



A case of urethral metastasis of castration-resistant prostate cancer successfully cured with CyberKnife radiosurgery

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ABSTRACT

Distant urethral metastasis of the castration-resistant prostate cancer (CRPC) is very rare. In this case report, we present a 69-year-old man who was first diagnosed prostate cancer from the sessile papillary tumor in the prostatic urethra which recurred after surgery and androgen deprivation therapy and finally treated with CyberKnife radiosurgery. There has been no recurrence for 50 months. To the best of our knowledge, there is no case of urethral metastasis of the CRPC successfully controlled with CyberKnife radiosurgery in the literature.

Introduction

The common sites of the metastasis being bone, lung, liver, and brain, distant urethral metastasis of the prostate cancer is very rare.¹ The treatment of urethral metastasis usually presents poor prognosis and it has clinical value to report a controlled case with new modality. We present a case of urethral metastasis in the anterior urethra of castration-resistant prostate cancer (CRPC) 12 months after radical prostatectomy treated with CyberKnife radiosurgery.

Case presentation

A 69-year-old male patient was referred to our hospital because of macrohematuria. His initial prostate-specific-antigen (PSA) level was 9.598 ng/mL, and digital rectal examination indicated a hard mass which was suspected to be a local advanced prostate cancer. Cystoscopy revealed a sessile papillary tumor nodule in the posterior urethra near verumontanum (Fig. 1a). Transurethral resection of the tumor and transrectal ultrasound (TRUS) guided prostate biopsy were performed. Urethral tumor showed Gleason 4 + 4 prostatic adenocarcinoma (Fig. 1b) and TRUS prostate biopsy confirmed Gleason Score 5 + 4 adenocarcinoma in 4 out of 8 biopsy cores (Fig. 1c). Due to the unusual presentation of the urethral tumor, immunostaining was performed and showed strong PSA positivity. Staging computed tomography (CT) scan confirmed a locally advanced prostatic tumor. A radioisotope bone scintigraphy showed no bone metastasis. The patient had undergone

radical retropubic prostatectomy and extended lymphadenectomy. Pathological examination revealed two masses of Gleason Score 4 + 4 adenocarcinoma with extra prostatic extension (pathological T stage 3b, positive margin). The surgery was uneventful and serum PSA went down to 2.640 ng/mL. Twelve months after surgery, serum PSA arises, and cystoscopy revealed urethral tumor in the anterior urethra (Fig. 2a). Cold cup biopsy of the tumor was performed and it showed Gleason Grade 4 + 4 adenocarcinoma with positive PSA staining. Androgen deprivation therapy was initiated and the relapsed tumor vanished in 3 months. After 6 months of androgen deprivation therapy, he had another chance of macrohematuria and PSA elevation. Cystoscopy again revealed a relapse of urethral tumor diagnosed as CRPC due to the low testosterone value. MRI showed a tumor in the anterior urethra (Fig. 2b and c). Shared decision making was done with the patient. The patient did not expect any further surgical treatment and decided to undergo CyberKnife radiotherapy of 7.25 Gy × 5 times. The tumor had vanished and serum PSA value decreased to <0.003 ng/mL. Cystoscopy and MRI were performed every 6 months and he is currently clinically stable for 50 months. There had been no severe comorbidity other than several chances of microscopic hematuria.

Discussion

Primary penile urethral cancer is very rare and metastatic tumors are even less frequent. The origin is usually the bladder, prostate, or the gastrointestinal system. Ellis and Epstein reviewed 29 cases of

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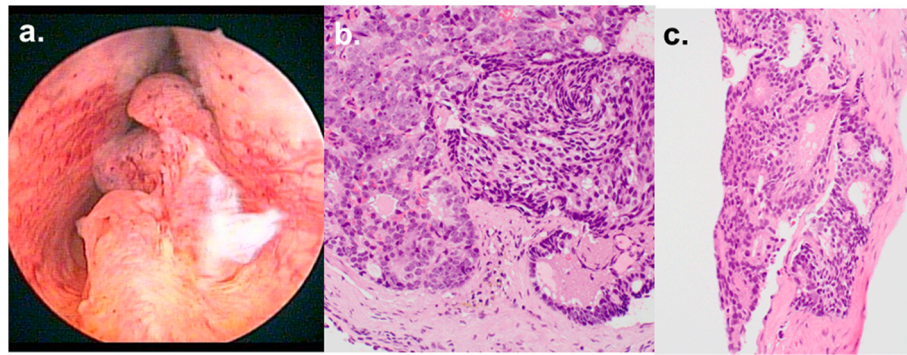


Fig. 1. Cystoscopic appearance of a papillary tumor in the prostatic urethra near verumontanum is shown. (a) The main histological features of the tumor in the prostatic urethra and the prostate biopsy specimen are presented. Gleason score 4 + 4 and 4 + 5 adenocarcinoma were the main pattern. (b, c).

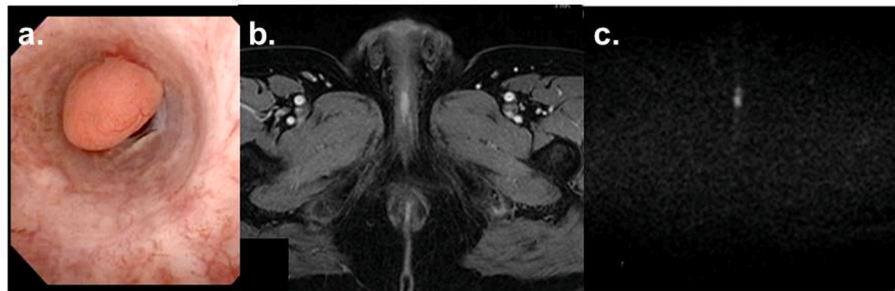


Fig. 2. Cystoscopic appearance of relapsed tumor in the penile urethra is shown. An exophytic growth of the tumor is observed. (a) Images of MRI in the anterior penile urethra are presented. (b, c).

metastatic prostate cancers to the penis, found 16 (55.2%) of them had originated from prostatic ductal adenocarcinomas and most of the remainder originated in acinar adenocarcinomas.² Our case has features of high grade prostatic acinar adenocarcinoma.

Metastases from prostate cancer to the urethra show a number of architectural patterns including papillary, cribriform, single glands. The first visual diagnosis in our case was primary urethral cancer of urothelial origin, so that immunostaining was performed to confirm the true nature of the tumor. Urothelial and prostate cancers resembles morphologically, and some of the poorly differentiated prostate adenocarcinomas has negative PSA immunostaining. In our case, the PSA staining was strongly positive in each tissue so that we could diagnose as prostate cancer metastasize to urethra. The mechanism of the spread to the urethra is still unclear and there is no single clear explanation because of the complex structure of the urethra. The mechanism has been discussed to include 4 patterns, such as implantation by instrumentation, arterial emboli, direct invasion, and venous or lymphatic dissemination in a retrograde manner.^{3,4} Comparing the histology of our case before and after radical prostatectomy as shown in Figs. 1a and 2a, it seems that implantation during surgery might be the causative in our case. To achieve the curative treatment, we should have advocate total cystoprostatectomy and urethrectomy. The incidence of primary urethral cancer is very low, and the metastatic one is even lower. In localized primary urethral cancer, complete urethrectomy with surrounding tissue is advised to minimize recurrence due to positive margins.⁵ During the radical prostatectomy, the prostatic urethra was completely removed but the pathology reported a lesion of extraprostatic extension around one of the prostate cancer mass and vein infiltration of the cancer. The relapsed tumor occurred 6 months after surgery in the penile urethra which was just near the vesicourethral anastomosis lesion. Those results indicate venous dissemination and implantation during surgery.

Conclusion

Patients with metastatic prostate cancer to the urethra generally have a poor prognosis because they are usually diagnosed in advanced stages. In this presented case, total cystoprostatectomy and urethrectomy might have been a candidate for the curative treatment, however, it could be invasive. CyberKnife therapy was performed with no adverse effects and there had been no severe comorbidity, therefore, it has been indicated that CyberKnife radiosurgery can be an effective treatment option for the urethral metastasis of CRPC.

Ethical statement

Written informed consent was taken from the patient for this report. This work has been approved by the Ethics Committee of the University of Yamanashi Hospital.

Statement of ethics

The treatment was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. The patient has given his written informed consent to publish his case (including publication of images). Information revealing the subject's identity is to be avoided.

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Author contributions

Drafting the article: Yoshifumi Kasai, Norifumi Sawada, Takahiko Mitsui.

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Declaration of competing interest

Conflicts of interest: The authors have no conflicts of interest to declare.

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