Renal-type clear cell carcinoma of prostate: A case report and review of literature

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ABSTRACT

We analyzed the clinicopathological features of renal-type clear cell carcinoma (RTCCC) in the prostate and its diagnosis according to the example in our hospital and review of the literature. Clinicopathological features of RTCCC in the prostate were observed in a patient from our hospital combining with a review of the literature. Microscopically, the tumor was composed of cells with abundant and translucent cytoplasm, arranged in the form of the vesicular nest or glandular structure. Therefore, it was necessary to distinguish between metastatic clear cell renal cell carcinoma and primary RTCCC in the prostate. Immunohistochemistry (IHC) of this case showed tumor cells were positive expression for cytokeratin (CKpan), low-molecular weight cytokeratin, epithelial membrane antigen, and prostate-specific antigen (PSA), P504S, prostate-specific membrane antigen and partial positive expression for vimentin and CD10. The tumor cells displayed negative expression of high molecular weight cytokeratin, cytokeratin 7 (CK7), CK34, PAX8, and renal cell carcinoma. The morphological and immunohistochemical features of this tumor were in correspondence with RTCCC of the prostate. This tumor is a rare variant of the prostate carcinomas. To the best of our knowledge, this type of extrarenal tumor has only been reported in six previous studies. Combination of histology, IHC, imaging, and serum PSA is needed to perform a suitable diagnosis.

KEY WORDS: Clear cell carcinoma, prostate, prostate specific antigen, renal cell carcinoma, renal-type

INTRODUCTION

Renal-type clear cell carcinoma (RTCCC) of the prostate is a very rare variant, resembling with prostatic adenocarcinoma and transitional cell carcinoma together with uncommonly encountered clear cell carcinoma of Mullerian type and especially, metastatic clear cell renal cell carcinoma (CCRCC). CCRCC accounts for 85% of all the renal tumors.[1] Patients with early-stage CCRCC are commonly absent of clinical syndromes, and those with advanced-stage CCRCC could occur to metastases to lungs, liver, and bone.[2] However, metastases of prostate and bladder are extremely rare.[3-4] Previous studies reported that 6 cases with RTCCC of prostate serving as a primary tumor in an extra-renal location have been described.[5-10] Therefore, we attempted to investigate the clinicopathological features of RTCCC in the prostate in combination with the prior studies reported in this study.

MATERIALS AND METHODS

Patients

We collected clinicopathological data of a case of prostatic cancer from Red Cross Hospital of Yulin in 2015. The tumor was confirmed as RTCCC of the prostate by pathological experts in our hospital and the Sixth Affiliated Hospital of Shanghai Jiaotong University. We also achieved clinicopathological information respecting 6 cases with prostate RTCCC in some literature.

Pathological characteristics

Samples grossly – A large number of cells with empty cytoplasm was diffuse infiltration among the remnants of the prostate gland and smooth muscle, surrounding a small amount of scattered tumor cells with pink stained cytoplasm, lining as vesicular nests or glandular structure, showing invasive growth,
irregular nuclear shape, central and inconspicuous nucleoli, rare mitoses, and sinusoids-like structure among these tumor cells [Figure 1]. The features of histology were in accordance with that of CCRCC. Moreover, the imaging examination displayed no tumors were found in both kidneys. CKpan, low molecular weight cytokeratin (LMWCK), P504S, prostate specific membrane antigen (PSMA), cytokeratin 8 (CK8)/18, epithelial membrane antigen (EMA) and CK19 are positive expression, Vimentin (Vim) and CD10 are partial positive expression, and high molecular weight cytokeratin (HMWCK), CK7, CA125, CD117, CK20, RCC, and PAX8 are negative expression and Ki-67 index is close to 7% [Figure 1]. Immunohistochemistry (IHC) supported that this tumor was primary cancer of the prostate instead of coming from kidney or liver. Experts in the Sixth Affiliated Hospital of Shanghai Jiaotong University agree with the above diagnosis, and the Gleason score: 4 + 5 = 9 points.

**Immunohistochemistry**

Formalin-fixed, paraffin-embedded samples were cut into 4-µm thickness sequential sections and processed for IHC. The staining of antibody CKpan, P504S, prostate-specific antigen (PSA), PSMA, CK8/18, EMA, CK19, Vim, CD10, LMWCK, HMWCK, CK7, CD117, CK20, RCC, CK20, RCC, and PAX8, and Ki-67. The biomarkers of epithelial origin are CKpan, CK8/18, EMA, CK19, LMWCK, HMWCK, CK7, CK20; the biomarkers of renal cell carcinoma (RCC) are CKpan, Vim, CD10, RCC, CK7, P504S, CD117, PAX8; the biomarkers of prostate cancer are HMWCK, CKpan, P504S, PSA, PSMA; Ki67 index is used to describe the proliferative activity of cells (Products of Fuzhou Maixin Biological Technology Development Company) is observed.

**Immunohistochemistry evaluation**

We defined that negative expression was marked as 0, weak expression as 1+, moderate expression as 2+, strong expression as 3+, and percentage of positively stained cells in 25% increments from 0% to 100% was categorized as the four group of 0%–25%, 26%–50%, 51%–75%, and 76%–100%.

**RESULTS**

A male patient, aged 73 years, complained frequent urination, increased frequency of nocturia, hesitancy, and urine with a sense of endless for 6 years, progressive above symptoms for the past 2 years. Ultrasound examinations in the local hospital showed “enlarged prostate, bladder stones,” and the condition did not improve after treatment. Rectal examination in our hospital showed prostate II enlarged, tough texture, the central sulcus turned shallow, no nodules, and tenderness. Urinary tract ultrasound showed multiple cysts in the right renal, and benign prostatic hyperplasia. Serum examination showed total PSA (TPSA) 33.21 ng/ml (normal value range from 0 to 4.4 ng/ml), free PSA (FPSA) 3.43 ng/ml (normal value range from 0 to 2.5 ng/ml, FPSA/TPSA = 0.10 (normal value range from 0.26 to 1). To alleviate symptoms, patients received epidural anesthesia for transurethral resection of bladder holmium laser lithotripsy and transurethral resection of the prostate surgery. Because the patient was very elder, and the family did not agree with further examination and treatment, and finally discharged, thus the condition of tumor metastasis had not been obtained. IHC suggested its origin was a primary prostate carcinoma, instead of coming from kidney, liver, or other organs. Therefore, this case in our hospital was diagnosed with RTCCC of the prostate. Experts in the Sixth Affiliated Hospital of Shanghai Jiaotong University agreed with the above diagnosis, and the Gleason score: 4 + 5 = 9 points.

**DISCUSSION**

Histology and cellular morphology of tumor tissue were similar to CCRCC in this case. Typical features of CCRCC are grossly larger tumor volume and colorful cut surface. Microscopically showed clear cytoplasm of tumor cells with vesicular nest and glandular structures and diffuse capillary network among the nests, the obvious inflammatory cell infiltration, and the nuclei vary from partially visible to prominent.\(^{[4]}\) The immunohistochemical expression of CCRCC showed positive expression of LMWCK and Vim, whereas negative expression of HMWCK and CK7, CK20, PSA, and carcinoembryonic antigen (CEA). In addition, most of...
the CCRCC is a diffusely strong positive expression of EMA, CD10, and RCC. The prominent clear cell consists of the obvious vesicular nest with a small amount of glandular structure by microscopy, which is similar to CCRCC, suggesting that it is necessary to exclude metastatic clear cell renal cell cancer. However, in this case, it is characterized by common symptoms of urinary frequency, urgency, and Computed tomography scan showed that no tumor was found in kidneys, bladder, and urethra. Therefore, we speculated that this tumor of the prostate was regarded as the primary cancer of the prostate. Some literature reported that CCRCC metastases to urinary tract are extremely rare and the cases of CCRCC only metastases to prostate have not been reported while that of accompanying with other organs were currently found in two studies.

Moreover, the immunohistochemical expression, in this case, showed that positive expression of CD10, Vim, and LMWCK and negative expression of CK7 was similar with that of RCC, but the positive expression of PSA, PSMA, P504S and negative expression of RCC, PAX-8 was the important differentiated key to support the primary cancer of prostate instead of metastasis of CCRCC. Especially the biomarker, PAX-8, has an important role to differentiate primary RCC. Moreover, elevated serum PSA in this patient also support the primary prostate cancer. Above all the evidence are likely to support the diagnosis of RTCCC of the prostate for the first time by the Singh et al. reported.

Currently, the WHO classification of tumors of the prostate does not discuss the content of classification of this tumor. We, respectively, analyzed at home and abroad a total of 6 clear cell renal carcinoma of the prostate, together with this case of our hospital. Most of the 7 cases were diagnosed with benign prostatic hyperplasia, and the ages of the seven patients were all over 60-year-old. Gleason scores were over 7 score. We observed single cancer cell with diffuse infiltrative growth pattern, indicating the area of poorly differentiated carcinoma, but the mitoses and Ki67 index was low. All these patients had the elevated serum PSA except one case. IHC displayed that the positive expression of LMWCK, P504S, EMA, Vim, and CD10 of tumor cells and the negative expression of PAX8, CEA, HMWCK, and CK7, in addition, to vary expression of CKpan, PSA, PSAP described in the literature. RTCCC of prostate often accompanied by systemic metastases, mostly high-grade cancer or advanced clinical stage revealed that the higher degree of malignancy. Patne et al. thought that therapeutic strategy of prostate RTCCC was similar to the common type of prostate cancer. They found that patient with endocrine therapy after radical treatment had a good effect. However, Sato et al. reported that a case belonged to the cluster group of RCC by the microarray data using cluster analysis, and this patient was treated with tyrosine kinase inhibitor therapy resembling with the protocol of CCRCC, but the reaction to this therapy was unfavorable due to the rapidly progressive tumor. Therefore, the most optimized treatment plan remained to be investigated due to the unique biological features.

To sum up, there are certain characteristics for this tumor in clinical development, prognosis, pathology morphology, and IHC, but its biological behavior and clinical treatment are necessary to be further explored.

CONCLUSION

RTCCC is a rare variant of the prostate carcinomas. The morphological and immunohistochemical features of this tumor were in correspondence with RTCCC of the prostate. Combination of histology, IHC, imaging, and serum PSA is needed to perform a suitable diagnosis.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES