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Case report

Intensity-modulated radiation therapy for small cell carcinoma of the prostate: A case report

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ABSTRACT

Small cell carcinomas (SCC) make up only 1% of malignancies of the prostate. Reports of several case series have described outcomes of surgery and chemotherapy for SCC of the prostate, but few reports address radiotherapy. We treated a case of SCC of the prostate with intensity-modulated radiation therapy (IMRT) consisting of 70 Gy administered in 35 fractions followed by hormonal therapy using only luteinizing hormone-releasing hormone (LH-RH) agonist. The tumor volume decreased remarkably by 4 months after IMRT. The rapid decrease in tumor size of this SCC of the prostate seemed to suggest a similar high radiosensitivity to that of SCC of the lung, but the tumor increased rapidly thereafter within the radiation fields, and pelvic lymph node metastases had developed by 24 months after IMRT. By 28 months after IMRT, multiple lung metastases developed, and the patient died of SCC of the prostate 31 months after initial diagnosis.

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1. Introduction

Small cell carcinoma (SCC) is uncommon in the prostate gland and accounts for less than 1% of prostatic malignancies.[1] Its prognosis is considered worse than that of common adenocarcinoma despite several aggressive treatments that include surgery and/or chemotherapy and/or hormonal therapy. Recent reviews have reported the dismal outcome of SCC, with 5-year survival of 14.3% and average survival less than one year.[2] No standard treatment is established for this rare variant, which seems generally resistant to hormonal therapy. Surgery is sometimes recommended, but many cases are judged unresectable at initial diagnosis because of the tumor's aggressive growth with distant metastases. On the other hand, SCC is often considered to be a systemic disease, and recommended chemotherapy includes drugs such as carboplatin, etoposide, and docetaxel. Though we found

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several case-series reports that described outcomes of surgery and chemotherapy for SCC of the prostate, we believe few reports describe radiotherapy. We report a case with SCC of the prostate that we treated with IMRT consisting of a total dose of 70 Gy administered in 35 fractions followed by hormonal therapy using only luteinizing hormone-releasing hormone (LH-RH) agonist.

2. Case report

An 81-year old man visited our hospital with symptoms of ischuria; his performance status was graded one based on the guidelines of the Eastern Cooperative Oncology Group, and he was admitted for further evaluation. The patient had many comorbidities, including hypertension, type 2 diabetes mellitus, interstitial pneumonia, and chronic renal failure. He had no family history of prostate cancer. An elastic hard mass in the right lobe of the prostate at rectal examination and initial serum level of prostate-specific antigen (PSA) of 7.42 ng/mL suggested prostate cancer. Magnetic resonance (MR) imaging demonstrated a large mass in the right lobe of the prostate with extracapsular extension and invasion to the right seminal vesicle. The tumor showed iso-signal intensity on T1-weighted image, low signal intensity on T2-weighted image, and high signal intensity on diffusion-weighted image (Fig. 1). A transrectal prostate biopsy confirmed small cell carcinoma (SCC) of the prostate histology, and there was a strong positive staining for chromogranin A, a secretory protein, and MIB1, an antibody against the protein Ki-67, a protein expressed in proliferating cells (Fig. 2).

Four of 5 cores were positive in the right lobe of the prostate, and none of the 5 cores in the left lobe was positive. Other examinations, including chest X-ray and contrast-enhanced computed tomography (CT), revealed no abnormal enlargement of pelvic lymph nodes and no distant metastases. We finally diagnosed the tumor as Stage III (T3bN0M0) SCC of the prostate according to the TNM classification system[4] and categorized it as high risk according to the D'Amico classification.[5]

The tumor was judged unresectable because of its aggressive growth, which included its invasion of the right seminal vesicle, and the patient's many comorbidities precluded chemotherapy. We, therefore, chose IMRT as an initial treatment, utilizing a protocol similar to that for standard treatment of common adenocarcinoma of the prostate. IMRT was delivered by a 10-MV X-ray using 7 portals with a daily dose of 2 Gy administered 5 times a week. We created 3 radiation volumes – the gross tumor volume (GTV), the clinical target volume (CTV), and the planning target volume (PTV). For the first course of radiation, we referred to pretreatment CT and MR imaging to create the GTV and CTV on the treatment-planning CT. The CTV included the GTV, entire prostate gland, and bilateral entire seminal vesicles. The prescription dose was a minimum dose of at least 95% of the CTV, and inverse optimization was performed. The PTV included the CTV with a margin of 0.9–1.0 cm, except for the posterior of the prostate, where a margin of 0.6 cm was used. Finally, a radiation oncologist rearranged the PTV according to the dose limit of the CTV and organs at risk, including the bladder and rectum. Fig. 3 shows the dose distribution of IMRT. IMRT was performed and

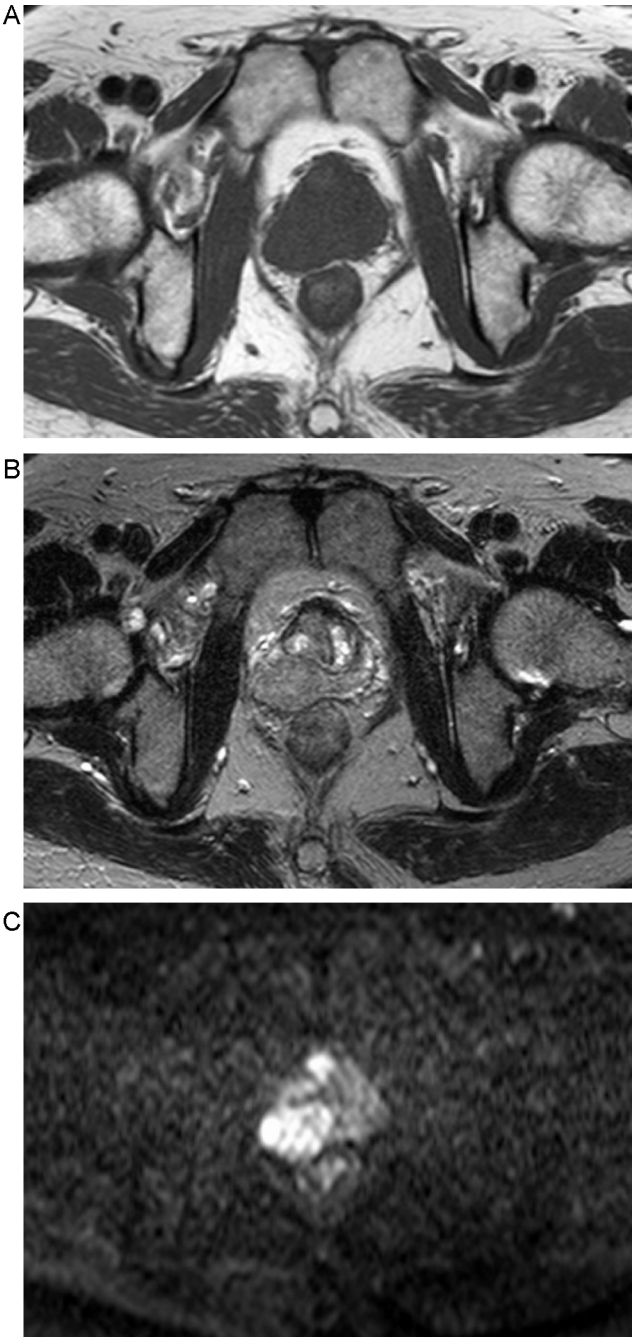

Fig. 1 – Magnetic resonance imaging demonstrates a large mass in the right lobe of the prostate that invades beyond the surgical capsula of the prostate and to the right seminal vesicle. (A) Iso-signal intensity on T1-weighted image; (B) low signal intensity on T2-weighted image; (C) high signal intensity on diffusion-weighted image.

continued to a total dose of 70 Gy in 35 fractions in the same radiation fields with no change. Serum PSA was 5.04 ng/mL at completion of the IMRT.

We evaluated outcomes and toxicities weekly during IMRT and at subsequent patient visits every 1–2 months thereafter. Follow-up examinations included physical examination, serum PSA testing, and imaging studies when necessary.

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