Case Report

A case of rapidly progressive prostate cancer with bone and lymph node metastasis after contact laser vaporization for benign prostatic hyperplasia

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Abbreviations & Acronyms
BPH = benign prostatic hyperplasia
CT = computed tomography
CVP = contact laser vaporization of the prostate
DRE = digital rectal examination
GS = Gleason score
HoLEP = holmium laser enucleation of the prostate
ISUP = International Society of Urological Pathology
LUTS = lower urinary tract symptoms
MRI = magnetic resonance imaging
PC = prostate cancer
PSA = prostate-specific antigen
PVP = photoselective vaporization of the prostate
TUR-P = transurethral resection of the prostate

Introduction: Prostate cancer is incidentally diagnosed in 6%–11% of benign prostatic hyperplasia surgeries.
Case presentation: A 79-year-old man was diagnosed with benign prostatic hyperplasia. The prostate volume was 54.5 mL, and the prostate-specific antigen level was 7.121 ng/mL. Magnetic resonance imaging and prostate biopsy were not performed. He then underwent contact laser vaporization of the prostate. After 3 months, gross hematuria occurred, and the prostate-specific antigen level was 62.495 ng/mL. Cystoscopy and magnetic resonance imaging revealed prostate cancer with bladder invasion. Prostate biopsy and transurethral resection were performed, revealing adenocarcinoma with a Gleason score of 5 + 5. The patient was diagnosed with prostate cancer T4N1M1b, and triplet therapy was initiated. After 6 months, the prostate-specific antigen level was 0.037 ng/mL, and the metastases had shrunk.
Conclusion: Vaporization for high-grade prostate cancer can lead to rapid progression. Therefore, screening for prostate cancer before benign prostatic hyperplasia surgery is important.

Key words: biopsy, laser therapy, magnetic resonance imaging, prostatic hyperplasia, prostatic neoplasms.

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Keynote message

When vaporization is performed for high-grade prostate cancer, rapid progression is possible. Therefore, screening for prostate cancer before benign prostatic hyperplasia surgery is important.

Introduction

Surgery for BPH is indicated in cases of urinary retention, urinary tract infection, and symptoms of outlet obstruction refractory to medical therapy.[1] When considering surgery for BPH, screening for PC is usually performed using DRE, PSA, or MRI, and if PC is suspected, prostate biopsy is performed.[2] With the widespread use of PSA screening, the incidence of incidental cancers diagnosed after surgery has decreased from 23% to 7%, and that of T1b cancers has decreased from 15% to 2%.[3]

TUR-P was the standard treatment for BPH. Recently, enucleation and vaporization are widely used. CVP uses a 980-nm diode laser,[4] and its treatment outcomes and complications are comparable to those of PVP.[5] Although there are reports of PC being diagnosed after PVP,[6–8] there are few reports of cases being diagnosed immediately after CVP.

Herein, we report a case of PC with bone and lymph node metastases diagnosed 6 months after CVP.

Case presentation

A 79-year-old man was diagnosed with BPH 8 years previously. His PSA level was initially 2.269 ng/mL and increased to 4.0 ng/mL in 7 years. Medication did not improve urinary dysfunction; therefore, he was referred for day surgery. The prostate volume was 54.5 mL, DRE revealed a soft and regular-sized prostate, and the PSA level was 7.121 ng/mL. MRI, prostate biopsy, and CT were not performed. He underwent CVP, and urinary flow improved. Three months after CVP, gross hematuria occurred, and the PSA level was 14.503 ng/mL. Transabdominal ultrasonography revealed a bladder mass.

The patient was referred to our hospital 6 months after CVP (Fig. S1). DRE revealed a stony-hard mass, and the PSA level was 62.495 ng/mL. Cystoscopy (Fig. 1) and MRI (Fig. 2) suggested PC with bladder invasion. Prostate biopsy and transurethral resection were performed to control hematuria. Pathological examination revealed adenocarcinoma with a GS of 5 + 5, and transurethral resection of the bladder tumor was performed (Fig. 3). CT and bone scintigraphy revealed multiple metastases to the pelvic and para-aortic lymph nodes and to the acetabulum and pubic bone, respectively (Fig. 4). The patient was diagnosed with PC T4N1M1b. Triplet therapy with androgen deprivation therapy, docetaxel, and darolutamide was administered. After 6 months of triplet therapy, the PSA level was 0.037 ng/mL. CT showed that the metastases had shrunk (Fig. S2), and partial response was achieved. Meanwhile, urinary function was preserved.

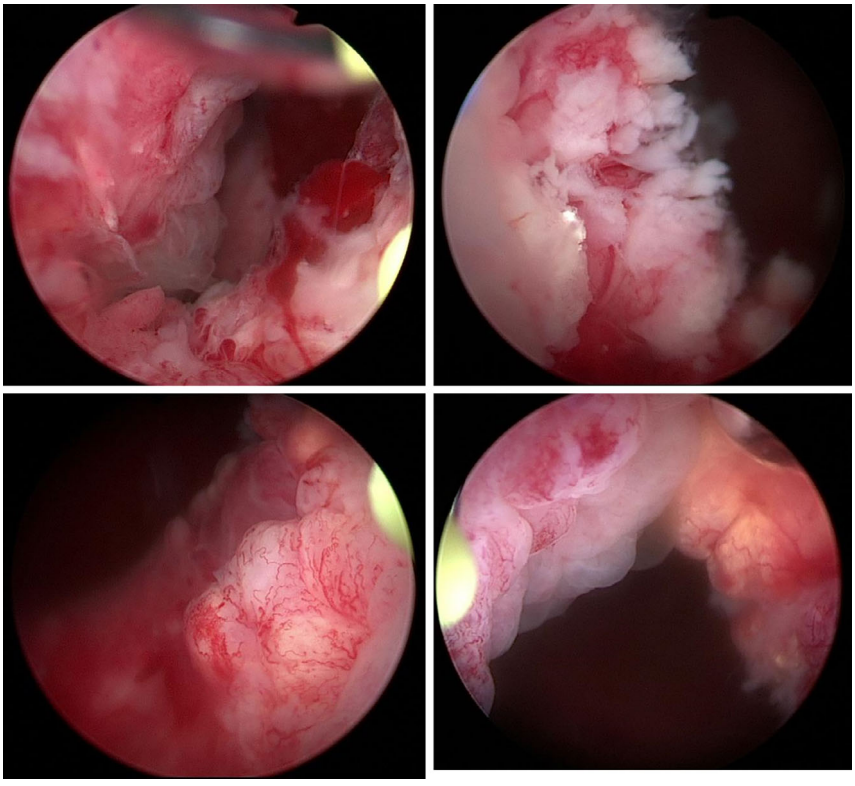

Fig. 1 Cystoscopy. Cystoscopy shows a non-papillary easily bleeding tumor extending from the prostatic urethra to the bladder neck.

Fig. 2 Magnetic resonance imaging (T2-weighted image) (a: axial, b: sagittal). Magnetic resonance imaging reveals a tumor centered on the anterior bladder and extending to the bladder neck.

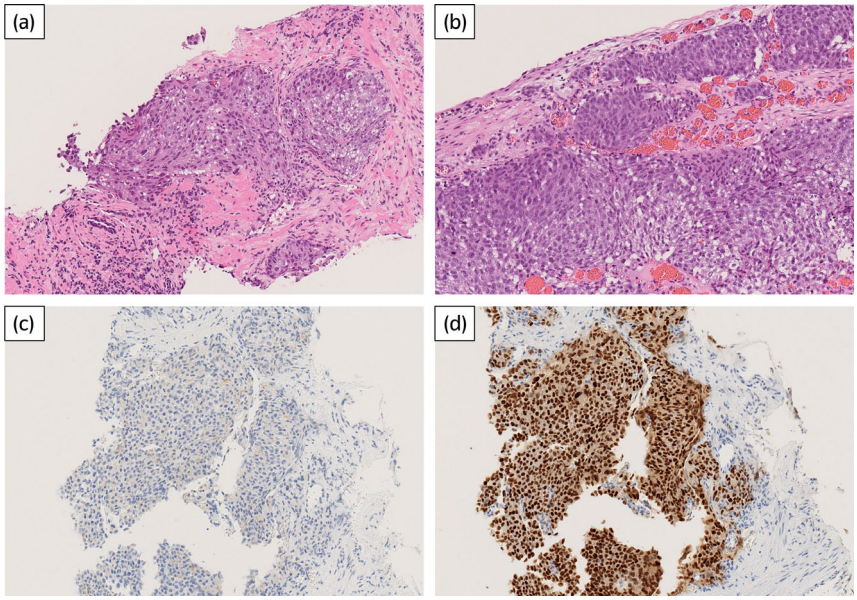

Fig. 3 Pathology. Prostate biopsy (a), (c), (d) and transurethral resection (b). (a) Poorly differentiated adenocarcinoma with GS 5 + 5 (hematoxylin and eosin staining, magnification 10×). (b) Adenocarcinoma with GS 5 + 5. Findings similar to prostate biopsy (hematoxylin and eosin staining, magnification 10×). (c) Prostrate-specific antigen staining is slightly positive (magnification 10×). (d) NKX3.1 staining is diffusely positive (magnification 10×).

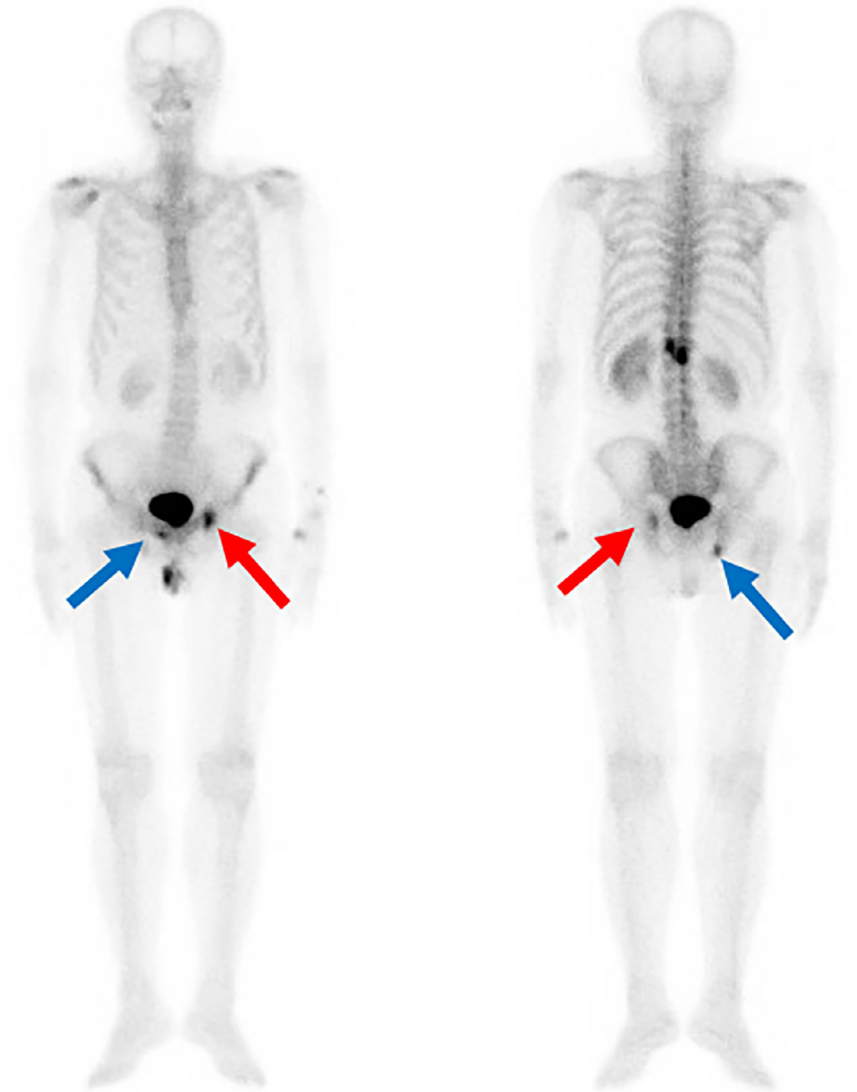

Fig. 4 Bone scintigraphy. Metastases to the left acetabulum (red arrow) and right pubic bone (blue arrow). RI accumulation in the Th11 vertebral body was diagnosed as a hemangioma based on CT findings.

Discussion

This is a case of rapidly progressing high-grade metastatic PC that was diagnosed 6 months after CVP. In this case, the clinical data before CVP were limited to the PSA levels. MRI and prostate biopsy were not performed because the patient wanted rapid improvement of urinary function.

There have been reports on the incidental diagnosis of PC after BPH surgery. A report of 1177 cases revealed incidentally diagnosed PC in 6.3% (n = 74) of patients; 67 (91%) were classified as ISUP grade group 1 (GS ≤6), which is insignificant cancer. In 1247 HoLEP cases, 134 (10.7%) had PC; only 3 (2.2%) were high-grade cancer classified as ISUP grade group 5 (GS ≥9).[9] In both reports, prostate biopsy was performed preoperatively. The incidence of incidental PC significantly decreases when prostate biopsy is performed before surgery for BPH (odds ratio, 0.29; 95% confidence interval, 0.12 to 0.72; $p = 0.007$).[10]

There have been reports of PC being diagnosed after PVP. In a study involving 1154 patients, 27 were diagnosed with PC, and the PC-free survival was 96.7% and 89.4% at 5 and 10 years, respectively.[7] In another study involving 94 patients that underwent PVP, low-stage PC was observed in 5 patients (5%) 3 years after surgery.[8] In both reports, PC screening was performed before PVP, and no rapid progression was observed. One disadvantage of vaporization is that PC cannot be diagnosed at the time of surgery. Preoperative screening using PSA measurements and MRI is important, and prostate biopsy is when cancer is suspected.[6,11,12]

Whether vaporization for PC causes rapid disease progression remains unclear. PVP was performed for LUTS in 71 patients with PC, and there were no cases of rapid progression or distant metastases.[13] A study comparing TUR-P and CVP for LUTS in locally advanced (T3 or T4) cancers after external beam irradiation revealed no cases of disease progression or distant metastases.[14] In low-grade or post-irradiation cases, vaporization did not contribute to disease progression.

There is a report of rapid progression of BPH after surgery. A patient with GS 4 + 5 PC had dissemination to the bone 2 weeks after HoLEP. Prostate biopsy was not performed because malignancy was not suspected based on the preoperative PSA level and DRE.[15] Compared with prostate biopsy, high-grade invasive cancer diagnosed using TUR-P has a high rate of metastasis and mortality.[16] When transurethral surgery for BPH is performed on high-grade PC, dissemination, and metastasis after surgery are possible. Thus, prior screening and diagnosis of PC are essential.

TUR-P for PC, especially those with a GS of 10, negatively impacts OS.[17] Transurethral manipulation may result in tumor seeding. In patients with PC who underwent TUR-P, 9.8% who were negative for PSA RT-PCR were positive postoperatively.[18] Laser surgery ablates prostate tissues to a depth of 4.0 ± 0.7 mm.[19] As PC is often located in the peripheral zone, it is unlikely to be ablated adequately, which may cause local recurrence. In some cases, local progression was observed after HoLEP, suggesting that transurethral manipulation may have caused seeding of PC cells into the bloodstream.[15]

Combined local treatment with systematic therapy can prolong OS in patients with low-volume metastatic prostate cancer.[20] Our patient had low-volume metastasis, a high GS, and extensive local invasiveness; therefore, the combination of local treatment was considered. However, radiotherapy was not performed owing to the lack of reports on the benefit of radiotherapy combined with triplet therapy. Recently, the PEACE-1 study showed an improvement in OS and radiographic progression-free survival when radiation therapy and abiraterone were combined with systematic therapy.[21] Consequently, the benefit of the addition of radiotherapy to triplet therapy may be considered as a primary treatment option for low-volume metastatic hormone-sensitive prostate cancer.

Conclusion

Postoperative dissemination or metastasis is possible in patients with high-grade PC. Diagnosis of PC using MRI or prostate biopsy before BPH surgery is crucial.

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Author contributions

Kei Muraoka: Writing – original draft. Akira Fujisaki: Writing – review and editing. Kosuke Uchida: Validation. Yasuhiro Hakamata: Validation. Yuka Kanda: Validation. Kota Sugiura: Validation. Masashi Yoshida: Validation. Shin Imai: Validation. Yoshiro Otsuki: Validation. Tatsuaki Yoneda: Supervision.

Conflict of interest

The authors declare no conflict of interest.

Approval of the research protocol by an Institutional Reviewer Board

None.

Informed consent

Written informed consent was obtained from the participant.

Registry and the Registration No. of the study/trial

None.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Fig. S1. Contact vaporization of the prostate. (a) Preoperative cystoscopy shows bladder outlet obstruction caused by benign prostatic hyperplasia. (b) Postoperative cystoscopy shows relief from bladder outlet obstruction after CVP (b).

Fig. S2. Computed tomography images obtained before and after chemotherapy. Para-aortic lymph node metastases observed before treatment (a) reduced in size after treatment (b).