Clinical Case Report

Medicine

OPEN

Huge mucinous tubular and spindle cell carcinoma of kidney

A rare case report and literature review

Jun-Hua Du, MD, Li Zhang, MD, PhD, Chao-Zhao Liang, MD, PhD*

Abstract

Rationale: Mucinous tubular and spindle cell carcinoma (MTSCC) is a variant of renal cell carcinoma newly added to the WHO classification in 2004. It is a rare variant of renal cell carcinoma and sometimes it is not easy to distinguish MTSCC from papillary renal cell carcinoma, chromophobe renal cell cancer, etc. The prognosis of MTSCC is favorable after surgical resection.

Patient concerns: A 45-year-old male patient presented with a right renal mass that was detected on ultrasonography incidentally. The computed tomography scan showed a huge homogenous mass with patchy calcification in the central area, and the lesion was slightly enhanced after contrast injection.

Diagnoses: According to postoperative pathology, the patient was diagnosed with MTSCC.

Interventions: The patient underwent an open transabdominal radical resection of right kidney and right retroperitoneal lymph node dissection.

Outcomes: The surgical outcomes were good, and no recurrence or metastasis was observed during the follow-up.

Lessons: MTSCC is a rare malignancy of the kidney and the prognosis is usually favorable. Preoperative enhanced CT and MRI can help differentiate MTSCC from other renal tumors, so as to provide a more suitable surgical approach for those who need to retain renal function as much as possible.

Abbreviations: ADC = apparent diffusion coefficient, CT = computed tomography, MRI = magnetic resonance imaging, MTSCC = mucinous tubular and spindle cell carcinoma, PET/CT = positron emission tomography-computed tomography.

Keywords: computed tomography, magnetic resonance imaging, mucinous tubular and spindle cell carcinoma, pathological features, surgery

1. Introduction

MTSCC is a variant of renal cell carcinoma newly added to the WHO classification in 2004. It is relatively rare in clinical treatment. Up to now, only about 100 cases have been reported worldwide, accounting for less than 1% of renal cell carcinoma.[1] Most of the reported cases received surgical resection, and compared with other variants of renal cell carcinoma, MTSCC has a favorable prognosis, and the recurrence and metastasis are rarely seen after resection.[2,3] Sometimes it is not easy to distinguish MTSCC from other types of renal cell carcinoma such as papillary renal cell carcinoma, chromophobe cell carcinoma and collecting duct carcinoma, and the differential diagnosis mainly relied on histopathologic examination.[4,5] There are limited studies on imagine features preoperatively.[2,6–8] Herein, we report a case of MTSCC of kidney, review the relevant literature, and analyze its clinical manifestations, imaging features and pathological features, expecting to provide help for the diagnosis of the tumor.

2. Case report

A 45-year-old male patient presented with a right renal mass that was detected on ultrasonography incidentally. There were no symptoms of right flank pain, fever, hematuria, anorexia, or weight loss. There was no significant past medical history and the physical examination revealed normal findings. The laboratory indices were unremarkable. The unenhanced computed tomography (CT) image revealed a huge ovoid mass (34 HU, 79.5 mm × 91.8 mm) compressing the right renal pelvis, and the tumor was homogenous with patchy calcification in the central area. With contrast injection, the lesion was slightly enhanced at the arterial phase (37 HU) and showed maximum enhancement at the excretory phase (50 HU), and renal cell carcinoma was considered (papillary renal cell carcinoma or chromophobe renal cell carcinoma, probably) (Fig. 1).

Transabdominal radical resection of right kidney and right retroperitoneal lymph node dissection were performed under general anesthesia. The kidney was cut open along the opposite side of the renal hilus, and we found a tumor of grayish white, red

Editor: N/A.

The authors have no conflicts of interest to disclose.

Department of Urology, The First Affiliated Hospital of Anhui Medical University, Hefei, Anhui, China.

* Correspondence: Chao-Zhao Liang, Department of Urology, The First Affiliated Hospital of Anhui Medical University, Jixi Road No. 218, Hefei 230022, Anhui, China (e-mail: liang_chaozhao@ahmu.edu.com).

Medicine (2018) 97:43(e12933)

Received: 14 June 2018 / Accepted: 25 September 2018

http://dx.doi.org/10.1097/MD.0000000000012933

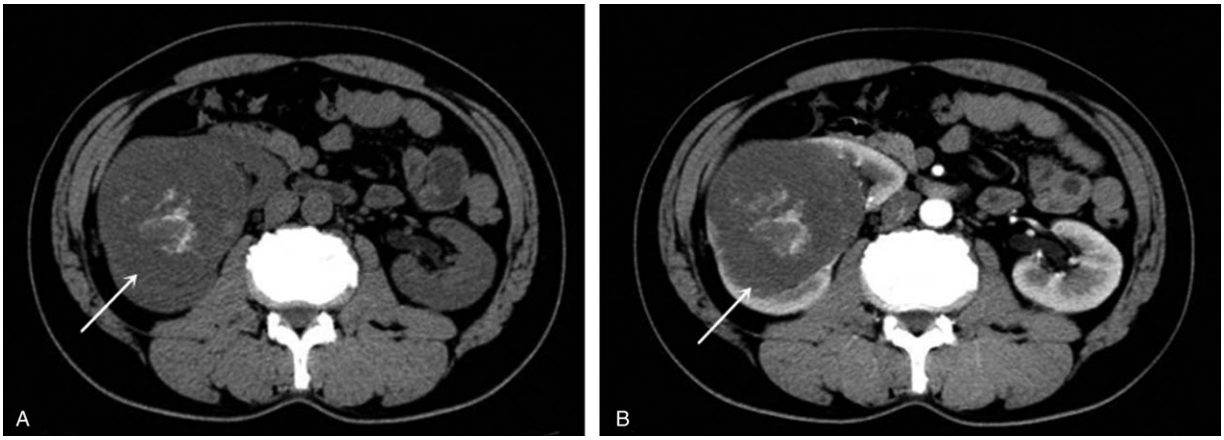

Figure 1. (A) Axial unenhanced CT-scan revealed a huge homogenous mass with patchy calcification in the central area (arrow). (B) Axial enhanced CT-scan showed the lesion (arrow) was slightly enhanced at the arterial phase after contrast injection.

and yellow colors from inside out at the middle and lower part of the kidney. It was of medium density with local necrosis (Fig. 2).

Under the microscope, the tumor cells were found in cord-like and nested arrangement, distributed in the myxoid stroma. The tumor cells, relatively uniform in size and shape, had a small spindle shape, with a relatively large hyperchromatic nucleus and rare nuclear mitoses. They consisted of many interstitial blood vessels, and focal hemorrhage and necrosis (Fig. 3). No tumor involvement was found in the ureter, vascular margins and the adrenal gland, and no tumor metastasis was detected in resected lymph nodes. Immunohistochemistry showed positive reactivity for CK7, CK18, pax-8, EMA, vimentin, CK19, CAIX, P504S, ki67 (5%). The tumor cells were negative for CD15, CD10, RCC, CD117, S-100, P63, and CK5/6. Based on morphologic and immunohistochemical markers, we determined that the patient had mucinous tubular and spindle cell carcinoma (MTSCC).

There was no evidence of recurrence or metastasis in 4-month follow-up. Informed written consent was obtained from the patient for publication of this case report and accompanying images.

3. Discussion

MTSCC is a rare and unusual variant of renal cell carcinoma. The age of onset is very widely distributed. It has been reported in people from 13 to 82 years old, but it is more prevalent among middle-aged people over 50 years old. It is relatively more prevalent among females. The incidence ratio of male to female is about 1:3-4.[4]

Most patients with MTSCC have no significant clinical manifestations.[9] The disease is mostly found accidentally during physical examinations or examinations for other diseases. If the tumor size is large, some patients may also have lumbar and abdominal pain, abdominal masses, or gross hematuria.[7]

As most MTSCC patients have good prognosis, the recurrence and metastasis are less likely to occur after surgical resection of the tumor.[2,3] Therefore, for patients with a large tumor and nephron-sparing surgery indication (such as contralateral renal insufficiency or certain benign diseases of the contralateral kidney), if the MTSCC can be diagnosed by imaging examination preoperatively, nephron-sparing surgery should be performed. It is helpful for the protection of renal function for this group of

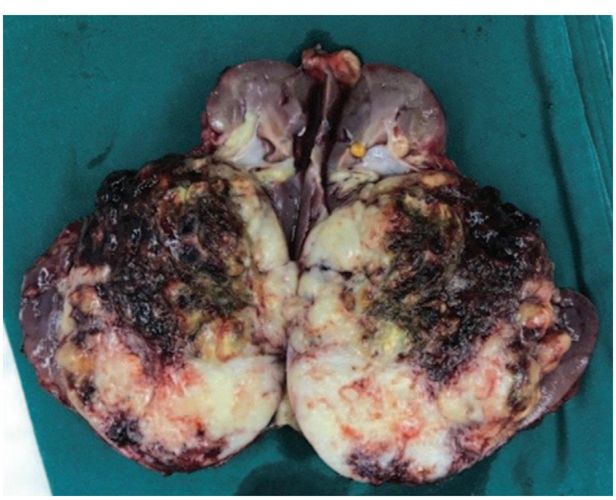

Figure 2. Gross specimen of the nephrectomy showed a huge mass with foci of necrosis.

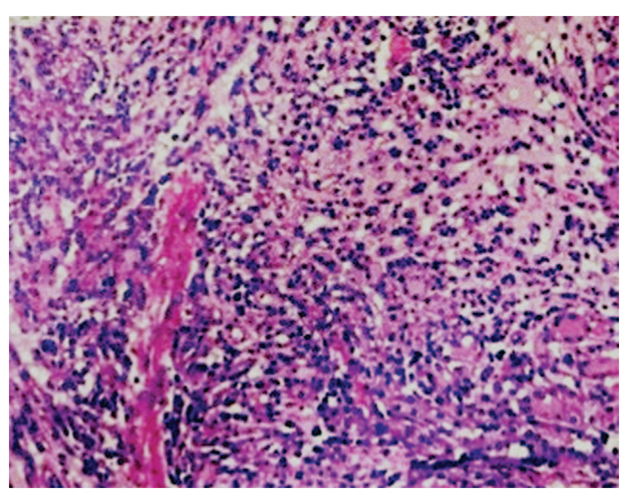

Figure 3. The tumor cells were found in cord-like and nested arrangement, distributed in the myxoid stroma (HE, ×200).

Table 1

Comparison of the CT attenuation of MTSCC and adjacent renal cortex.

	Number of cases	Unenhanced		Arterial		Corticomedullary		Delayed	
		MTSCC	Cortex	MTSCC	Cortex	MTSCC	Cortex	MTSCC	Cortex
Cornelis et al[6]	17	26.5		40		59		58	
Kenney et al[2]	19	36	33	67	191	89	187	76	151
Wu et al[8]	21	32.3	35.1	49.2	189.7	69.9	199.8	59.2	107.8
Zhu et al[7]	17	32.3	36.3	49.6	172.3	69.7	196.7	56.7	129.7
Our case	1	34	32	37	140	42	145	50	136

MTSCC = mucinous tubular and spindle cell carcinoma.

patients after surgery. If the MTSCC cannot be diagnosed by the imaging examination, biopsy may be adopted for diagnosis.[10]

There are limited studies on the CT features of MTSCC at present.[2,6–8] The CT scan shows that MTSCC generally does not infringe on the renal pelvis and perirenal tissue, and there is no swelling of the lymph nodes. The unenhanced CT scan shows that tumors are generally of uniform density, but sometimes there is bleeding or calcification in the tumor. The tumors are generally slowly heterogeneously enhanced after injection of contrast agent. But tumors with diameters less than 5 cm are generally homogeneously enhanced, and the degree of tumor enhancement is generally less than that of the cortex in the same period.[6] Zhu et al[7] studied the CT features of 17 cases of patients with MTSCC. They found that 5/17 of the patients had cystic or necrotic components, 3/17 had calcifications, and 14/17 of patients' tumors had a poorly defined margin. They summarized the CT features of MTSCC as follows: the center of the tumor is located in the medulla of the kidney; isodense on unenhanced CT, poorly defined margin, and less enhancement than the cortex and medulla on all phases (Table 1). Sometimes it's not easy to distinguish MTSCC from papillary renal cell carcinoma, chromophobe cell carcinoma and collecting duct carcinoma on the CT scan.

(1) MTSCC and papillary renal cell carcinoma are both hypovascular tumors. Papillary renal cell carcinoma generally shows homogeneous on the CT scan. In contrast, MTSCC generally shows heterogeneity.[6] Besides, papillary renal cell carcinoma can occur simultaneously in multiple distributions or in bilateral kidneys, and the diameter of the tumor is generally less than 2 cm.[7]
(2) The enhancement of chromophobe cell carcinoma is more obvious than that of MTSCC, and is similar to the enhancement of renal medulla; if the tumor is large, radial or spoke-like enhancement is common.[11]
(3) Collecting duct carcinoma is generally presented as a heterogeneous hypodense mass on unenhanced CT scan, which can be accompanied by calcification or cystic components; its enhancement is generally more obvious than that of MTSCC, and its margin is poorly defined; it tends to infiltrate into the renal pelvis or renal vein, and there are manifestations of lymph node or distant metastasis.[7,12]

There are relatively fewer studies on the magnetic resonance imaging (MRI) features of MTSCC. According to the multicenter study by Cornelis et al,[6] compared with the adjacent renal cortex, MTSCC shows mostly heterogeneously intermediate to high signal on the T2-weighted imaging. The tumor shows high signal intensity in diffusion-weighted imaging, while the apparent diffusion coefficient (ADC) of tumors is generally low. The papillary renal cell carcinoma generally shows homogenously low signal intensity on T2-weighted imaging. Therefore, for papillary renal cell carcinoma, especially the low-grade papillary renal cell carcinoma, it is not easy to differentiate from MTSCC with CT scan, MRI could help for differentiation.

In addition, there have been a small number of reports on the contrast-enhanced ultrasonography and PET/CT used for the diagnosis of MTSCC. MTSCC is hypoechoic, and Doppler shows no significant blood flow signals. There are a few blood flow signals around the mass, and the contrast-enhanced ultrasonography clearly shows slight enhancement.[13] Contrast-enhanced ultrasonography can be applied to patients who cannot receive the enhanced CT or MRI examination. Besides, it has the advantages of being safe, simple, and well-tolerated by patients; it has the real-time imaging, with no radiation exposure or nephrotoxicity, and it has a good presentation of blood flow and its distribution, etc. Although the standard uptake value of MTSCC on PET/CT is high, because ^{18}F-FDG is excreted by urine, it is likely to produce a false-negative result.[14,15] Nevertheless, PET/CT can help to detect systemic metastasis and lymph node metastasis.

The typical pathological changes of MTSCC are that the cuboidal and spindle cells are arranged into tubular and cord-like shapes, floating in the mucous background.[16] These features can also be seen in the case presented in the present study. Sometimes under the microscope, it is not easy to differentiate MTSCC from type-1 papillary renal cell carcinoma, and further immunohistochemistry may help for diagnosis. Low-molecular weight keratins such as CK8, CK18, and CK7 are positive in MTSCC.[16] According to the study by Zhao and He,[4] the tumor cells were highly positive for EMA and AMACR, while negative for CD10 and CD15 mostly. Paner et al[5] studied the immunohistochemical features of 20 cases of MTSCC and 27 cases of papillary renal cell carcinoma. They found the immunoreactivity in MTSCC was AMACR 93%, CK7 81%, EMA 95%, RCC Ma 7%, CD10 15%, HMWK 15%, and c-kit 5%, and in papillary renal cell carcinoma was AMACR 95%, CK7 65%, EMA 88%, RCC Ma 25%, CD10 80%, HWMK15%, and c-kit 18%. Sarsik et al[17] have reported the immunoreactivity in MTSCC was AMACR 100%, CK7 100%, CK19 100%, RCC Ma 50%, CD10 11%, and KspCad 38% while the values for papillary renal cell carcinoma were AMACR 100%, CK7 90%, CK19 100%, RCC Ma 100%, CD10 80%, and KspCad 0%. Similar to these studies, the immunohistochemical staining profile of MTSCC is positive for CK7, CK18, CK19, and EMA and negative for CD15 and CD10 in our case.

MTSCC is generally a low-grade malignant tumor. Recurrence and metastasis are rarely seen after radical nephrectomy or nephron-sparing surgery. However, there are reports about

MTSCC with sarcomatoid differentiation which has recurrence and metastasis discovered in follow-up after surgery.[2,6,18] And there are even reports about low-grade MTSCC which has postoperative recurrence and metastasis.[6] Therefore, close follow-up are necessary for patients with MTSCC after surgery. Unlike metastatic renal clear cell carcinoma, which can be treated with sunitinib and other targeted drugs, there is no effective treatment for MTSCC with systemic metastases. Only 1 case of metastatic MTSCC is reported to be effectively treated with sunitinib.[19]

4. Conclusion

MTSCC is a rare malignancy of the kidney. Preoperative enhanced CT and MRI can help differentiate it from other renal tumors. Biopsy can be performed when necessary. So as to provide a more suitable surgical approach for those who need to retain renal function as much as possible. Patients generally have a good prognosis after surgical resection, but they are suggested to have long term follow-up.

Author contributions

Project administration: Jun Hua Du.
Resources: Jun Hua Du.
Supervision: ChaoZhao Liang.
Writing – original draft: Jun Hua Du.
Writing – review & editing: Li Zhang, ChaoZhao Liang.
Jun Hua Du orcid: 0000-0003-2064-843X.

References

[1] Lopez-Beltran A, Scarpelli M, Montironi R. 2004 WHO classification of the renal tumors of the adults. Eur Urol 2006;49:798–805.
[2] Kenney PA, Vikram R, Prasad SR, et al. Mucinous tubular and spindle cell carcinoma (MTSCC) of the kidney: a detailed study of radiological, pathological and clinical outcomes. BJU Int 2015;116:85–92.
[3] Hussain M, Ud Din N, Azam M, et al. Mucinous tubular and spindle cell carcinoma of kidney: a clinicopathologic study of six cases. Indian J Pathol Microbiol 2012;55:439–42.
[4] Zhao M, He XL. Mucinous tubular and spindle cell renal cell carcinoma: a review of clinicopathologic aspects. Diagn Pathol 2015;10:168.
[5] Paner GP, Srigley JR, Radhakrishnan A, et al. Immunohistochemical analysis of mucinous tubular and spindle cell carcinoma and papillary renal cell carcinoma of the kidney: significant immunophenotypic overlap warrants diagnostic caution. Am J Surg Pathol 2006;30:13–9.
[6] Cornelis F, Ambrosetti D, Rocher L, et al. CT and MR imaging features of mucinous tubular and spindle cell carcinoma of the kidneys. A multi-institutional review. Eur Radiol 2017;27:1087–95.
[7] Zhu Q, Zhu W, Wang Z. Clinical and CT imaging features of mucinous tubular and spindle cell carcinoma. Chin Med J (Engl) 2014;127:1278–83.
[8] Wu J, Zhu Q, Zhu W, et al. Comparative study of CT appearances in mucinous tubular and spindle cell carcinoma and collecting duct carcinoma of the kidney. Br J Radiol 2015;88:20140434.
[9] Luciani LG, Cestari R, Tallarigo C. Incidental renal cell carcinoma-age and stage characterization and clinical implications: study of 1092 patients (1982–1997). Urology 2000;56:58–62.
[10] Leveridge MJ, Finelli A, Kachura JR, et al. Outcomes of small renal mass needle core biopsy, nondiagnostic percutaneous biopsy, and the role of repeat biopsy. Eur Urol 2011;60:578–84.
[11] Kondo T, Nakazawa H, Sakai F, et al. Spoke-wheel-like enhancement as an important imaging finding of chromophobe cell renal carcinoma: a retrospective analysis on computed tomography and magnetic resonance imaging studies. Int J Urol 2004;11:817–24.
[12] Pickhardt PJ, Siegel CL. Collecting duct carcinoma of the kidney: are imaging findings suggestive of the diagnosis? AJR Am J Roentgenol 2001;176:627–33.
[13] Zhang Q, Wang W, Zhang S, et al. Mucinous tubular and spindle cell carcinoma of the kidney: the contrast-enhanced ultrasonography and CT features of six cases and review of the literature. Int Urol Nephrol 2014;46:2311–7.
[14] Öztürk H. Renal mucinous tubular and spindle cell carcinoma and 18F-fluorodeoxyglucose-PET/CT findings. Clin Genitourin Cancer 2014;12:e161–6.
[15] Furuya S, Manabe O, Nanbu T, et al. Renal mucinous tubular and spindle cell carcinoma shows a high uptake on 18F-FDG PET/CT. Intern Med 2018;57:1131–4.
[16] Srigley JR, Delahunt B, Eble JN, et al. The International Society of Urological Pathology (ISUP) vancouver classification of renal neoplasia. Am J Surg Pathol 2013;37:1469–89.
[17] Sarsik B, Sımşır A, Karaarslan S. Mucinous tubular and spindle cell carcinoma of kidney and problems in diagnosis. Turk Patoloji Derg 2011;27:116–26.
[18] Thway K, du Parcq J, Larkin JM, et al. Metastatic renal mucinous tubular and spindle cell carcinoma. Atypical behavior of a rare, morphologically bland tumor. Ann Diagn Pathol 2012;16:407–10.
[19] Larkin J, Fisher R, Pickering L, et al. Metastatic mucinous tubular and spindle cell carcinoma of the kidney responding to sunitinib. J Clin Oncol 2010;28:e539–40.