

Oncology

Renal-type Clear Cell Carcinoma Occurring in the Prostate With Zinner Syndrome



Yuichi Sato, Masao Kataoka, Junya Hata, Hidenori Akaihata, Soichiro Ogawa, Yoshiyuki Kojima*

Department of Urology, Fukushima Medical University School of Medicine, Fukushima, Japan

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ABSTRACT

We report a case of clear cell carcinoma occurring in the prostate with Zinner syndrome in a 64-year-old man. Based on the immunohistochemical findings, it was concluded that this tumor represented primary renal-type clear cell carcinoma arising in the prostate. After receiving radical cystoprostatectomy, he was treated with tyrosine kinase inhibitor (TKI) therapy for local recurrence in accordance with the protocol of renal cell carcinoma (RCC) treatment, because microarray cluster analysis using a resected sample demonstrated that the present case belonged to the cluster group of RCC.

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Introduction

Clear cell carcinoma (CCC) of the prostate is a very rare condition, and information reported in the literature is limited.^{1–4} Zinner syndrome is characterized by the triad of ipsilateral renal agenesis, seminal vesicle cyst, and ejaculatory duct obstruction.⁵ Herein, we report a case of a 64-year-old man with Zinner syndrome who developed renal-type CCC of the prostate. Immunohistochemical and biologic features of renal-type CCC of the prostate are discussed.

Case presentation

A 64-year-old man presented with gross hematuria several days in duration. The patient had been diagnosed with Zinner syndrome, presenting with left renal agenesis (Fig. 1A), seminal vesicle cyst (Fig. 1B) and ejaculatory duct obstruction (Fig. 1C), at the age of 45.

Digital rectal examination detected a hard, enlarged and non-mobile prostate compressing the rectal wall. Laboratory examination revealed no abnormalities. The levels of PSA (0.19 ng/ml) were within normal ranges. Urine analysis showed hematuria. Ultrasonography showed a heteroechoic prostate mass adjacent to

the seminal vesicle cyst. Computed tomography and magnetic resonance imaging revealed a huge mass, measuring 54 × 58 × 67 mm, which occupied the pelvic cavity (Fig. 1D and E). There was no evidence of metastasis in any organ.

Ultrasound-assisted transperineal needle biopsy was conducted to enable a pathological diagnosis. Histopathological examination revealed CK7-positive and CK20- and PSA-negative non-ciliated cuboidal cells, with the cytoplasm ranging from clear to eosinophilic, suggestive of CCC (Fig. 2A–C). The patient underwent a radical cystoprostatectomy with ileal conduit and bilateral lymph node dissection. The tumor had grown expansively and adhered to the urinary bladder, but did not invade the rectum. Macroscopically, the resected specimen had an encapsulated mass with focal hemorrhages and necrosis. Microscopic findings exhibited morphological and immunohistochemical characteristics similar to those of CCC of the kidney (Fig. 2D and E). Normal prostatic tissue was almost replaced by CCC, but the coexistence of CCC and normal prostate-like tissue without a defined border between them was identified in only a very small region (Fig. 2E). The results of an immunohistochemical study using the resected sample were the same as those of the biopsy sample. Based on these findings, it was concluded that this tumor represented primary renal-type CCC arising in the prostate.

Local recurrence in the pelvis was apparent 24 months after surgery. In order to decide on a course of treatment, we performed microarray cluster analysis using the sample of the present case, and compared the gene expression profiling with prostate adenocarcinoma (prostate cancer: PCa), urothelial cell carcinoma (UCC)

* Corresponding author. Department of Urology, Fukushima Medical University School of Medicine, 1 Hikarigaoka, Fukushima 960-1295, Japan. Tel.: +81 24 547 1316; fax: +81 24 548 3393.

E-mail address: ykojima@fmu.ac.jp (Y. Kojima).

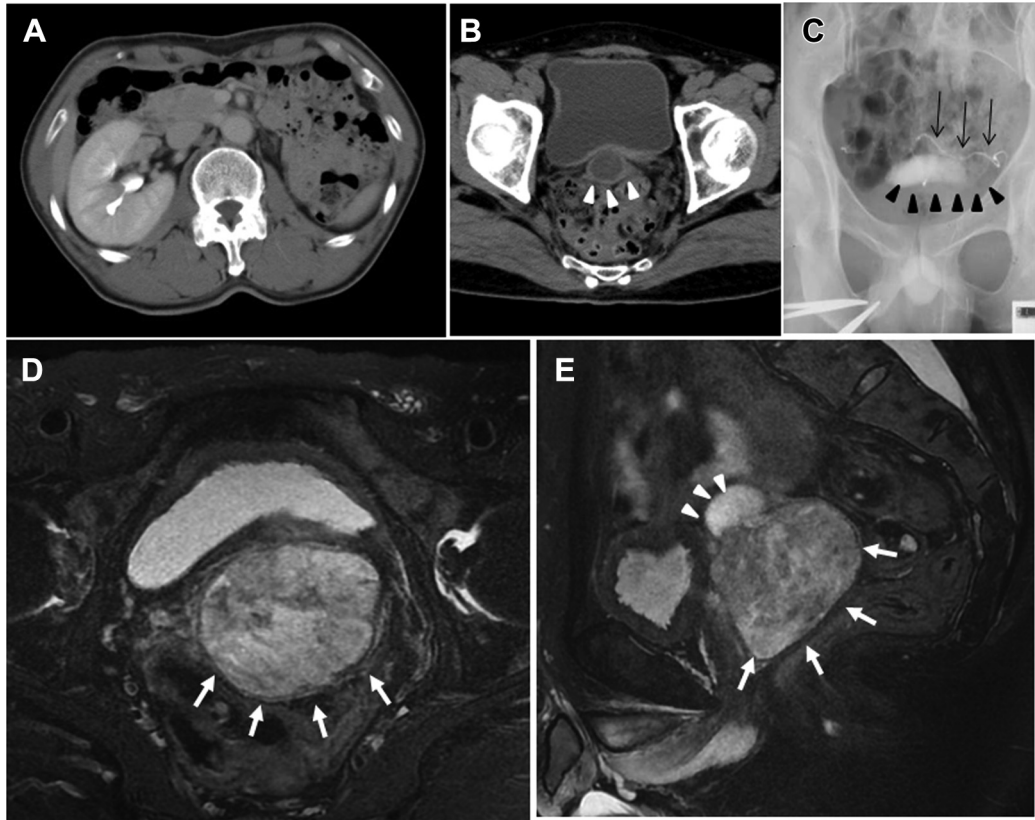


Figure 1. Abdominal and pelvic CT and vasography, which were performed 19 years before diagnosis of the pelvic mass, shows left renal agenesis (A), seminal vesicle cyst (B), and ejaculatory duct obstruction (C), respectively. T2-weighted magnetic resonance image shows a large pelvic mass adjacent to the bladder (D), and seminal vesicle cyst (E). Arrowheads: seminal vesicle cyst; small arrow: vas deferens; large arrows: large pelvic mass.

and RCC samples, which were previously obtained during surgeries for them in our department (Fig. 3). This microarray study was approved by the ethics committee of our institution. Hierarchical cluster analysis demonstrated separation of the cases into almost three distinct groups, PCa, UCC and RCC, with large linkage distances apparent when clustering was performed with the gene expression profiling. In the dendrogram, the present case belonged to the cluster group of RCC, demonstrating that the present case had a similar gene expression pattern to that of RCC. Therefore, he was treated with TKI therapy (sunitinib malate 25 mg/day) in accordance with the protocol of RCC treatment. However, the patient succumbed to the disease 29 months after surgery due to multi-organ system failure.

Discussion

Renal-type CCC of the prostate is extremely rare, but has been reported in recent years.^{1–4} It is important to distinguish it from other CCCs of the male urinary tract, including metastatic RCC, a variant of PCa, UCC and adenocarcinoma of the urinary bladder, and mullerian CCC.¹ In the present case, the differential diagnosis was suggestive of them. The most possible consideration was metastatic RCC to the prostate, although there are very few existing reports of RCC presenting with metastasis to the prostate at initial diagnosis.¹ The clear cell lesion identified in the present case demonstrated an immunohistochemical profile almost identical to that of RCC, with positive expression of CK7 and negative results of CK20 and PSA.

However, there was no clinical or radiological evidence of renal tumor in this patient. Although PCa corresponding to Gleason's grade 4 may have a clear cell or hypernephroid pattern, it should stain positively for PSA. Urothelial carcinoma may have a clear cell pattern, but it should stain positively for CK20. The remaining differential diagnostic consideration was mullerian CCC, which has the presence of immunoactivity for CK7 and CK20. In the present case, however, immunoactivity of CK20 was absent, and the coexistence of CCC and normal prostate-like tissue without a defined border between them was identified. Finally, the tumor in the present case was considered to represent primary renal-type CCC arising in the prostate. Microarray cluster analysis also supported the final pathological diagnosis.

The association of seminal vesicle cyst with ipsilateral renal agenesis was first reported in 1914, which became known as Zinner syndrome.⁵ Abnormal development in the kidney and urinary tract system during weeks 4 and 7 of gestation induces the condition of this syndrome. Since the ejaculatory ducts are normally derived from the mesonephric system, the ejaculatory ducts form abnormally in this condition and fluid builds up inside, forming a seminal vesicle cyst.⁵ One possible hypothesis for development of CCC in the prostate in the present case may include an embryologic renal remnant in or adjacent to the prostate because of an embryogenesis abnormality in the kidney and urinary tract system.

The microarray data using cluster analysis demonstrated that the present case belonged to the cluster group of RCC. Therefore, he was treated with TKI therapy in accordance with the protocol

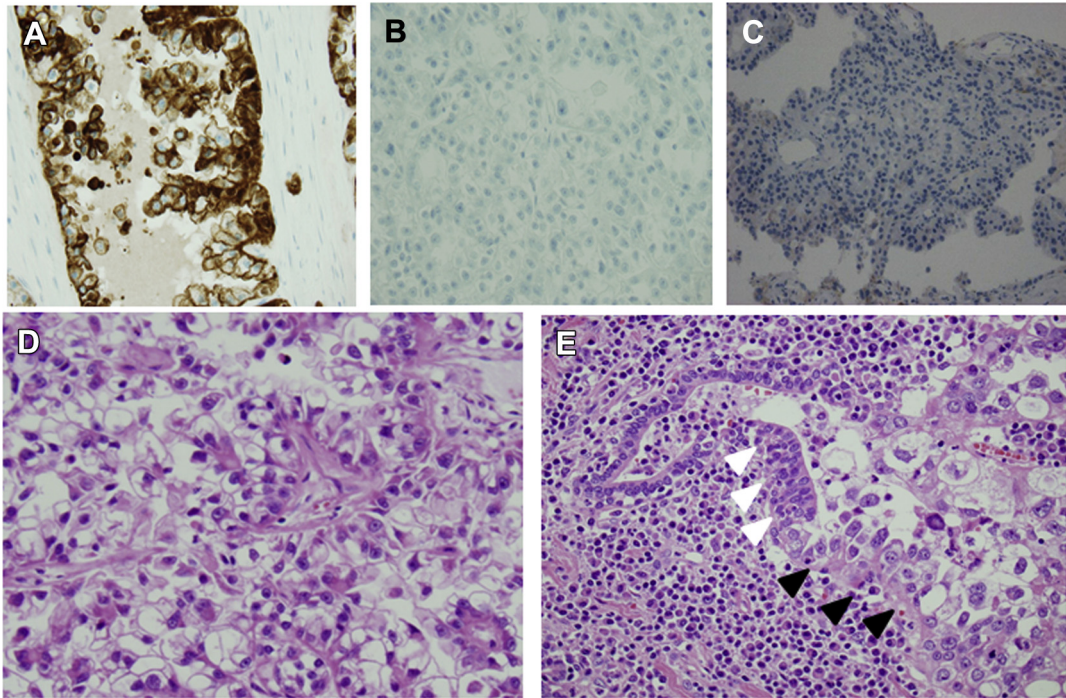


Figure 2. Microscopic findings of biopsy (A–C) and resected sample (D and E). Histopathological examination revealed CK7-positive (A) and CK20- (B) and PSA-negative (C) non-ciliated cuboidal cells, with cytoplasm ranging from clear to eosinophilic (D), suggestive of clear cell carcinoma. The coexistence of clear cell carcinoma (black arrowheads) and normal prostate-like tissue (white arrowheads) without a defined border between them is identified in only a very small region (E). (D and E): Hematoxylin-eosin stain, $\times 100$.

of RCC treatment, although it was ineffective because it was a rapidly progressing cancer. Although the gene expression pattern in the present case was similar to that of RCC, further study

should have been conducted to define in detail the biologic features of renal-type CCC of the prostate and to establish a treatment strategy.

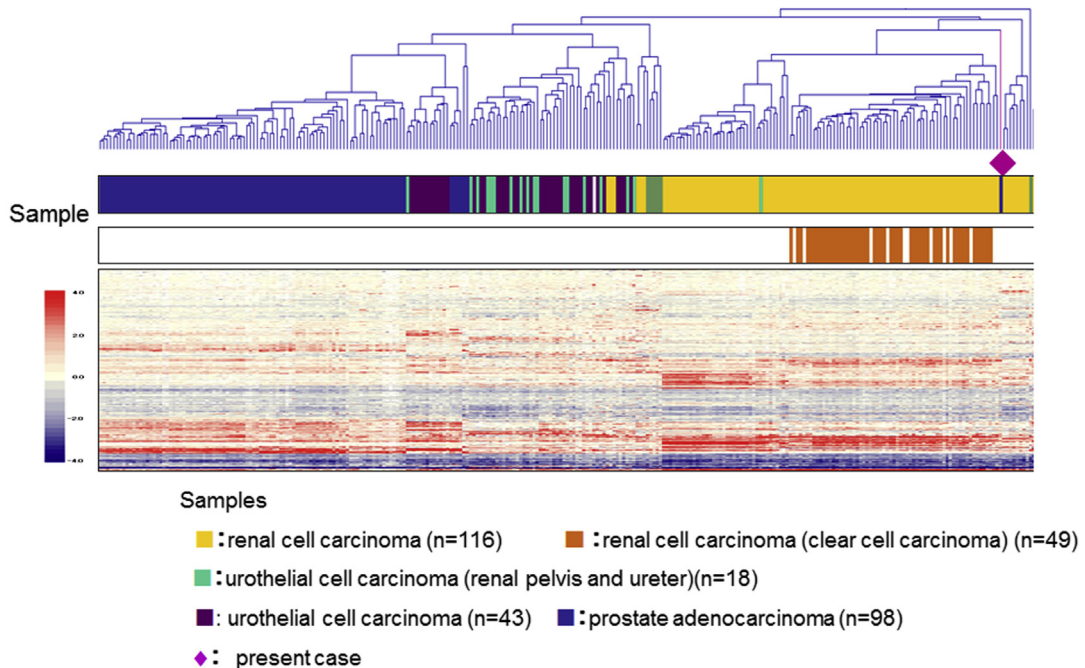


Figure 3. Microarray cluster analysis demonstrates that the gene expression pattern of the sample in this patient belonged to that of renal cell carcinoma, but not that of urothelial cell carcinoma or prostate adenocarcinoma.

Conclusion

Renal-type CCC of the prostate is extremely rare. The microarray cluster analysis may be sometimes helpful in confirming the diagnosis of an extremely rare disease.

Conflict of interest

There is no conflict of interest.

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