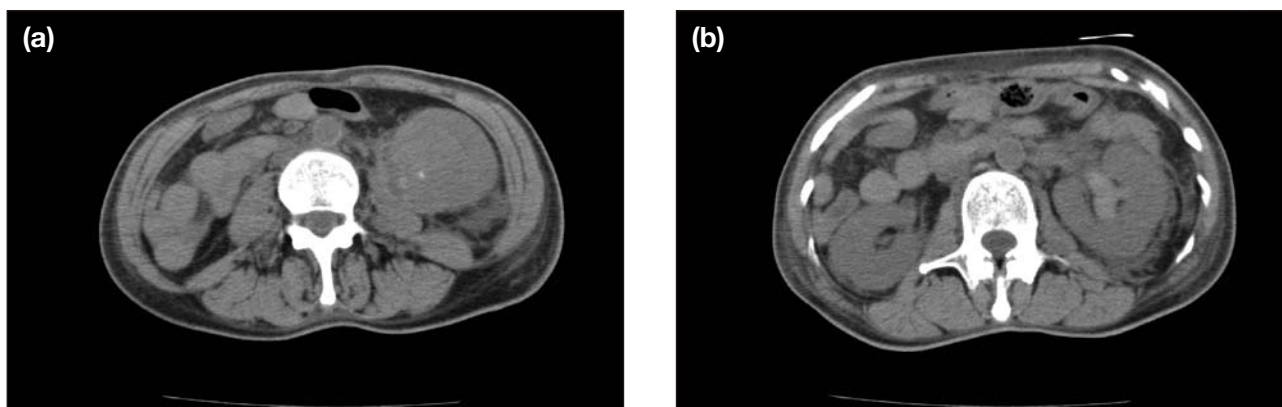


Figure 1. Pre-embolisation computed tomography images of the abdomen showing (a) an ill-defined heterogeneous mass in the lower pole of the left kidney, suggestive of renal cell carcinoma, with a central component of the renal cell carcinoma adjacent to the inferior aspect of the renal sinus; and (b) hyperdensity inside the prominent left pelvicalyceal system compatible with acute bleeding.

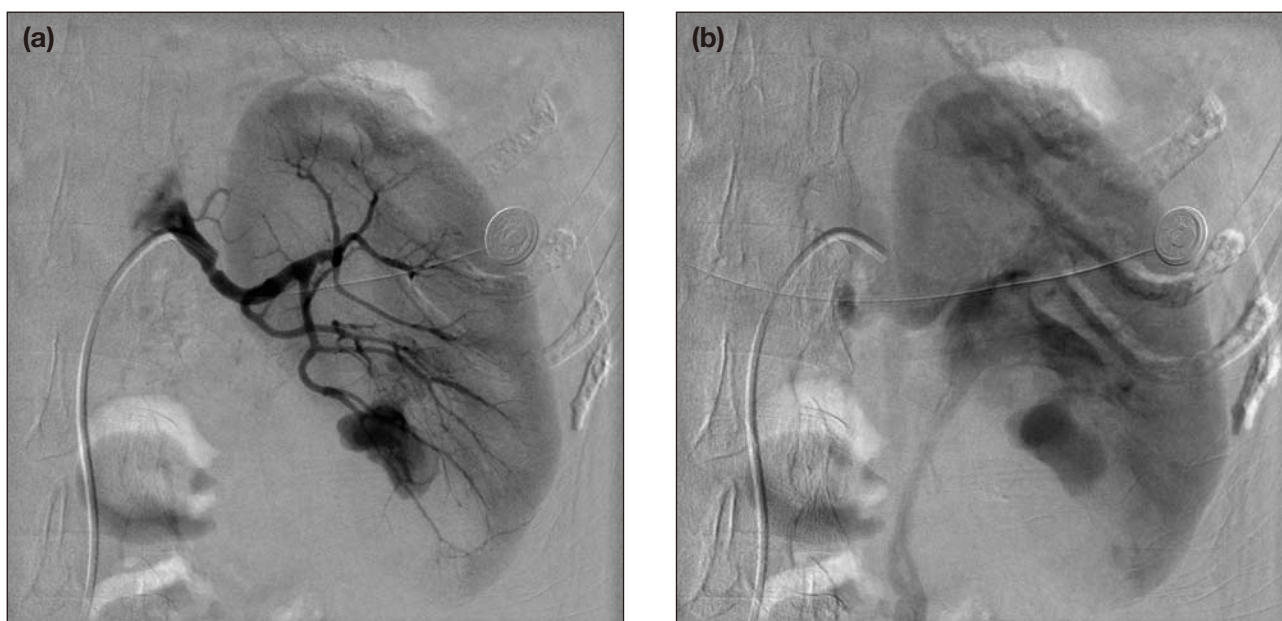


Figure 2. Selective left renal arteriogram showing (a) a well-defined collection of contrast in the inferior aspect of the left kidney, the configuration of which corresponds to a lower pole calyx, no pseudoaneurysm or early draining vein, and mild transient focal narrowing at the proximal left renal artery due to arterial spasm; and (b) the contrast collection in the inferior renal calyx draining into the renal pelvis then to the left ureter.

A fistulous communication between an arcuate artery of the lower pole of the left kidney and the left lower pole calyx was noted (Figure 2a), with marked contrast shunting into the left pelvicalyceal system (Figure 2b). No early draining vein was noted. No pseudoaneurysm or hypervascular tumour was seen. The left renal vein was opacified and patent.

The interlobar artery giving rise to the arcuate artery shunting to the left lower pole calyx was superselectively cannulated (Figure 3) and embolised using two 2- x 2-cm stainless steel coils (Cook, Inc). Postembolisation arteriograms showed no more shunting or opacification of the left pelvicalyceal system (Figure 4).

The patient became haemodynamically stable after the procedure. There was no deterioration in renal function by biochemical examination. The haematuria stopped and the patient was discharged 4 days after the procedure.

Follow-up CT scan with contrast 2 months after the embolisation showed an interval decrease in the size of the tumour to 3.8 x 3.3 x 3.6 cm. No renal infarct or gross renal vascular abnormality was noted. No arterial contrast-enhancing tissue was noted to suggest residual RCC. Follow-up CT scan 18 months after the embolisation showed further interval reduction in size to 1.9 x 2.6 x 2.0 cm.



Figure 3. Superselective cannulation of the interlobar artery going to the lower pole of the left kidney showing a fistulous communication between an arcuate artery of the lower pole of the left kidney and the left lower pole calyx, with marked contrast shunting into the left pelvicalyceal system.

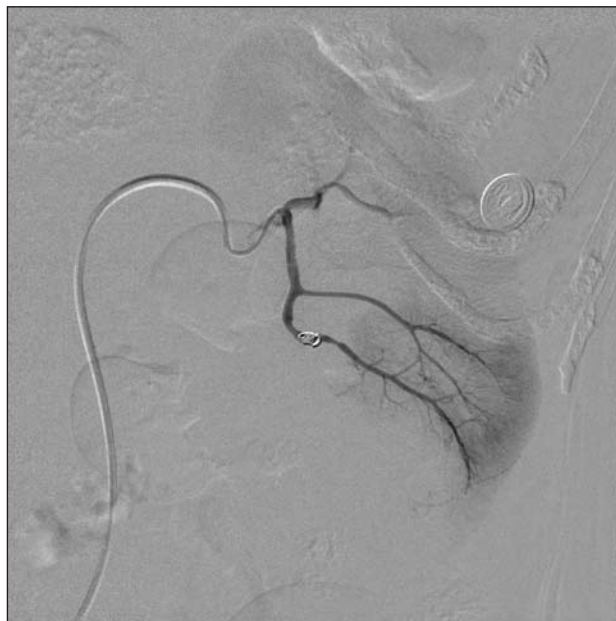


Figure 4. Postembolisation angiogram showing the interlobar artery giving rise to the arcuate artery shunting to the left lower pole calyx, which was superselectively cannulated and embolised – no contrast shunting into the pelvicalyceal system is seen.

DISCUSSION

The incidence of RCC is increasing as more tumours are being detected incidentally by advanced imaging equipment. Minimally invasive therapies are being advocated to preserve functioning renal tissue, especially for patients with multiple RCC or who are not suitable for definitive curative resection.

RFA is considered to be a safe procedure with a relatively low complication rate.¹⁻⁵ Post-RFA haematuria, if present, is usually minor.^{6,7} Gervais et al found that the first urine specimen from 5 of 8 patients (62%) had microscopic hematuria;^{8,9} 1 minor and 2 major haemorrhages occurred after 140 ablations.⁹ Most post-RFA haematuria happens 1 to 2 days after the procedure, some of which may be due to direct laceration of the intrarenal arterial branch by the RFA needle.

Gross haematuria can be due to renal artery pseudoaneurysm or arteriovenous fistula. The bleeding pattern of a post-radiofrequency ablation can be immediate or delayed by a few days or months. Emergency angiography and embolisation are the appropriate measures for management.

It is possible that the post-RFA delayed haematuria in this patient was due to tiny pseudoaneurysm formation with delayed rupture into the lower pole calyx resulting

in a direct arteriocalyceal fistula. The large amount of blood loss is also consistent with pseudoaneurysmal bleeding. The negative finding of the PET-CT after the RFA and the follow-up CT scans 2 months and 18 months after the embolisation excluded the possibility of tumoural bleeding. The interval decrease in the size of the tumour was compatible with post-RFA change.

In reviewing the management of this patient, a contrast CT scan would have been useful before the angiography and embolisation for diagnosis and to depict the vascular anatomy of the kidney. Saving the contrast load by omitting the aortogram would have been beneficial if the contrast CT scan was done.

This patient demonstrates that life-threatening haematuria is one of the complications of RFA for RCC, even after 6 months. Detailed history taking and clinical correlation would prompt the initiation of rapid treatment.

REFERENCES

1. de Baere T, Kuoch V, Smayra T, et al. Radiofrequency ablation of renal cell carcinoma: preliminary clinical experience. *J Urol*. 2002;167:1961-4.
2. Gervais DA, McGovern FJ, Arellano RS, McDougal WS, Mueller PR. Radiofrequency ablation of renal cell carcinoma: part 1. Indications, results, and role in patient management over a 6-year period and ablation of 100 tumors. *AJR Am J Roentgenol*. 2005;185:64-71.
3. Gervais DA, Arellano RS, McGovern FJ, McDougal WS, Mueller

- PR. Radiofrequency ablation of renal cell carcinoma: part 2. Lessons learned with ablation of 100 tumors. *AJR Am J Roentgenol.* 2005;185:72-80.
4. Mayo-Smith WW, Dupuy DE, Parikh PM, Pezzullo JA, Cronan JJ. Imaging-guided percutaneous radiofrequency ablation of solid renal masses: techniques and outcomes of 38 treatment sessions in 32 consecutive patients. *AJR Am J Roentgenol.* 2003;180:1503-8.
 5. Roach H, Whittlestone T, Callaway MP. Life-threatening hematuria requiring transcatheter embolization following radiofrequency ablation of renal cell carcinoma. *Cardiovasc Intervent Radiol.* 2006;29:672-4.
 6. Zagoria RJ. Imaging-guided radiofrequency ablation of renal masses. *Radiographics.* 2004;24(Suppl):S59-71.
 7. Rhim H, Dodd GD, III, Chintapalli KN, et al. Radiofrequency thermal ablation of abdominal tumors: lessons learned from complications. *Radiographics.* 2004;24:41-52.
 8. Gervais DA, McGovern FJ, Wood BJ, Goldberg SN, McDougal WS, Mueller PR. Radio-frequency ablation of renal cell carcinoma: early clinical experience. *Radiology.* 2000;217:665-72.
 9. Gervais DA, McGovern FJ, Arellano RS, McDougal WS, Mueller PR. Renal cell carcinoma: clinical experience and technical success with radio-frequency ablation of 42 tumors. *Radiology.* 2003;226:417-24.