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Case Report

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Synchronous Partial Nephrectomy and Renal Artery Aneurysm Repair in Bilateral Renal Cancers: Case Report and Literature Review

Nazario Foschi[a] Mauro Ragonese[a] Pierluigi Russo[a] Domenico Nigro[a] Luca Di Gianfrancesco[a] Simona Sica[b] Giovanni Tinelli[b] Yamume Thsomba[b] PierFrancesco Bassi[a]

[a]Unit of Urology, A. Gemelli Hospital, IRCCS – Catholic University of the Sacred Heart, Rome, Italy;
[b]Unit of Vascular Surgery, A. Gemelli Hospital, IRCCS – Catholic University of the Sacred Heart, Rome, Italy

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Renal artery aneurysm · Renal cancer · Partial nephrectomy

Abstract
The treatment of renal cancer has changed in the last decades with an increase in application of conservative surgery such as partial nephrectomy (PN) in order to achieve an optimal oncological outcome with the maximum preservation of renal function. The indication for PN is mandatory in case of bilateral tumors or in case of impaired renal function. Renal artery (RA) aneurysm (RAA) is a rare occurrence, and its treatment could be radiological or surgical according to the anatomy of the aneurysm and the clinical characteristics of the patients. Here, we report a case of simultaneous ipsilateral occurrence of renal cancer and RAA in a patient with bilateral renal masses, treated with 1 surgical procedure with good functional and oncological outcomes. This rare occurrence must be known by surgeons treating renal cancers, and it is possible to perform the 2 procedures in 1 surgical step.

Introduction

Bilateral renal cell carcinoma (RCC) is a rare entity that can occur synchronously or asynchronously and can be familiar or sporadic. Multiple reports confirm an incidence of bilateral RCCs between 1 and 5%, with only <2% of patients with RCC having synchronous sporadic lesions [1, 2]. Renal artery (RA) aneurysms (RAAs) are rare, occurring in approximately 0.09% of the general population [3].

The coexistence of RAAs and RCCs is a rare presentation with only anecdotal reports, and it represents a real challenging management dilemma [4]. We report the case of a bilateral synchronous renal cancer and contextual right RAA.

Case Report

A 69-year-old asymptomatic man underwent routine checkup with abdominal ultrasound that revealed 2 bilateral solid renal masses; therefore, he underwent a contrast-enhanced CT that re-

karger@karger.com
www.karger.com/uin

Mauro Ragonese
Unit of Urology, A. Gemelli Hospital
IRCCS – Catholic University of the Sacred Heart
L.go A. Gemelli 8, IT–00168 Rome (Italy)
mauroragonese87@gmail.com

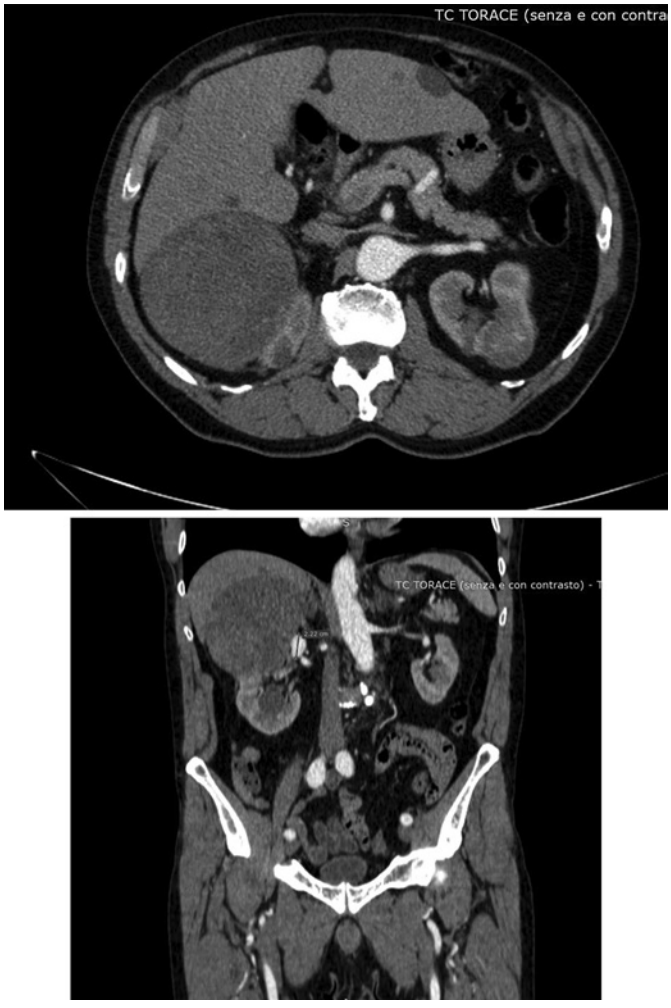

Fig. 1. CT scan showing bilateral renal masses and right RAA. RAA, renal artery aneurysm.

vealed the concomitant presence of a right RAA. The patient has no significant past medical history, except for hypertension and Gilbert disease. The patient was a habitual smoker, with an average of 15 cigarettes per day for 40 years.

No familiar history of urological cancers was reported. The ASA score was 2, Charlson Comorbidity Index was 4, and the BMI of the patient was 27.04.

The CT scan described 2 renal masses: the first one was partially exophytic with a maximum diameter of 10 cm in the upper pole of the right kidney (PADUA score: 10) and the second was partially exophytic in the lower pole of the left kidney with the maximum diameter of 35 mm (PADUA score 6) (Fig. 1). No renal vein involvement, lymphadenopathy, or distant metastases were described. The right RA showed an aneurysmatic dilatation of 22 mm of maximum diameter (Fig. 1, 2).

After multidisciplinary discussion of the case involving the radiologist and vascular surgeon, an open surgery was planned in order to ensure the simultaneous treatment of the renal mass and the aneurysm.

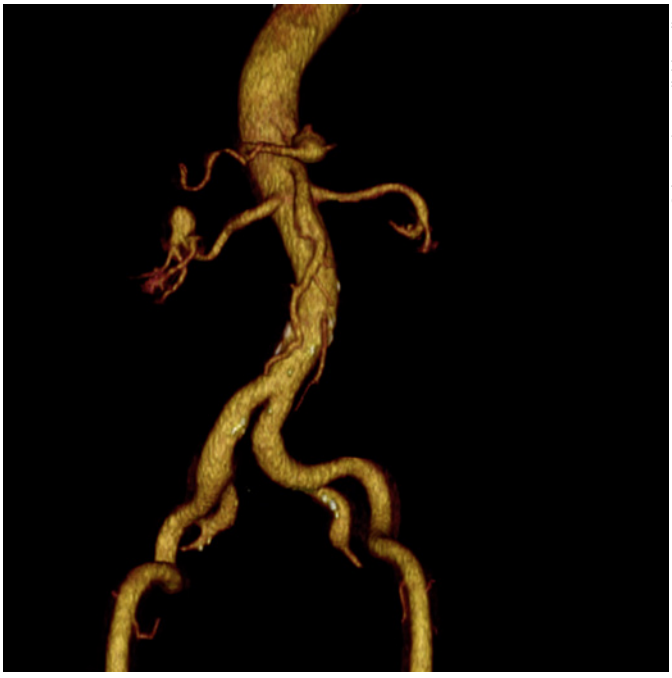

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Fig. 2. 3D reconstruction of right RAA. RAA, renal artery aneurysm.

A simple enucleation of the tumor was performed, with a 10-min warm renal ischemia. In the vascular phase, the right renal aneurysm was exposed and clamped proximally and distally.

The aneurysm was completely resected, and reconstruction by an end-to-end anastomosis with a 3/0 polypropylene running suture was performed. In order to prevent a kidney injury, the right RA was perfused with a histidine-tryptophan-ketoglutarate (HTK) solution (Custodiol®; Dr. Franz-Kohler Chemie GmbH, Bensheim, Germany) (Fig. 3).

The operative time was 210 min, total blood loss was 250 mL, warm ischemia time was 10 min for the tumor enucleation, and 8 min for the following aneurysm repair. At pathological examination, a grossly exophytic solid mass with hemorrhagic content of about 9 cm of maximum diameter (pT2, Fuhrman 2 papillary renal cancer) was found.

Postoperative course was uneventful, and no major grade (Clavien Dindo ≥ 2) complications were reported. The patient was discharged on postoperative day 8.

Preoperative serum Cr was 1.75 mg/dL with an estimated glomerular filtration rate of 45.1 mL/min; after 30 days, serum Cr was stable at 1.81 mg/dL, with an estimated glomerular filtration rate of 43.0 mL/min.

Renal color Doppler ultrasound performed 40 days after surgery showed RA patency with successful aneurysm repair with normal renal Doppler ultrasound values: the RA-peak systolic velocity (RA-PSV), estimated from spectral analysis of the Doppler-shifted signal, was 110 cm/s, and the resistive index, calculated using the formula ([PSV – end-diastolic velocity]/PSV) was 0.68 (Fig. 4).

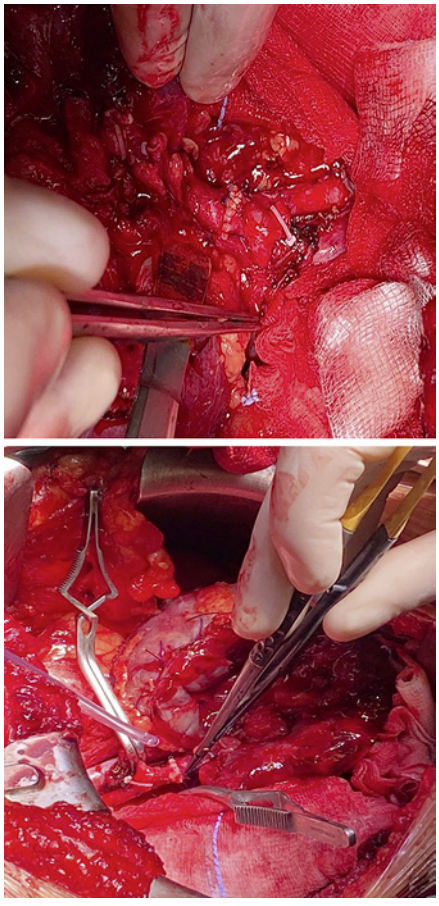

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Fig. 3. Intraoperative pictures showing RAA correction with the suture on the RA and the renorrhaphy on the right kidney after enucleation. RA, renal artery; RAA, renal artery aneurysm

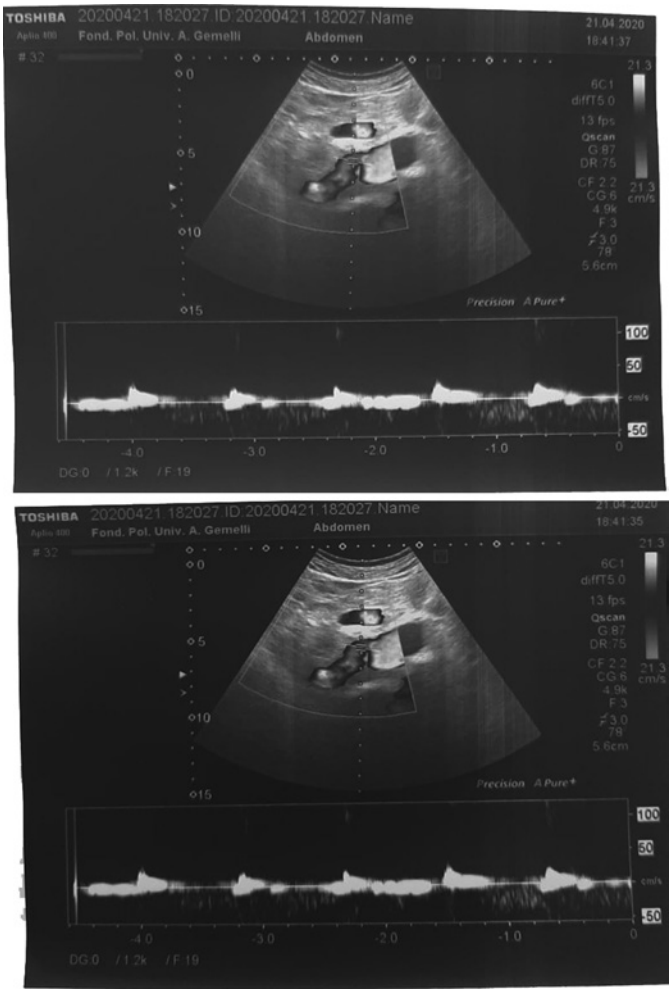

Fig. 4. Echo Doppler ultrasound of RA. RA, renal artery.

Discussion and Literature Review

RCCs and RAAs occurring simultaneously are an unusual clinical presentations. If both conditions affect the same kidney, the management could represent a challenging situation.

The majority of patients are asymptomatic, and the RAAs are discovered on cross-sectional imaging performed for evaluation of other conditions.

About 20 years ago, Hafez et al. [4] reported on the evolution of a single-institution case series on these topics, but in their series, there were gathered multiple vascular conditions reported as "renal artery diseases."

Among these patients, only 9 patients had a bilateral synchronous RCCs and RA diseases, but the latter were only atherosclerosis, and no one underwent surgical repair, and just 2 patients underwent percutaneous angioplasty before partial nephrectomy (PN).

In the literature, few cases of the ipsilateral coexistence of RAA and RCC are reported, as summarized in Table 1 [5–11]. However, in the majority of the cases reviewed, radical nephrectomy was performed for the coexistence of a normal contralateral kidney.

In a case series by Abreu et al. [11], outcomes of 9 RAA patients in whom the RAA correction was performed robotically were reported. Two patients of the series did have a simultaneous ipsilateral renal cancer, with PADUA scores 7 and 10 and with a benign histology in 1 case (angiomyolipoma).

They reported a median ischemia time for RAA correction of 26 (29–69) min. The authors themselves specify that the surgeons involved in these cases were high-volume robotic surgeons, with more than 2,000 procedures performed. There are no other cases reported in the

Table 1. Summary of cases of ipsilateral coexistence of RAA and RCC

Author	Age, years	Sex	Symptoms	Subtype of RCC	Treatment
Selli et al. [5]	56	M	Hypertension and hematuria	Clear cell type, T2N0M0	Radical nephrectomy
Selli et al. [5]	70	F	Hypertension	Clear cell type, T3N0M0	Radical nephrectomy
Takamizawa et al. [6]	63	F	Asymptomatic macrohematuria	Clear cell type, pT2b	Aneurysmectomy and PN
Yazawa et al. [7]	57	F	Hypertension	Clear cell type, pT2	Radical nephrectomy
Subramonian et al. [8]	49	M	Hematuria and loin pain	Unknown	Aneurysmectomy and PN
Casillas et al. [9]	49	M	Hypertension, chest pain, and history of abdominal pain	Papillary type, T1N0MX	Radical nephrectomy
Wang et al. [10]	57	M	Abdominal pain	Clear cell type, T1aN0M0	Radical nephrectomy
Abreu et al. [11]	nr	nr	nr	Angiomyolipoma Clear cell type (TNM not reported)	Partial nephrectomy and aneurysmectomy
Current case	69	M	Asymptomatic and bilateral renal masses	pT1b N0 MX papillary, Fuhrman 2	Aneurysmectomy and PN

nr, not reported; RCC, renal cell carcinoma; RAA, renal artery aneurysm; PN, partial nephrectomy.

literature of a minimally invasive simultaneous approach to renal mass and RAA, confirming the high complexity of these procedures moreover when performed in 1 surgical session.

Indications for RAA intervention include size >2 cm, female gender within childbearing age, symptoms (pain, hematuria, and medically refractory hypertension), thromboembolism, dissection, and rupture. In the literature, the total ischemia time of RAA repair ranges between 60 and 155 (median, 70) min and is even longer ex vivo (range, 140–450 min; median, 302 min) due to the complexity of the procedure.

In this case, 2 hilar clampings were needed, one for enucleation procedure and the other for the aneurysm repair. Even if not consecutive, a total time of warm ischemia was of about 18 min; taking into account the complexity of the procedure, we can consider it acceptable.

The contralateral RCC treatment, robotic PN, was performed 3 months from discharge. The pathology report revealed a T1a Clear Cell RCC. At the time of the second operation, serum Cr was stable at 1.81 mg/dL.

There is not any unique approach for patients with synchronous RAA and renal cancer. The treatment must be individualized and requires a multidisciplinary approach and a careful perioperative planning; however, concomitant PN and aneurysm repair is a feasible approach in this challenging scenario.

Statement of Ethics

The patient gave his written informed consent for the publication of all data and images.

Conflict of Interest Statement

The authors have no conflict of interest to declare.

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Author Contributions

N. Foschi and S. Sica: conception of the work and drafting of the manuscript. D. Nigro and P. Russo: acquisition of data. M. Ragonese, G. Tinelli, and L. Di Gianfrancesco: revision of the manuscript. Y. Thsomba and P.F. Bassi: supervision and final approval of the manuscript.

References

1 Klatte T, Wunderlich H, Patard JJ, Kleid MD, Lam JS, Junker K, et al. Clinicopathological features and prognosis of synchronous bilateral renal cell carcinoma: an international multicentre experience. BJU Int. 2007;100(1):21–5.

2 Blute ML, Itano NB, Cheville JC, Weaver AL, Lohse CM, Zincke H, et al. The effect of bilaterality, pathological features and surgical outcome in nonhereditary renal cell carcinoma. J Urol. 2003;169(4):1276–81.

3 Henke PK, Cardneau JD, Welling TH, Upchurch GR Jr, Wakefield TW, Jacobs LA, et al. Renal artery aneurysms: a 35-year clinical experience with 252 aneurysms in 168 patients. Ann Surg. 2001 Oct;234(4):454–3.

4 Hafez KS, Krishnamurthi V, Campbell SC, Novick AC. Contemporary management of renal cell carcinoma with coexistent renal artery disease: update of the cleveland clinic experience. Urology. 2000 Sep 1;56(3):382–6.

5 Selli C, Carini M, Turini D, Schifano A. Renal cell carcinoma associated with renal artery aneurysm. Report of two cases. Urol Int. 1983;38(6):374–7.

6 Takamizawa A, Hirano J, Watanabe H, Ishigohka M, Kawamura S. Conservative surgery of renal cell carcinoma associated with renal (artery) aneurysm in solitary kidney: a case report. Nihon Hinyokika Gakkai Zasshi. 1989;80:274–8.

7 Yazawa K, Nishimura K, Miura H, Honda M, Fujioka H. [Renal cell carcinoma associated with renal artery aneurysm]. Hinyokika Kiyo. 1997;43(5):343–5.

8 Subramonian K, Weston PM, Curley P. Multifocal renal cancer associated with renal artery aneurysm and a unique genetic change. Br J Urol. 1998;82(5):761–2.

9 Casillas RA, Romero L, Virgilio C. Coexisting renal cell carcinoma and renal artery aneurysm. Ann Vasc Surg. 2002;16(3):353.

10 Wang Z, Xiong W, Pan C, Zhu L, Wang P, Wang X, et al. Coexisting renal cell carcinoma and renal artery aneurysm: a case report and literature review. Exp Ther Med. 2015;9(6):2356–8.

11 Abreu A, Medina LG, Chopra S, Gill K, Cacciamani GE, Azhar RA, et al. Robotic renal artery aneurysm repair. Eur Urol. 2020 Jul;78(1):87–96.