Case Report

Successful treatment with DCF chemotherapy and radiotherapy for primary squamous cell carcinoma of the prostate

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Introduction: Primary squamous cell carcinoma of the prostate is an extremely rare tumor with poor prognosis. Squamous cell carcinoma of the prostate is estimated to comprise less than 1% of all prostate carcinomas. We report herein a case with clinical response to docetaxel, cisplatin, and 5-fluorouracil chemotherapy with radiotherapy, in a patient with metastatic squamous cell carcinoma of the prostate.

Case presentation: A 74-year-old man consulted with frequent urination. The prostate-specific antigen level was 1.62 ng/mL. Multiparametric magnetic resonance imaging showed prostate imaging and reporting and data system category 5 for the whole prostate and biopsy was performed. The pathological diagnosis was pure squamous cell carcinoma of the prostate. Fluorodeoxyglucose positron emission imaging showed fluorodeoxyglucose accumulation in the whole prostate and multiple pelvic lymph nodes. Four cycles of docetaxel, cisplatin, and 5-fluorouracil regimen were administrated along with radiotherapy. The patient showed a marked response with no major adverse events.

Conclusion: The present case suggests the potential of docetaxel, cisplatin, and 5-fluorouracil chemotherapy with radiotherapy for squamous cell carcinoma of the prostate.

Key words: DCF chemotherapy, primary squamous cell carcinoma of prostate, radiotherapy.

Keynote message

Metastatic SCC of the prostate is very rare, unassociated with elevated PSA values, and lacking any established therapy. We report a case of primary metastatic SCC of the prostate (cT4N1M0) in which DCF chemotherapy with radiotherapy proved effective.

Introduction

Primary SCC of the prostate is an unusual tumor with poor prognosis, characterized by advanced stage at diagnosis and early metastasis. SCC is estimated to comprise less than 1% of all prostate tumors.1

SCC of the prostate shows extremely poor prognosis compared to adenocarcinoma. This pathology is not associated with elevated levels of PSA and combined androgen blockade therapy usually proves ineffective. The optimal therapeutic strategy for SCC of the prostate remains unclear. The TAX 324 trial showed a long-term survival benefit of DCF chemotherapy for locally advanced squamous cell carcinoma of the head and neck.2 DCF chemotherapy showed significantly longer overall and progression-free survivals for hypopharyngeal and laryngeal cancers with 2-years of follow-up. Onoda et al. reported the feasibility of DCF chemotherapy for SCC of the prostate.3 We report herein a case with metastatic SCC of the prostate that showed clinical response to DCF chemotherapy with radiotherapy.
Case presentation

A 74-year-old Japanese man was referred to his primary care hospital for the investigation and treatment of gross frequent urination in April 2019. He had a history of completely cured colorectal cancer (laparoscopic transverse colectomy; high-grade tubular adenoma, 2014), gastric cancer (laparoscopic total gastrectomy; pT1b, 2012), esophageal cancer (ESD; pT1a, 2011), and tonsil cancer (partial glossectomy; pT1, 2009). PSA level was 1.62 ng/mL within the normal range. Neuron-specific enolase level was normal (13.3 ng/mL; normal <16.3 ng/mL). Soluble interleukin-2 receptor (sIL-2R) was elevated (647 ng/mL; normal <582 ng/mL). Multiparametric MRI showed enlargement and marginal irregularity in prostate (PI-RADS score 5). The suspected malignant lesion showed infiltration of the seminal vesicle and bladder neck (Fig. 1a,b).

The patient underwent transrectal prostatic needle biopsy, and pathological examination revealed pure SCC of the prostate. Hematoxylin and eosin staining showed nests of differentiated squamous carcinomatous cells. These squamous carcinomatous cells showed a formation of intracellular bridges and individual keratinization in the central part (Fig. 2a,b).

Immunohistochemically, tumor cells appeared positive for CK5/6 and p40, but negative for GATA3, uroplakin2, prostatic serum acid phosphate, and PSA. On the basis of these findings, the patient was diagnosed with pure SCC of the prostate (Fig. 2c,d). Serum SCC was 6.1 ng/mL (normal <1.5 ng/mL). FDG-PET showed FDG accumulation in the whole prostate and multiple pelvic lymph nodes in the region of the obturator nerve (Fig. 1c,d). The patient was treated with volumetric modulated arc therapy (VMAT) (total, 78 Gy in 39 fractions) to the whole pelvis and prostate. After radiotherapy, the patient received four cycles of DCF chemotherapy (5-fluorouracil at 600 mg/m² administered as a continuous infusion for 5 days from day 1, docetaxel at 50 mg/m² on day 2, and cisplatin at 60 mg/m² on day 2; interval: 4 weeks).

DCF chemotherapy has been already approved by a new medical technology review committee in Kochi Medical School Hospital (approved number: 2019–13). PET/CT and MRI after four cycles of DCF chemotherapy showed a marked response. The whole prostate generally shrank to normal size and marginal irregularity disappeared on MRI (Fig. 3a,b). FDG accumulation in pelvic lymph nodes disappeared and no lymph node swelling was apparent in the region of the obturator nerve (Fig. 3c,d). Serum SCC was within the normal range (0.9 ng/mL) after radiochemotherapy. As adverse events during DCF chemotherapy, myelosuppression (neutropenia, Grade 4) and stomatitis (Grade 2) were observed. The patient was judged to be in complete remission on imaging and as of the 6-month follow-up remained in complete remission.
Fig. 2 Pathological findings from prostate biopsy. (a) Microscopic features of the prostate biopsy show atypical cells with nuclear enlargement and eosinophilic cytoplasm forming large alveolar nests (×40). (b) Parakeratosis is evident and cells have differentiated into squamous epithelium (×200). (c) Immunohistochemistry of the prostate biopsy shows positive staining for p40 (×200). (d) Immunohistochemistry of the prostate biopsy shows negative staining for prostatic serum acid phosphatase (×200).

Fig. 3 Imaging findings after treatment. (a) After treatment, MRI shows a significant shrinkage of the whole prostate to normal size. (b) The same region shows significant improvement of the signal intensity for the entire prostate on diffusion-weighted imaging. (c) FDG-PET shows no accumulation of FDG in prostate. (d) FDG-PET shows significant improvement of FDG accumulation in pelvic lymph nodes.
Discussion

We reported a case with SCC of the prostate treated using DCF chemotherapy and radiotherapy. This report describes the second description of metastatic SCC of the prostate successfully treated using DCF chemotherapy. No consensus has been reached regarding the optimal therapeutic strategy for metastatic SCC of the prostate because of the rarity of this disease.

In 1974, Mott et al. reported diagnostic standards for SCC of the prostate. They suggested five criteria for diagnosis: (i) clear malignant tumor showing invasive growth and anaplasia; (ii) histological features characteristic of SCC such as keratinization, cancer pearl formation, and intercellular bridges; (iii) no parts showing histological characteristics specific to adenocarcinoma with squamous metaplasia; (iv) no history of anti-androgen treatment for adenocarcinoma; and (v) no SCC in other organs, especially in the bladder. In this case, items were all satisfied, and as for Item 5, although there was a history of esophageal cancer and tonsil cancer, both cancers showed pathologically pT1 stage and no lymphovascular invasion. There was no evidence of recurrence and metastasis for more than 5 years after surgery. The primary site of the SCC was considered to be the prostate.

Various therapies, such as prostatectomy, combined androgen blockade therapy, and radiotherapy, have been tried for SCC of the prostate. However, all therapies were ineffective and definitive treatments with established efficacy for SCC of the prostate have remained lacking.

Munoz et al. reported the use of combined-modality therapy to treat SCC of the prostate with extracapsular disease. Administration of three courses of cisplatin 75 mg/m² on day 1 and continuous infusion of 5-fluorouracil at 750 mg/m² on days 1–5 were performed subsequently with radiotherapy (total, 72 Gy). This patient showed survived for 60 months.

The TAX 324 trial was a randomized, open-label phase III trial comparing three cycles of DCF induction chemotherapy (docetaxel 75 at mg/m², followed by intravenous cisplatin at 100 mg/m² and fluorouracil at 1000 mg/m²/day, administered as a continuous infusion for 4 days) with three cycles of PF (intravenous cisplatin 100 mg/m², followed by fluorouracil at 1000 mg/m²/day as a continuous infusion for 5 days) in patients with stage III or IV squamous cell carcinoma of the head or neck. Five-year survival rates for DCF and PF were 52% and 43%, respectively. Median survival time was 70–76 months for DCF and 34–38 months for PF. This study demonstrated a significant survival benefit of DCF chemotherapy in head and neck cancer.

Onoda et al. reported the feasibility of combined administration of DCF chemotherapy and radiotherapy (total, 64 Gy) for SCC of the prostate with lymph node metastasis. The patient in that report showed no evidence of recurrence at the 24-month follow-up after treatment.

In the present case of SCC of the prostate, DCF chemotherapy as a first-line treatment showed marked improvement of the whole prostate lesion and in pelvic lymph nodes. This case suggests the potential of DCF chemotherapy as a first-line treatment option for SCC of the prostate.

Conflict of interest

The authors declare no conflict of interest.

Approval of the research protocol by an institutional review board

The Ethical Review Committee of Kochi medical school does not require ethical approval for reporting the individual case. A new medical technology review committee in Kochi Medical School Hospital approved DCF chemotherapy (approved number: 2019-13).

Informed consent

Written informed consent was obtained from the patient for their anonymized information to be published in this article.

Registry and the registration no. of the study/trial

Not applicable.

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