Renal cell carcinoma with a pelvicalyceal system tumor thrombus: a case report

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Case report

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Abstract

Background

Renal cell carcinoma (RCCs) is the most common malignancy of the kidney. When RCC progresses, it is known to form tumor thrombus in the renal vein and/or inferior vena cava. However, RCC does not normally form tumor thrombus in the pelvicalyceal system.

Case presentation

A 56-year-old man presented to our department for the treatment of a renal tumor with asymptomatic gross hematuria. In a dynamic CT study, contrast enhancement revealed a tumor suspected to be RCC, but atypical finding as a tumor thrombus that filled the pelvicalyceal system was also observed. Nephroureterectomy was performed, and the tumor was diagnosed histopathologically as clear cell RCC and papillary RCC.

Conclusion

We report a rare case of RCC directly invading the pelvicalyceal system as a thrombus mass, with no microscopic individual tumor implants in the pelvicalyceal system wall, invasion of the renal vein, or invasion of adjacent organs. To our knowledge, only six such cases have been reported in English literature, and as a result, very few theories explaining pelvicalyceal system invasion have been presented. This highlights the significance of adding invasion of the pelvicalyceal system as part of the most recent, updated tumor metastases classification.

Background

Renal cell carcinoma (RCC) and adenocarcinoma account for about 85% of all solid neoplasms of the kidney[1], Advances in imaging technology have dramatically increased the incidence of all stages of RCC [2]. Goetzl et al. [3] reported that 51%-56% of renal cortical tumors are diagnosed incidentally. In 1978, the TNM system, which was first used for staging RCC, was adopted by the Union Internationale Contrele Cancer (UICC) [4]. Identification of the prognostic factors for RCC is critical for analyzing patient survival as well as for evaluating treatment options. Several studies have revealed that the TNM stage is the most important prognostic factor[5]. Several revisions of the TNM system have been made by UICC and the American Joint Committee on Cancer (AJCC). RCC with a pelvicalyceal system tumor thrombus is rare, although a vein tumor thrombus is not uncommon in RCC. So far, it has been described in six English-language literatures [6]. Urinary Collecting System Invasion (UCSI) of RCC including tumor thrombus in the renal pelvis and/or ureter has not been classified in the UICC TNM classification because of less frequency [7]. The role of pelvicalyceal system tumor thrombus in prognosis is still undetermined.

What's more, RCC with pelvicalyceal system tumor thrombus is often misdiagnosed as transitional cell carcinoma (TCC) preoperatively. However, a correct preoperative or intraoperative diagnosis is very

important to decide surgical strategy. And, one of the most important challenges in the treatment of non-metastatic RCC patients is the detection of patients at risk for disease recurrence in order to tailor follow-up protocols and to assign these patients to potential adjuvant treatment protocols.

A thorough review of the medical literature reveals almost no data for the Chinese population. Consequently, We present a rare case of RCC, and we hope that it should be help to understand whether the presence of the pelvicalyceal system tumor thrombus plays a role in predicting patient survival.

Case Presentation

A 58-year-old man who had a history of a chief complaint of asymptomatic gross hematuria without relevant comorbidities. A left renal tumor was suspected based on plain abdominal CT, and he was referred to our department. Physical examination revealed no abnormality in the chest, the abdomen or the extremities. Laboratory data on admission revealed mild renal function impairment (white blood cell count [WBC] $6.0 \times 10^9/L$, hemoglobin [Hb] 161 g/L, percentage of neutrophil cell 71%, platelet count [PLT] $276 \times 10^9/L$, blood urea nitrogen [BUN] 7.6 mmol/L, creatinine [Cr] 121 $\mu\text{mol/L}$, C-reactive protein [CRP] 156.7 mg/L. Urinalysis showed microscopic hematuria.

A dynamic CT study revealed a tumor (5.2×5.4 cm in diameter) in the lower pole of the left kidney (Figs. 1A) and which showed contrast enhancement in the early phase and extended into the left pelvicalyceal system (Figs. 1B, 1C) on 15 May 2020. And para-aortic lymph nodes enlargement were observed (Fig. 1D). In addition, No obvious distant metastasis was observed on chest CT or bone scanning. Cystoscopy revealed no obvious tumorous lesion. The tumor was diagnosed as left RCC (cT3aN0M0), and transabdominal laparoscopic radical left nephroureterectomy and hilar lymph node dissection were performed. Also total ureterectomy was additionally performed, although intraoperative histopathological examination could rule out urothelial carcinoma. Histopathological examination: The macroscopic findings of the excised tumor were a yellow color, and hemorrhage and necrosis were observed in its interior. There was cord-shaped tumor thrombus extending into pelvicalyceal system (Fig. 2). Histologically, clear cell RCC with severe necrosis, invasion and proliferation were observed (Fig. 3A, 3B), and papillary RCC (Fig. 3C, 3D). And no RCC was observed in lymph node. Immunostaining was positive for CD10 EMA and vimentin (Fig. 4A, 4B, 4C), negative for P504S (Fig. 4D). According to these findings, the tumor was diagnosed as clear cell RCC and papillary RCC (pT3apN0). No malignancy was observed in the surrounding renal pelvic or ureteral mucosa.

Discussion And Conclusion

This case report presented a patient with thrombus-like tumor of renal cell carcinoma like transitional cell carcinoma of kidney. This presents difficulty in differentiating between RCC and renal pelvis transitional cell carcinoma. To the best of our knowledge, our case is the first reported pelvicalyceal system tumor thrombus in RCC in China.

Involvement of the urinary collecting system by renal cell carcinoma is rare in the absence of other poor prognostic features associated with the primary tumor. Clear cell carcinoma most commonly invades, while invasion by papillary tumors is rare. Due to the rarity of cases involving thrombus-like tumor into pelvicalyceal system, current staging system does not mention the importance of collecting system involvement in the TNM classification [8]. This case has unique pathology of mixed RCC between clear cell and papillary RCC, which extends into the collecting system without invading adjacent organs or extending outwards from the pelvicalyceal system wall.

On abdominal CT, the mass seems only filled renal pelvis, however it was found on macroscopic examination that the pelvicalyceal system were also filled by tumor thrombus, this phenomenon was very unique because the tumor thrombus filled the pelvicalyceal lumen instead of invading it.

In 2007, Gulati et al. reported the only other case of RCC that directly invaded from the renal pelvis into the ureter and formed a tumor thrombus [6]. A tumor thrombus is thought to advance into the vein due to pressure in the vein and the renal pelvis. Gulati et al. reported that venous pressure was increased due to the renal vein tumor thrombus and lymph node compression [6]. In the patient in this present report, there was neither microscopic venous invasion nor tumor thrombus in the renal vein, and no massive lymph node metastasis that was large enough to increase the venous pressure. Therefore, the tumor thrombus was thought to have spontaneously spread directly into the pelvicalyceal system.

Uzzo et al reported that no case of local involvement of the ureter by tumor was identified in 61 cases with UCSI [9]. It is controversial that whether UCSI should be added into TNM classification [10, 11], however most reported UCSI of RCC to be a significant predictor of prognosis [9–12]. Thus, the case in the present report is very rare and must be followed up carefully.

In such cases, it is very important to make a correct preoperative diagnosis of the tumor type because the operative methods of TCC and RCC are different. Nephroureterectomy is suggested for treatment of TCC while nephrectomy for RCC [13]. Based on preoperative examinations including imaging procedures, we had difficulty to differentiate it from renal pelvis transitional cell carcinoma. Thus, this case required careful consideration regarding surgery. Finally nephroureterectomy was performed, including resection of the ureter.

Antiangiogenic targeted therapy agents, usually consisting of multi-kinase inhibitors, have been used successfully to treat renal cell carcinomas [14]. Although the present results didn't very clearly show that collecting-system invasion are poor prognostic factor, we think that this patient should have access to targeted tyrosine kinase (TKI) or mammalian target of rapamycin (mTOR) inhibitor treatment after operation.

RCC with pelvicalyceal system tumor thrombus is rare. A correct preoperative or intraoperative diagnosis is very important to decide surgical strategy. Intraoperative frozen section is recommended. Laparoscopic radical nephroureterectomy is a safe and feasible operative method in treatment of RCC with a pelvicalyceal system tumor thrombus. All of the patients were treated with targeted tyrosine kinase (TKI)

or mammalian target of rapamycin (mTOR) inhibitor. It should be studied that a revised stage including patients with collecting-system invasion with tumor thrombus might improve its prognostic validity.

Abbreviations

BUN: Blood urea nitrogen; Cr: Creatinine; CRP: C-reactive protein; CT: Computed tomography; Hb: Hemoglobin; UCSI: Urinary Collecting System Invasion; UICC: Union Internationale Contrele Cancer; AJCC: American Joint Committee on Cancer; TCC: transitional cell carcinoma; TKI: tyrosine kinase; mTOR: mammalian target of rapamycin.

Declarations

Availability of data and materials

All necessary information about this case report was presented in the manuscript. Raw data regarding our patients are not publicly available due to the respect and protection of our patients' privacy but are available from the corresponding authors upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Written informed consent was obtained from the patients for the publication of this case report and any accompanying images.

Ethics approval and consent to participate

This report was approved by the Ethical Committee of Strategic Support Force Characteristic Medical Center, and written informed consent was obtained from the patients.

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Authors' contributions

G liu and J-K Li designed the case report. J-K Li wrote the manuscript. Z-G Cui revised the manuscript. L Chao, X-Y Liu, Y Xiang and J-K Li performed the operations. R Chen, X-T Song, W-T Han and H-Z Qi

collected the data and searched the literatures. All authors discussed the cases and commented on the manuscript. All authors read and approved the final manuscript.

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References

1. Li M, Shi A, Kong W, Zhang J, Chen Y, Huang J, Huang Y: **Transitional cell carcinoma with extension of the renal vein and IVC tumor thrombus: report of three cases and literature review.** *World journal of surgical oncology* 2016, **14**(1):309.
2. Chow WH, Devesa SS, Warren JL, Fraumeni JF, Jr.: **Rising incidence of renal cell cancer in the United States.** *Jama* 1999, **281**(17):1628-1631.
3. Goetzi MA, Desai M, Mansukhani M, Goluboff ET, Katz AE, Sawczuk IS, Benson MC, Olsson CA, McKiernan JM: **Natural history and clinical outcome of sporadic renal cortical tumors diagnosed in the young adult.** *Urology* 2004, **63**(1):41-45.
4. Chang Y-H, Chuang C-K, Pang S-T, Wu C-T, Chuang K-L, Chuang H-C, Liao S-K, 廖育亨, 莊國榮, 龐士廷 *et al.* **Prognostic value of TNM stage and tumor necrosis for renal cell carcinoma.** *The Kaohsiung journal of medical sciences* 2011, **27**(2):59-63.
5. Chang Y-H, Chuang C-K, Pang S-T, Wu C-T, Chuang K-L, Chuang H-C, Liao S-K: **Prognostic value of TNM stage and tumor necrosis for renal cell carcinoma.** *The Kaohsiung journal of medical sciences* 2011, **27**(2):59-63.
6. Gulati M, Gore JL, Pantuck AJ, Kim Y, Barajas L, Rajfer J: **Ureteral tumor thrombus from renal cell carcinoma extending into bladder.** *Urologic oncology* 2007, **25**(5):393-395.
7. Fujita O, Wada K, Yamasaki T, Manabe D, Takeda K, Nakamura S: **Renal cell carcinoma with a tumor thrombus in the ureter: a case report.** *BMC urology* 2011, **11**:16.
8. Rouprêt M, Babjuk M, Compérat E, Zigeuner R, Sylvester RJ, Burger M, Cowan NC, Böhle A, Van Rhijn BW, Kaasinen E *et al.* **European Association of Urology Guidelines on Upper Urinary Tract Urothelial Cell Carcinoma: 2015 Update.** *European urology* 2015, **68**(5):868-879.
9. Uzzo RG, Cherullo E, Myles J, Novick AC: **Renal cell carcinoma invading the urinary collecting system: implications for staging.** *The Journal of urology* 2002, **167**(6):2392-2396.
10. Verhoest G, Avakian R, Bensalah K, Thuret R, Ficarra V, Artibani W, Tostain J, Guille F, Cindolo L, De La Taille A *et al.* **Urinary collecting system invasion is an independent prognostic factor of organ**

confined renal cell carcinoma. *The Journal of urology* 2009, **182**(3):854-859.

11. Waalkes S, Merseburger AS, Herrmann TR, Kramer MW, Wegener G, Rustemeier J, Hofmann R, Kuczyk MA, Schrader AJ: **Urinary collecting system invasion is no independent prognostic factor in renal cell carcinoma.** *World journal of urology* 2010, **28**(3):283-288.
12. Klatte T, Chung J, Leppert JT, Lam JS, Pantuck AJ, Figlin RA, Belldegrun AS: **Prognostic relevance of capsular involvement and collecting system invasion in stage I and II renal cell carcinoma.** *BJU international* 2007, **99**(4):821-824.
13. Juan YS, Jang MY, Shen JT, Chou YH, Huang CH, Hsieh TJ: **Transitional cell carcinoma of the renal pelvis with extension into the inferior vena cava: a report of two cases.** *The Kaohsiung journal of medical sciences* 2003, **19**(7):362-367.
14. Escudier B, Porta C, Schmidinger M, Rioux-Leclercq N, Bex A, Khoo V, Gruenvald V, Horwich A: **Renal cell carcinoma: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up.** *Annals of oncology : official journal of the European Society for Medical Oncology* 2016, **27**(suppl 5):v58-v68.

Figures

Figure 1

Horizontal section of the preoperative contrast-enhanced abdominal CT scan showing a large, heterogeneously enhancing soft tissue mass arising from the lower pole of the left kidney (A, arrow). A tumor thrombus in the left pelvicalyceal system (B, C, arrow), and lymph node (D, arrow).

Figure 2

The cut surface of the bisected kidney showing a large, solid, tumor in the lower pole of the left kidney with hemorrhage and necrosis. The macroscopic findings of the long tumor thrombus in the pelvicalyceal system.

Figure 3

Histologic examination. Two types of tumor found: clear cell (A and B) and papillary cell (C and D). (A, B and C; HE, x100), (D; HE, x200).

Figure 4

Immunohistochemistry examination. CD10 (A), EMA (B) and vimentin (C) was positive. negative for P504S (D). (A, B, C and D; x200).

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