Case report

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A case of prostatic carcinosarcoma with cytological and immunohistochemical findings

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Abstract

Prostatic carcinosarcoma (PCS) is an extremely rare malignancy and is reported to have a very poor prognosis. A 77-year-old Japanese male was diagnosed as PCS containing two components, adenocarcinoma and leiomyosarcoma by the immunohistochemical analysis. Cytology was initially useful for the diagnosis. Treatments with androgen ablative and surgical therapies could not improve the patient's life, and he died at 12 months after the first visit.

Keywords: Prostate, carcinosarcoma, cytology, immunohistochemistry

Background

Prostate cancer which is often found after elevation of serum prostate-specific antigen (PSA) value, is one of the most common cancers in men. Morphologically, most of the prostate cancers are adenocarcinoma [1,2], although non-epithelial malignancies are known to develop in the prostate [3] with an incidence of less than 0.1% of all prostate malignancies [4]. Prostatic carcinosarcoma (PCS) which was first reported in 1967 by Hamlin and Lund [5], is an extremely rare malignancy and has very poor prognosis with a survival of approximate 7 months [6-9]. PCS is a histological mixture of adenocarcinoma and certain type(s) of sarcoma [1,2,10]. Approximate less than 100 PCS cases have been reported in the prostate [4]. Some PCSs may also be referred to as sarcomatoid carcinoma [6-9,11]. Also, only a few studies on the cytological and immunohistochemical findings of this rare malignancy were described [12,13].

We report here cytological, histopathological, and immunohistochemical findings of PCS which developed in a old Japanese man.

Case presentation

A 77-year-old Japanese male noticed macro-hematuria and visited to the Department of Urology in our hospital. On digital rectal examination, a diffusely enlarged lesion on the left lobe of the prostate was palpable. Serum PSA was slightly elevated:

4.03 ng/dL (<4 ng/dL).

MRI showed a cystic lesion with irregular margin on the left lobe of the prostate and partially invaded over the outer layer (Figure 1). A subsequent biopsy revealed Gleason 5 (3+2) adenocarcinoma (Figure 2) of the prostate. The patient was diagnosed as T3aN0M0 prostate adenocarcinoma by the contrast CT, bone scintigraphy and MRI, and wanted to receive an endocrine therapy. Two months after his first visit, the LH-RH analogue therapy was started. Although the serum PSA level decreased to normal levels at 8 months after the start of the therapy, the patient complained of urinary obstruction. MRI revealed an enlarged prostatic lesion, and trans-urethral resection of the prostate (TUR-P) was performed for the purpose of release of the urinary obstruction. A total amount of 35 g prostate was resected. Histopathological examination on the TUR-P specimen showed neoplasm consisted of a mixture of carcinomatous and sarcomatous components. The carcinomatous component (Figure 3A) was well - moderately differentiated prostatic adenocarcinoma, showing a positive reaction against the antibody of PSA. On the other hand, the sarcomatous component (Figure 3B) was consisted of spindle-like cells with marked nuclear atypia. These spindle-like tumor cells were positive for α -smooth muscle action (α -SMA) (Figure 3C) and desmin (Figure 3D). We observed tumor cell necrosis and 17 mitotic figures including abnormal division figures per 10

Figure 1. Transverse view of pelvic MRI-T2.
A cystic prostatic lesion with irregular margin on the left lobe partially invaded over the outer layer.

Figure 2. Histopathology of the biopsy specimens.
Note: Gleason 5 (3+2) adenocarcinoma. H&E stain (original magnification, x200).

high-power fields (hpf). These findings suggested that sarcomatous component was leiomyosarcoma.

Heterogeneous components, such as osteosarcoma and osseous sarcoma could not be found. Retrospective examination of the prostatic biopsy showed the presence of non-epithelial atypical cells (Figure 4) with weakly positive reaction with SMA. Thus, the patient could be diagnosed as PCS at his first visit. Although TUR-P had been performed, the tumor rapidly enlarged and obstruction of the urine occurred again. Therefore, the total pelvic exenteration (PE) with cutaneous ureterostomy and colostomy were performed. Macroscopically, the resected prostate tumor was measuring 8x4.5x4 cm (Figure 5), and the surgical margins were free from the tumor. Cytology of the cut-surface of the tumor at the PE revealed the presence of two types of tumor cells with different origin: one was an adenocarcinoma like cells with a sheet formation (Figure 6A), and the other was big sarcomatous cells with a marked nuclear

Figure 3. Histopathology of the trans-urethral resection of the prostate (TUR-P) specimen.
Prostatic lesion contains (A) Gleason 5 (3+2), adenocarcinoma and (B) spindle-like sarcomatous cells which are immunohistochemically positive for (C) α-smooth muscle actin (α-SMA) and (D) desmin. (A) H & E stain (original magnification, x160); (B) H & E stain (original magnification, x200); (C) immunohistochemistry of α-SMA (original magnification, x80); and (D) immunohistochemistry of desmin (original magnification, x80).

Figure 4. Re-examination of the first biopsy specimen shows the presence of a few sarcomatous atypical cells (arrow) with multi-nuclei. H & E stain (original magnification, x200).

atypia and several nucleoli (Figure 6B). Histopathological examination of the PE specimen also showed a mixture of carcinomatous and sarcomatous components (Figure 7A). The carcinomatous component was well-moderately differentiated tubular/acinar adenocarcinoma with a positive reaction with PSA (Figure 7B). In addition, the sarcomatous component, which had 19 mitotic figures including abnormal division figures per 10 hpf, was spindle-like cells with marked nuclear atypia. They showed positive reactivity of α-SMA

Figure 5. Cut-surface of the resected tumor. Note whitish gray tumor with hemorrhage is noted.

Figure 6. Touch smears from the cut-surface of the resected tumor. (A) A sheet of glandular cells with slight atypia suggesting of well-differentiated adenocarcinoma. (B) A multinucleated large sarcomatous cell with marked nuclear atypia and prominent nucleoli. (A) Papanicolaou stain (original magnification, x400); and (B) Papanicolaou stain (original magnification, x400).

(**Figure 7C**) and desmin (**Figure 7D**) patient was detected as a local recurrence and died at 12 months after the first visit, although we did not detect distant metastasis.

Discussion

The origin and pathogenesis of PCSs is still unknown; some authors proposed that both carcinoma and sarcoma simultaneously developed within the prostate, while others suggested that adenocarcinoma underwent transformation into sarcoma [7,9,14,15]. The present case was suggested to be the latter case from the findings of histopathological re-examination of the biopsy. A recent report by Rodrigues, et al. [16] described deletion of a prostate-specific erythroblast transformation-specific (ETS)-related gene in both the sarcomatous and adenocarcinoma, suggesting that PCSs are derived from prostate epithelium.

Although half of PCSs have developed in patients with a history of prostatic adenocarcinoma [6,8], immunohistochemical examinations was performed in a few cases [12,13]. In our case, we observed multi-nucleated large sarcomatous cells

Figure 7. Histopathology of the resected tumor consisting of (A) a mixture of carcinomatous and sarcomatous components. Immunohistochemistry shows (B) positive reaction of PSA in the adenocarcinoma cells, (C) positive reaction of α -SMA in the sarcoma cells and (D) positive reactivity of desmin. (A) H & E stain (original magnification, x80); (B) immunohistochemistry of PSA (original magnification, x160); (C) immunohistochemistry of α -SMA (original magnification, x80); and (D) immunohistochemistry of desmin (original magnification, x80).

as well as adenocarcinoma cells on the Papanicolaou-stained stamp smears from the cut-surface of the resected tumor. The prostatic tumor was initially diagnosed as adenocarcinoma in the biopsy specimen. The TUR-P pathological specimen showed a mixture of carcinomatous with a positive reaction of PSA and sarcomatous components with a positive reaction of α -SMA. Retrospective analysis of the biopsy specimen revealed a weakly positive reaction with α -SMA in the spindle cells. The PE pathological specimen and cytological findings also confirmed the primary PCS in the prostate.

We performed cytological diagnosis of the present case, as the cytological findings were useful for the diagnosis of the PCS [12,13]. In PCSs reported, adenocarcinoma was usually high grade [6]. Interestingly, some cases were reported to be adenosquamous carcinoma, which may be associated with chondrosarcoma development [6,17]. The most common sarcomatous component was reported to be osteosarcoma (50-62%) followed by chondrosarcoma (33-45%), leiomyosarcoma (17-24%), and rhabdomyosarcoma (10-12%) [6,7]. In the present case, the sarcomatous component was leiomyosarcoma based on the immunohistochemical findings showing positive reaction with α -SMA. From the cytological findings, the epithelial component was diagnosed as adenocarcinoma, however the sarcomatous one could not be diagnosed as leiomyosarcoma because of the presence of a few sarcoma cells.

The mean age at the diagnosis of PCSs is 66 year-old, and the survival period was extremely short, being approximate

7 months [7,18]. The most common site of metastasis of PCs was the lung (43%) [7]. Reported treatment modalities include TUR-P, orchiectomy, chemotherapy, radiation, androgen ablation therapy, prostatectomy, and PE [7,18]. However, at present there is no standardized treatment regimen for PCs.

Conclusion

An extremely rare case of prostatic carcinosarcoma with a mixture of adenocarcinoma and leiomyosarcoma in a 77-year-old man is presented with the histopathology, cytological, and immunohistochemical findings which were useful for the accurate diagnosis. As the prognosis of the tumor is extremely poor, various therapies could not put the patient's life off.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	KN	SM	YY	SY	TT
Research concept and design	✓	--	--	--	--
Collection and/or assembly of data	✓	✓	✓	✓	--
Data analysis and interpretation	✓	✓	✓	✓	--
Writing the article	✓	--	--	--	--
Critical revision of the article	✓	--	--	--	✓
Final approval of article	✓	✓	✓	✓	✓
Statistical analysis	--	--	--	--	--

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