Case Report

Successful radiofrequency ablation of liver metastases from prostate cancer

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Abbreviations & Acronyms
AWS = antiandrogen withdrawal syndrome
CAB = combined androgen blockade
CBZ = cabazitaxel
CT = computed tomography
DOC = docetaxel
ENZ = enzalutamide
FLU = flutamide
mCRPC = metastatic castration-resistant prostate cancer
MDT = metastases directed therapy
MRI = magnetic resonance imaging
PCa = prostate cancer
PSA = prostate-specific antigen
RFA = radiofrequency ablation

Introduction: Patients with liver metastases from prostate cancer show poor prognosis. We performed metastases-directed therapy using radiofrequency ablation of liver metastases in an attempt to improve the prognosis in a patient with metastatic prostate cancer.

Case presentation: We present the case of a 66-year-old man who was treated for metastatic castration-resistant prostate cancer. Evaluation showed isolated liver metastases together with elevated serum prostate-specific antigen levels. We performed metastases-directed therapy using radiofrequency ablation of the liver tumor. The patient showed no recurrent liver metastases for 42 months and survived for 66 months after diagnosis of metastatic prostate cancer.

Conclusion: To our knowledge, this is the first report that describes radiofrequency ablation of liver metastases from prostate cancer. This procedure may be a useful therapeutic option for metastases-directed therapy in patients with liver metastases from prostate cancer.

Key words: liver metastasis, metastases-directed therapy, prostate cancer, radiofrequency ablation.

Keynote message

Patients with liver metastases from prostate cancer tend to show poor prognosis. The clinical benefits of metastases-directed therapy for liver metastases from prostate cancer remain controversial. We present a case of successful radiofrequency ablation of liver metastases from prostate cancer. This procedure may be a useful therapeutic option for metastases-directed therapy for metastatic prostate cancer.

Introduction

Recent studies have reported the usefulness of local treatment for primary and metastatic lesions of oligometastatic PCa. Local treatment for metastatic lesions is referred to as MDT. MDT is proposed as a useful approach even in patients with mCRPC with limited number of metastatic sites (oligometastasis). MDT for PCa metastases includes metastasectomy and stereotactic body radiotherapy in patients with oligometastatic bone and lymph node disease, and this approach may likely delay disease progression.1,2

Patients with liver metastases from PCa have poor prognosis. Compared with metastases at other sites, liver metastases are known to be associated with poorer median overall survival (approximately 13 months).3

We performed MDT concomitant with systemic therapy in an attempt to improve the prognosis of patients with liver metastases from PCa.

We report a case of MDT using RFA for liver metastases from PCa in a patient who showed long-term disease control and prolonged survival.

Case

A 66-year-old man was diagnosed with PCa cT3N1M1ab in January 2014. The serum PSA level was 215 ng/mL, with Gleason score of 5 + 5 in 8 of 8 cores at his first visit. Imaging revealed lymph node and bone metastases with an extent of disease score of 2. Therefore, CAB therapy using goserelin acetate and bicalutamide was initiated.
The serum PSA level decreased to 0.092 ng/mL with improvement in lymph node and bone metastases. However, a subsequent increase in the serum PSA level led to diagnosis of CRPC in September 2014. Anti-androgen withdrawal syndrome was confirmed, and we observed a decrease in serum PSA levels.

The serum PSA level again increased to 1.982 ng/mL in December 2015. CT revealed a low-density area (18 mm in diameter) in segment 6 of the liver (Fig. 1a).

FLU, which was the second-line systemic treatment at that time, was started.

In January 2016, ultrasound examination was performed and detected a solid lesion with a size of 17 × 18 × 18 mm. Due to the increase in PSA in March 2016, FLU was discontinued for the purpose of confirming AWS.

Lymph node and bone metastases continued to regress; therefore, we considered MDT using RFA based on the location and size of the liver lesion. We asked the Department of Gastroenterology to perform biopsy of liver tumor and possibly RFA. After that, contrast-enhanced MRI was performed, and revealed a liver tumor in the same area. The lesion showed high signal intensity on diffusion-weighted imaging and significant enhancement in the early phase and washout in the late phase, suggestive of a metastatic liver tumor (Fig. 1b).

Biopsy of the liver tumor was performed on April 2016, but the diagnosis could not be made due to the defective specimen.

In June 2016 (due to the patient’s social situation, there was a blank period of 2 months), we performed re-biopsy of the liver lesion and RFA. On the day of the ultrasound examination, the size of the liver tumor was 20 × 18 × 13 mm.

The patient was discharged 5 days later without postoperative complications.

The histopathological examination of the liver tumor biopsy specimen was adenocarcinoma, although the PSA staining of the liver biopsy was faint, we concluded that it is liver metastases from PCa (Fig. 2). The search for neuroendocrine cancer did not performed.

The serum PSA level decreased slightly from 13.535 ng/mL (pre-treatment) to 12.043 mg/mL (post-treatment). However, the serum PSA level increased to 19.432 ng/mL, with worsened bone metastases, 3 months later. The patient was treated with systemic therapy using DOC (treated with a total of 20 cycles) followed by ENZ. Bone metastases showed gradual progression; however, liver metastases did not recur for over 3 years (Fig. 3).

Tumor recurrence was observed in segment 6 of the liver in December 2019, 42 months after RFA, and repeat RFA performed at the same site controlled liver metastases at least temporarily.

The patient developed multiple liver metastases a year later in December 2020. We changed systemic treatment to CBZ, then performed a third session of RFA of seven lesions; however, liver metastases rapidly worsened. The patient died of liver failure in June 2021, 66 months after the detection of liver metastases (Fig. 4).

Discussion

PCa primarily metastasizes to bone and lymph nodes, and visceral metastases involving the lungs and liver, are relatively rare. Usually, liver metastases develop in an advanced state of systemic disease. Therefore, liver metastases secondary to oligometastases are extremely rare.

In our case, the liver metastases appeared as a solitary lesion, and lymph node and bone metastases regressed following systemic treatment. We performed MDT to the metastatic liver lesion considering oligometastatic disease in this patient.

Few reports have discussed MDT for liver metastases from PCa. Wang et al. reported a case of successful surgical resection of solitary liver metastases. Bunck et al. reported radioembolization using selective intra-arterial administration of Yttrium-90 resin microspheres for successful treatment of multiple liver metastases. Yeo et al. reported microwave needle ablation and SBRT as a useful therapeutic strategy for liver metastases.

To our knowledge, no study has reported RFA for liver metastases from PCa.

RFA is often performed for hepatocellular carcinoma and liver metastases from colorectal cancer. RFA uses ultrasound to help guide a needle electrode into a cancerous tumor.
High-frequency electrical currents through the electrode creates focused heat that destroys the cancer cells surrounding the electrode. Minimal invasiveness and repeatability serve as advantages of RFA. In this case, RFA was well tolerated and was repeated thrice. In our view, RFA is effective treatment for liver metastases from PCa because the liver tumor could not be detected by CT from immediately after performing RFA, which was before DOC administration. The patient showed no recurrent liver metastases for 42 months and survived for 66 months after the diagnosis of metastatic PCa.

Whether MDT contributes to long-term survival in patients with liver metastases is uncertain; further accumulation of cases is warranted to conclusively establish the role of this treatment strategy in such cases. However, this therapeutic approach merits consideration in patients with limited number of liver lesions and other lesions are controlled. In our
opinion, RFA may be a useful therapeutic intervention in patients with the aforementioned clinical presentation.

**AUTHOR CONTRIBUTIONS**

Takahiro Sugano: Data curation. Mika Kino: Data curation. Takako Nakata: Data curation. Hiroki Kito: Methodology. Masafumi Inoue: Data curation. Hajime Fujie: Data curation. Koichiro Akakura: Conceptualization; data curation; formal analysis; methodology.

**Conflict of interest**

The authors declare no conflict of interest.

**Approval of the research protocol by an Institutional Reviewer Board**

Not applicable.

**Informed consent**

Informed consent was obtained from the patient for the publication of this article and the accompanying images.

**Registry and the Registration No. of the study/trial**

Not applicable.

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