Case Report

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Renal Clear Cell Carcinoma with Isolated Metastasis to Ipsilateral Perirenal Fat: A Case Report

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ABSTRACT

Renal cell carcinoma (RCC) is a common renal malignancy, and renal clear cell carcinoma is the most common pathological type of renal cancer, and its main metastatic pathways are hematogenous metastasis and lymphatic metastasis, which mainly metastasize to the regional lymph nodes, lungs, livers, bones, and brains. However, metastasis of renal cell carcinoma to perirenal fat is very rare. We report a case of renal clear cell carcinoma with isolated metastasis to ipsilateral perirenal fat which is the first case in the world.

Keywords: Renal Clear Cell Carcinoma; Perirenal Fat; Metastasis

Abbreviations: RCC: Renal Cell Carcinoma; ccRCC: Clear Cell Renal Cell Carcinoma; PAT: Perirenal Adipose Tissue; WAT: White Adipose Tissue; PTHrP: Parathyroid Hormone Related Protein; PKA: Proteinkinase A

Background

Renal cell carcinoma (RCC) is a common renal malignant tumor, and its pathological type is mainly clear cell renal cell carcinoma (ccRCC), accounting for about 70%-80% of RCC [1]. Renal carcinoma is a tumor with abundant blood supply and abundant lymphatic drainage. The main routes of metastasis are hematogenous metastasis and lymphatic metastasis, mainly to regional lymph nodes, lung, liver, bone and brain. Simple perirenal fat metastases are extremely rare, and the reported perirenal fat metastases are all contralateral. We report a case of renal clear cell carcinoma with isolated ipsilateral perirenal fat metastasis, which is the first case in the world.

Case Data

A 51-year-old male patient was admitted to hospital on September 15, 2022, mainly due to painless gross hematuria throughout the course of 1 day. The hematuria was dark red, no blood clots, intermittent attacks, accompanied by dysuria and discomfort, manifested as endless urine, urine waiting, no obvious lumbar pain and discomfort, no fever, chills and discomfort. Healthy in the past, smoking history of more than 20 years, 30 cigarettes/day. Other marital and family history is not special. Then he went to the local hospital and underwent urinary ultrasound. The result showed that the left kidney was heterogeneous hypoechoic mass (considering space occupation), the size of which was about 8cm. After admission, urinary system ultrasound showed that the left kidney could see 7.9cm uneven echo, and CDFI: abundant blood flow signal could be seen in the uneven echo. Further enhanced CT examination of urinary system showed: A mass soft tissue density shadow can be seen in the middle and lower pole of the left kidney, with a maximum cross-section size of about 85mm*75mm, and the renal pelvis calicum is under pressure, and the enhancement of the enhanced scan is uneven.

Scattered small blood vessel shadows can be seen during the arterial period, which is considered malignant. Meanwhile, nodules can be seen above the left kidney, with a size of about 17mm*12mm, and obvious enhancement can be seen during the arterial period, possibly lymph nodes (Figure 1). Other chest CT and other related examinations and laboratory tests showed no abnormality. No obvious abnormality was found in cardiopulmonary and urinary examinations. Preliminary diagnosis: left kidney tumor. After the relevant preoperative examination was completed and no obvious contraindications

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were found, laparoscopic radical left nephrectomy under intubation general anesthesia was performed successfully. Postoperative pathological gross view: the total size of kidney and perirenal fat was about 16*10.5*8cm, perirenal fat was easy to peel, the size of kidney and tumor was 11.5*9*8cm, the tumor size of 8*7.5*7cm was visible in the middle and lower poles of the kidney, and the tumor was solid in section, colored in shape, and in quality, close to the renal capsule and the renal pelvis, and no clear invasion of the renal pelvis was observed. The grayish-yellow nodules, 1.5cm in diameter, solid and tough, were found about 1cm from the upper pole of the kidney (Figure 2).

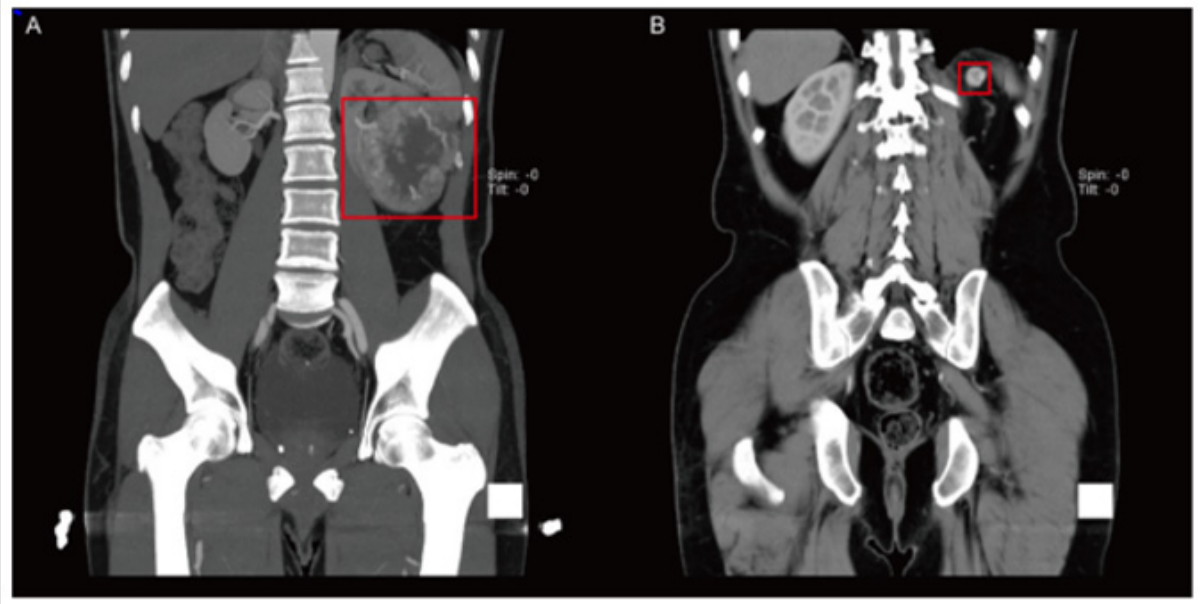

Figure 1: In the coronal plane of the enhanced CT, the primary renal tumor and perirenal intradiphular metastases can be significantly enhanced, and both exist in isolation.

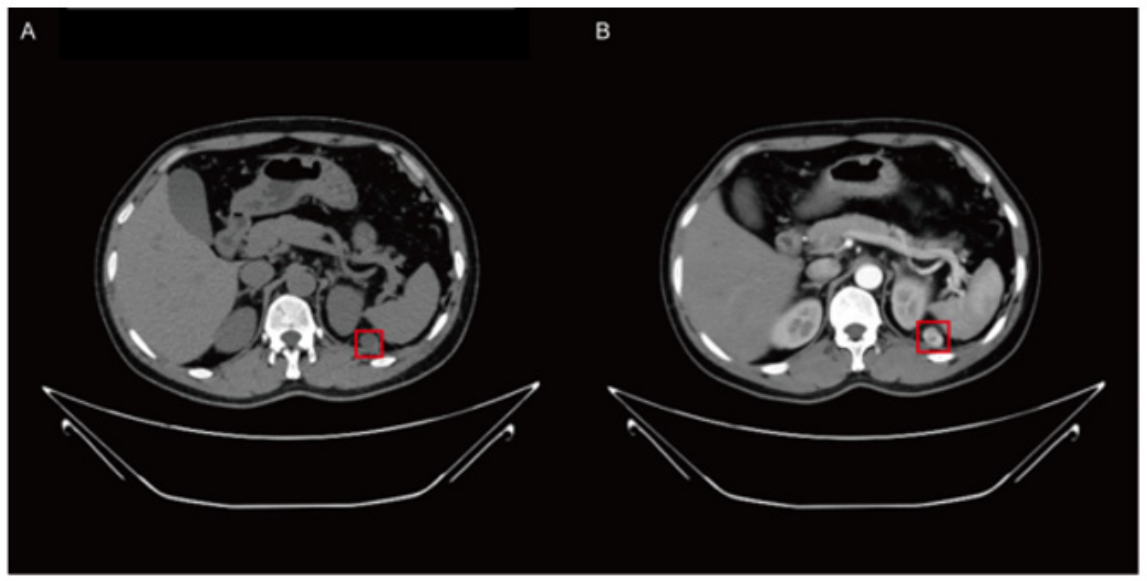

Figure 2: In the transverse plane of non-contrast enhanced CT and contrast-enhanced CT, periphrenal intradipose metastases were significantly strengthened and isolated from the kidney.

Pathological diagnosis: The tumor nodules in the left kidney and tumor + line were renal carcinoma, which were consistent with clear cell renal cell carcinoma with partial bleeding and necrosis according to immunohistochemistry. The WHO/ISUP grade 3-4 showed invasion of renal capsule but no clear invasion was found. The tumor nodules were found in perirenal fat with a diameter of 1.5cm, no clear intravascular cancer embolus was found, no clear nerve invasion was found, and no renal pelvis and renal sinus fat was involved. The peripheral renal tissue was not special. No cancer was found in the broken end of ureter and renal portal. No lymph nodes were found in the renal hilum (Figure 3).

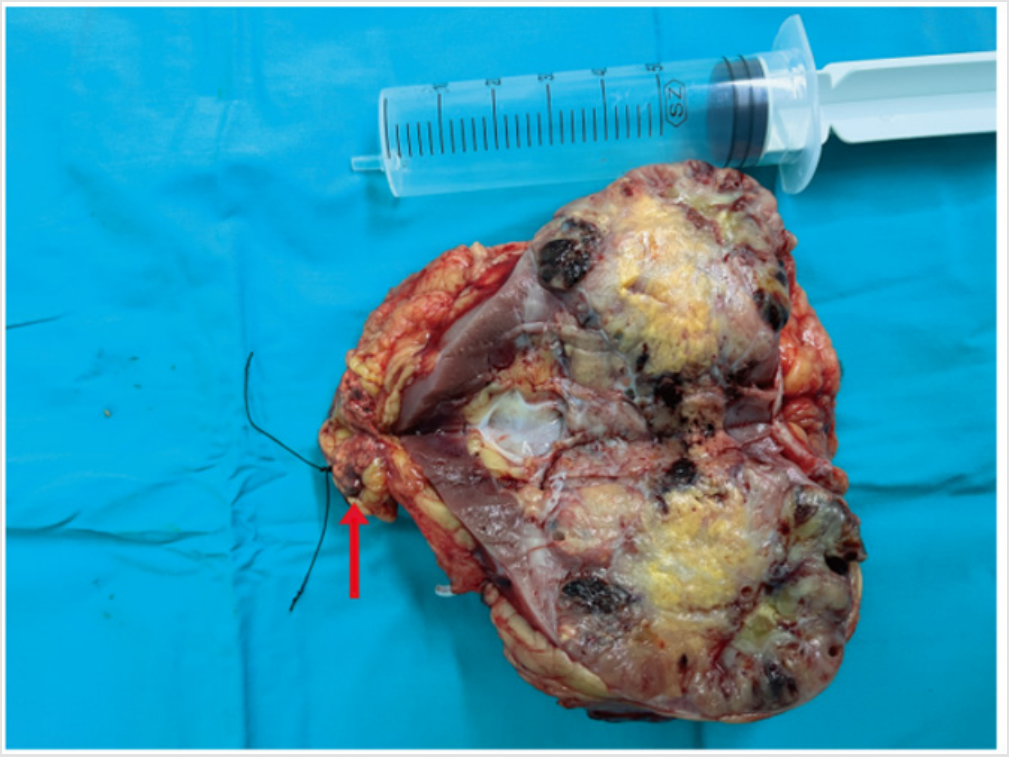

Figure 3: Perirenal intrafat metastase is at arrow in kidney specimen.

Immunohistochemical Results

CK7 (-), CK20 (-), CA-9 (+), CD10 (+), SDHB (+), TFE-3 (-), P504S (+), Ki-67 (hot zone about 20%+), CD117 (-), EMA (-), Vimentin (+), AE1/AE3 (+),PAX-8 (+), CK34βE12 (-).Clear cell carcinoma of left kidney T3N0M1 was diagnosed after surgery, and tyrosine kinase inhibitor (Sunitinib) was administered as adjuvant therapy. No tumor recurrence was observed after 3 months of follow-up.

Discussion

RCC is a common renal malignant tumor, and its pathological type is mainly ccRCC, accounting for about 70%-80% of RCC [1]. Clear cell carcinoma is the most common pathological type of kidney cancer, and 1/3 of patients have distant metastases once diagnosed, even if they receive timely surgery, there is still a 1/4 chance of distant metastases [2]. Renal carcinoma is a tumor with abundant blood supply and abundant lymphatic drainage. The main routes of metastasis are hematogenous metastasis and lymphatic metastasis, mainly to regional lymph nodes, lung, liver, bone and brain. However, there are also cases of metastasis to other rare sites such as the pancreas, thyroid, skin, and muscle tissue. Simple isolated ipsilateral perirenal fat metastasis is extremely rare. KoutaniA et al., first reported in 1997 [3]. Up to now, a total of 9 cases of renal cancer metastases to adipose tissue around the contralateral kidney have been reported worldwide, including 6 cases from Japan, 1 case from the United States, 1 case from France, and 1 case from China [4-8]. Therefore, the incidence of renal clear cell carcinoma with perirenal fat metastases has regional and ethnic factors. In this case, isolated ipsilateral perirenal fat metastasis was the first case in the world (Figure 4).

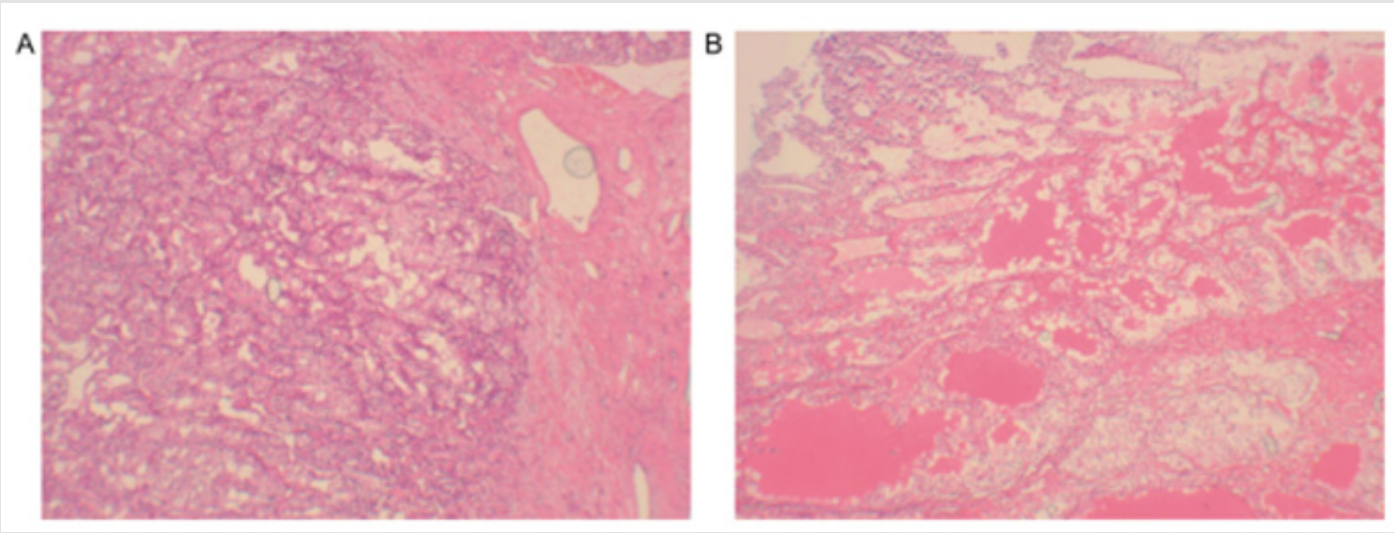

Figure 4: Image A and Image B are pathological sections of the primary tumor of the kidney and perirenal fatty metastases, respectively, and both are clear cell carcinoma.

At present, there are few studies on the pathway of renal clear cell carcinoma with perirenal fat metastasis, and the metastasis mechanism is unknown. Perirenal adipose tissue (PAT) is a white adipose tissue (WAT) located between the perirenal fascia and the renal envelope. It is generally believed that ccRCC cells can penetrate the renal envelope and enter the PAT during the development of renal tumors [9]. However, in this patient, the renal tumor was located in the middle and lower poles of the kidney, and the perirenal lipocarcinoma nodules were located in the upper pole of the kidney, with a significant 1cm normal tissue distance from the upper pole of the kidney. Therefore, the possibility of direct invasion and metastasis of tumor was excluded, and isolated perirenal fat metastasis was considered. The adipose tissue around the kidney is permeated by blood vessels and lymphatic vessels leading to the renal capsule, so some scholars consider the possibility of hemopoietic or lymphatic progression to be greater [7]. However, the postoperative pathological results of this case indicated that the tumor invaded the renal capsule but no clear invasion was found, while no clear cancer thrombus and nerve invasion were found in the vascular canal, and no abnormal lymph nodes were found in the renal portal. Therefore, the possibility of blood metastasis and lymphatic metastasis is less.

Through in-depth exploration of the two-way communication between ccRCC cells and PAT, some researchers found that ccRCC cells secreted parathyroid hormone-associated protein (PTHrP) through paracrine mode to activate the PKA pathway to drive the adjacent PAT Browning, which enhanced the metabolism of browned perirenal adipocytes and released a large number of metabolites. Excess lactic acid is released into the tumor microenvironment, thus promoting the growth, invasion and metastasis of ccRCC, constituting a new possible mechanism for promoting the growth of ccRCC tumors [9]. Therefore, the author believes that the information pathway between renal clear cell carcinoma and perirenal fat is worthy of further study. According to the current case data from all over the world, it can be found that for patients with renal tumor metastasis to perirenal fat, the time from removal of primary lesion to metastasis is relatively long, with an average time of 5 years and 6 months. Meanwhile, the tumor grades of patients are mostly grade 1-2 and a few grade 3, indicating that this type of case has a good prognosis and belongs to slow growth type [6]. In this case, the tumor was grade 3-4, and considering the high risk of recurrence, the patient was given oral tyrosine kinase inhibitor (Sunitinib) after laparoscopic radical nephrectomy for adjuvant treatment, and no tumor recurrence was found after 18 months of postoperative follow-up.

Finally, we believe that clear cell renal carcinoma with perirenal fat metastasis is extremely rare, so the metastasis mechanism and prognosis of the tumor need to be further studied with more cases and investigators.

Declarations

Ethics Approval and Consent to Participate

The study was approved by the Ethics Committee of the People's Hospital of Xingtai, China, and was conducted in accordance with the Declaration of Helsinki. All individuals involved in the study received informed written consent. Details revealing the identity of the subjects were omitted.

Consent for Publication

The patient imaging data and related information used in this study had been obtained with the patient's informed consent.

Availability of Data and Materials

The data and materials in this research are available for scientific research.

Competing Interests

The authors declare no competing interests.

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Authors' Contributions

All authors contributed to the idea and design of the paper. Gao Yanlin and Wei Junli wrote and conceived the paper; Zhang Ruiqiao produced Figures 1, 2, 3 and 4. All authors read and approved the final manuscript.

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