

Oncology

Retroperitoneoscopic Partial Nephrectomy for a Horseshoe Kidney Tumor



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ABSTRACT

Horseshoe kidney is the most common renal fusion anomaly found in about 0.15% to 0.25% of the population. Renal cell carcinoma associated with a horseshoe kidney has been described in fewer than 200 cases. Its incidence and prognosis seems to be not different from those of the general population, but surgical management may be challenging due to unique anatomic features of horseshoe kidneys, such as highly variable vasculature. We report a case of a 69-year-old male with an incidental 48-mm solid mass in the left moiety of a horseshoe kidney, successfully treated by retroperitoneoscopic partial nephrectomy. © 2017 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Horseshoe kidneys are the most common renal fusion anomaly found in about 0.15% to 0.25% of the population, with a 2:1 ratio in men.^{1,2} Malignancies in the horseshoe kidney are rare, occurring in 5% to 13% of patients with these anomalies. Renal cell carcinoma (RCC) accounts for about 50% of tumors found in the horseshoe kidney. However, its incidence as well as prognosis appears to be not different from those of the general population.¹ To our knowledge, only four cases of laparoscopic nephron-sparing surgery for tumors in the horseshoe kidney have been published; two of them performed transperitoneally and the other two via a retroperitoneal approach. In this report, we describe the case of retroperitoneal laparoscopic partial nephrectomy for a solid renal mass in the left moiety of a horseshoe kidney.^{2–5}

Case presentation

A solid tumor in the left moiety of a horseshoe kidney was incidentally found in a 69-year old man on a routine abdominal ultrasound. Contrast-enhanced computed tomography (CT) with three-dimensional (3D) reconstruction identified a 48-mm enhancing lower-pole, posteriorly located mass in the left moiety of the horseshoe kidney (Figs. 1, 2). The tumor was limited to the kidney, without any evidence of metastasis or lymph node lesions.

There was no vascular or collecting system involvement. P.A.D.U.A. nephrometry score was 7p.

The patient was not a smoker. The medical history was notable for long-standing, well-controlled diabetes type 2 and hypertension. Preoperative serum creatinine was 84.3 $\mu\text{mol/L}$ and estimated glomerular filtration rate (eGFR) was 81 mL/min. The preoperative American Society of Anesthesiologists (ASA) score was 2. A retroperitoneal laparoscopic partial nephrectomy was used to remove the tumor.

Under general anesthesia, the patient was placed in a flank position and modified port placement template was used to establish a retroperitoneal access, with the camera port placed on the middle axillary line, an 11-mm trocar inserted in the anterior axillary line, and two 5-mm working ports distributed, respectively, on the anterior side and the posterior axillary line. Following opening of the Gerota's fascia, the main left renal artery – supplying mainly upper pole and left side of the isthmus area – was identified, clamped using a tourniquet, and the protruding renal mass was completely resected with monopolar scissors. The resected renal parenchyma was sutured in two layers, supported with surgical bolsters and absorbable hemostats. The specimen was extracted in an Endo-bag and a drain was left in place.

The operative time was 156 minutes, with warm ischemia time of 24 minutes. The estimated blood loss was 75 mL. The drain was removed on postoperative day 2 and the patient was discharged uneventfully on day 4. The pathologic examination of the specimen confirmed clear-cell RCC pT1b Fuhrman II, with negative surgical margins. At 6 months, follow-up CT was negative for local recurrence and metastasis. There was no evidence of

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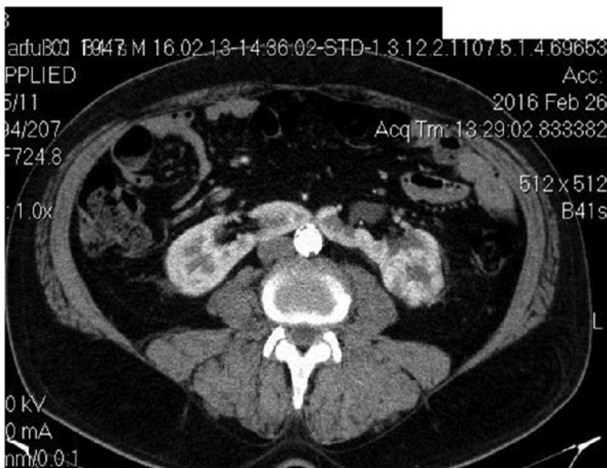


Figure 1. Axial contrast-enhanced abdominopelvic CT showing a 48-mm lower-pole mass in the left moiety of the horseshoe kidney.

collecting system obstruction and kidney function tests were normal.

Discussion

Tumors arising from kidneys with fusion anomalies are reported in 5% to 13% of the patients.¹ Renal cell carcinoma is the most commonly reported tumor of the horseshoe kidney, identified in about 50% of cases.^{1,2} While kidneys with fusion anomalies appear to have a higher risk of developing nephroblastomas and urothelial carcinoma, the incidence of RCC is no higher than that of the general population and prognosis depends on the same factors as in nonfused kidneys.¹

However, the unique anatomic features of horseshoe kidneys, such as highly variable vasculature, abnormal kidney position, the presence of the isthmus, and possible associated anomalies, can make surgery for a horseshoe kidney tumor technically challenging. Therefore, detailed preoperative radiological evaluation of these anatomical factors and proper surgical planning are essential.^{1–3,5}

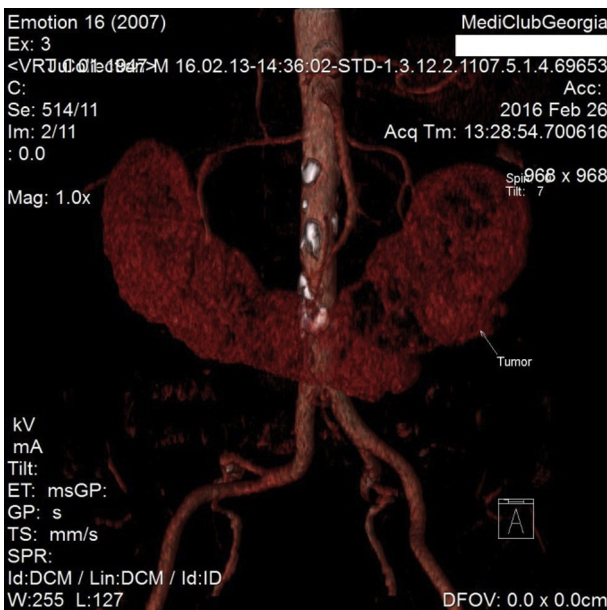


Figure 2. CT scan with three-dimensional reconstruction.

Table 1
Summary of literature.

Author	Year	Age, year	Sex	Side	Size, cm	Surgery	Operating Time, min	Estimated Blood Loss, mL	WIT, min	Pathology	Complications
Molina and Gill	2003	68	M	R	2	R-LPN	198	100	31	Hemorrhagic cyst	No
Tsivian et al	2007	62	F	R	2	T-LPN	210	70	NR	Oncocytoma	No
Lee et al	2011	21	F	L	4	R-LPN	186	490	28	Metanephric adenoma	No
Benidir et al	2014	58	M	R	4	T-LPN	180	200	25	RCC	No
Present case	2017	69	M	L	4.8	R-LPN	156	75	24	RCC	No

NR: Not reported; RCC: renal cell carcinoma; R-LPN: Retroperitoneal laparoscopic partial nephrectomy; T-LPN: Transperitoneal laparoscopic partial nephrectomy; WIT: Warm ischemia time.

Open radical heminephrectomy or partial nephrectomy has been used for most tumors involving kidneys with fusion anomalies. Recent series suggest they can be treated with partial nephrectomy, when feasible, with limited blood loss and preservation of renal function, but overall and major complication rates are reportedly relatively high.¹

With advances in minimally invasive surgery, the open surgical technique has been duplicated laparoscopically. To our knowledge, only four cases of laparoscopic partial nephrectomy for horseshoe kidney tumors have been published in the literature, first by Molina and Gill in 2003.⁵ Two of them reported the surgery performed transperitoneally and the other two via a retroperitoneal approach^{2–5} (Table 1).

Conclusion

The unique anatomic features of horseshoe kidneys, such as highly variable vasculature, abnormal kidney position, the isthmus, and possible associated anomalies, can make surgery for a horseshoe kidney tumor technically challenging. Therefore, detailed preoperative radiological evaluation of these anatomical factors and careful surgical planning are essential. Though technically difficult, laparoscopic nephron-sparing surgery seems feasible and can be considered in these scenarios.

Consent

Written informed consent for the publication of this case report and the accompanying images was obtained from the patient. A copy of the written consent in the patient's native language is available for review.

Conflicts of interest

None declared.

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