

Oncology

Solitary brain metastasis from prostate cancer after multi modality treatment: A case report



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ABSTRACT

We herein report an unusual case of brain metastasis from prostate cancer during androgen deprivation therapy and post-docetaxel and definitive local therapy. The brain metastasis was surgically resected followed by Whole-brain radiation therapy. Postoperatively, his PSA again decreased to an undetectable level and remained undetectable with no evidence of new or recurrent disease.

Introduction

Prostate cancer is the most common cancer in men and the second leading cause of cancer death in North America. The two most common sites of metastasis are the lymph nodes and bone. Intracranial metastases from prostate cancer are extremely rare events in the natural history of the disease, and were initially reported to occur in an estimated 0.6% of patients. These metastases typically only occur in the context of widespread metastatic disease. We report a unique case of a solitary brain metastasis as the first recurrence site after definitive local therapy for prostate cancer.

Case presentation

A 63-year-old male presented with gross hematuria and visited our hospital in April 2014. Urine cytology showed adenocarcinoma cells with mucin production. His serum prostate-specific antigen (PSA) was 9.95 ng/ml. Digital rectal examination (DRE) detected a nodular mass on the right lobe. A trans-peritoneal prostate biopsy revealed a Gleason grade 5 + 5 adenocarcinoma. In addition, bladder neck involvement was confirmed by targeted biopsy. Computed tomography (CT) showed multiple enlarged abdominal and pelvic lymph nodes that were less than 15 mm in the short axis. Bone scintigraphy showed no evidence of bone metastasis.

The patient received degarelix acetate once a month, once daily

bicalutamide 80 mg, and docetaxel (70 mg/m²) every three weeks six times. After six months of androgen deprivation therapy (ADT) and docetaxel treatment, his PSA level decreased to 0.04 ng/ml. Follow-up chest and abdominopelvic CT images showed a marked decrease in the size of the previously enlarged lymph nodes. Subsequently, the patient received high-dose rate (HDR) brachytherapy to the prostate (a dose of 22Gy in two fractions), followed by external beam radiotherapy (EBRT) to the pelvic and para-aortic lymph nodes (a dose of 50.4Gy in 28 fractions). ADT was continued through radiotherapy and thereafter. His PSA level, however, showed a gradual increase after reaching a nadir (< 0.01 ng/ml) in September 2015. In December 2016, he presented with symptoms of dizziness. Magnetic resonance imaging (MRI) and CT examination of the brain showed a heterogeneous, multi-lobulated, intra-axial lesion in the right cerebellar hemisphere with rim enhancement and surrounding edema (Fig. 1). His PSA level rose to 1.34 ng/ml. No evidence of extra-cranial disease was detected by a repeat staging.

Right lateral suboccipital craniotomy was performed with gross total resection of the tumor. The pathological findings confirmed prostate cancer with positive immunohistochemical staining (Fig. 2). Adjuvant whole-brain radiation therapy (WBRT) was performed. Postoperatively, his PSA again decreased to an undetectable level and remained undetectable with no evidence of new or recurrent disease over a follow-up period of 23 months.

Abbreviations: PSA, prostate-specific antigen; DRE, digital rectal examination; CT, computerized tomography; ADT, androgen deprivation therapy; MRI, magnetic resonance imaging; WBRT, Whole-brain radiation therapy; CRPC, castration-resistant prostate cancer; HSPC, hormone-sensitive prostate cancer

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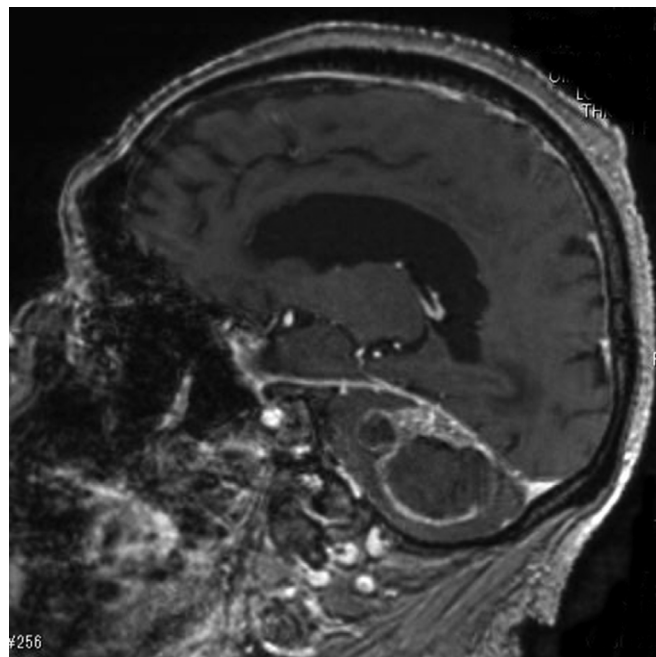
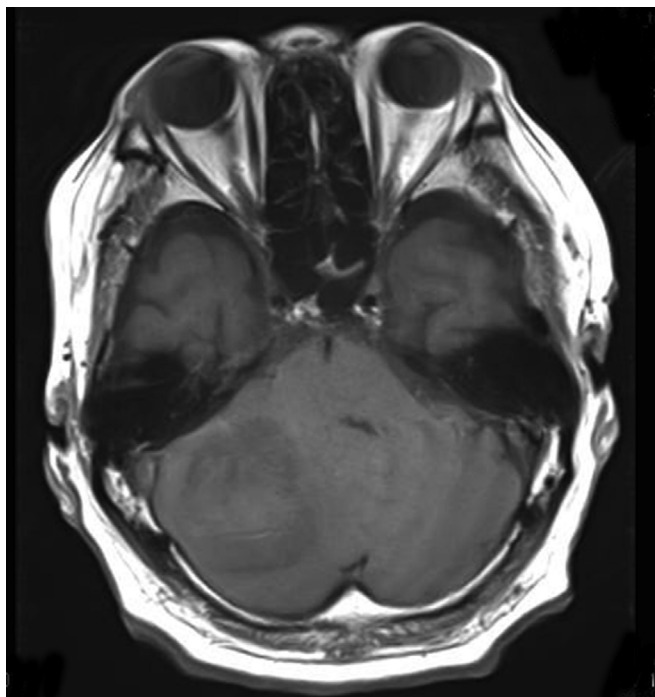


Fig. 1. (continued)

Fig. 1. Magnetic resonance (MRI T1) images in the axial plane (A), T1 images after gadolinium in the axial plane (B), and sagittal plane (C) and an enhanced computed tomography (CT) image (D) of the brain metastasis.

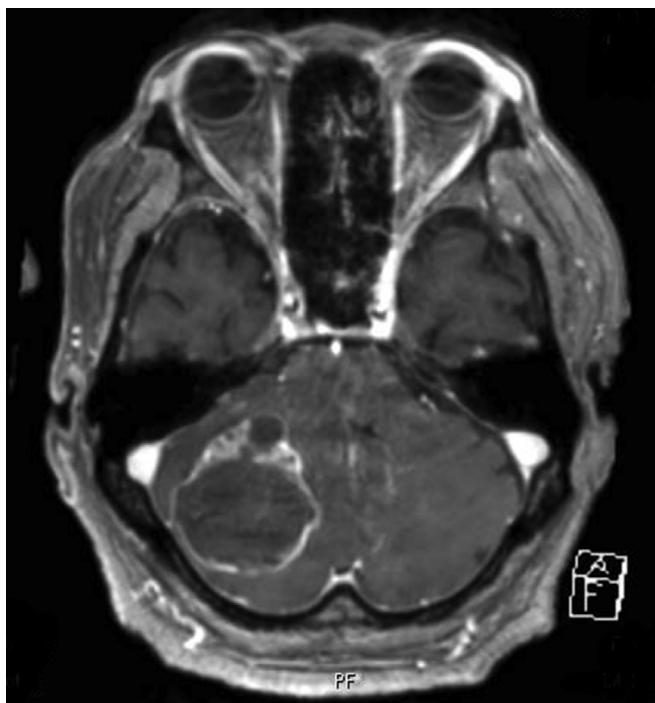


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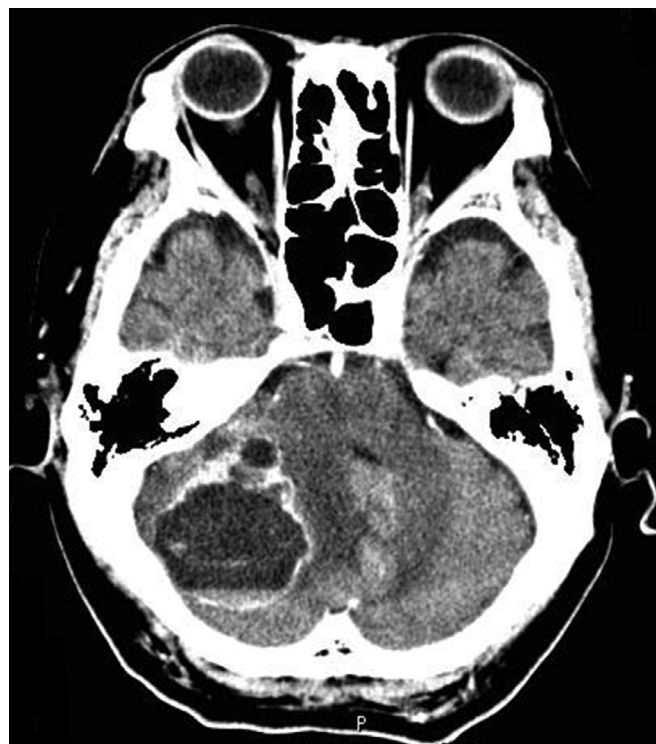


Fig. 1. (continued)

Discussion

We experienced an isolated brain metastasis during ADT and post-docetaxel and definitive local therapy. Recently, retrospective studies have suggested that interventions, such as radical prostatectomy and local or metastasis-directed radiotherapy, can be performed in the metastatic setting with minimal risk of toxic effects for oligometastatic prostate cancer patients, and may reduce the need for subsequent

palliative interventions.¹ The current case received HDR brachytherapy to the prostate, followed by EBRT to the pelvic and para-aortic lymph nodes with good local control.

Docetaxel has been recognized as an important treatment option for patients with metastatic castration-resistant prostate cancer (mCRPC) and hormone-sensitive prostate cancer (mHSPC).² Docetaxel is effective not only for lymph-node metastases and bone metastases, but also visceral metastases. Nonetheless, central nervous system metastasis has been observed. Brain metastasis from prostate cancer is a rare phenomenon with a reported incidence of 0.63%. Caffo et al. reported that the incidence of brain metastasis from prostate cancer increased to

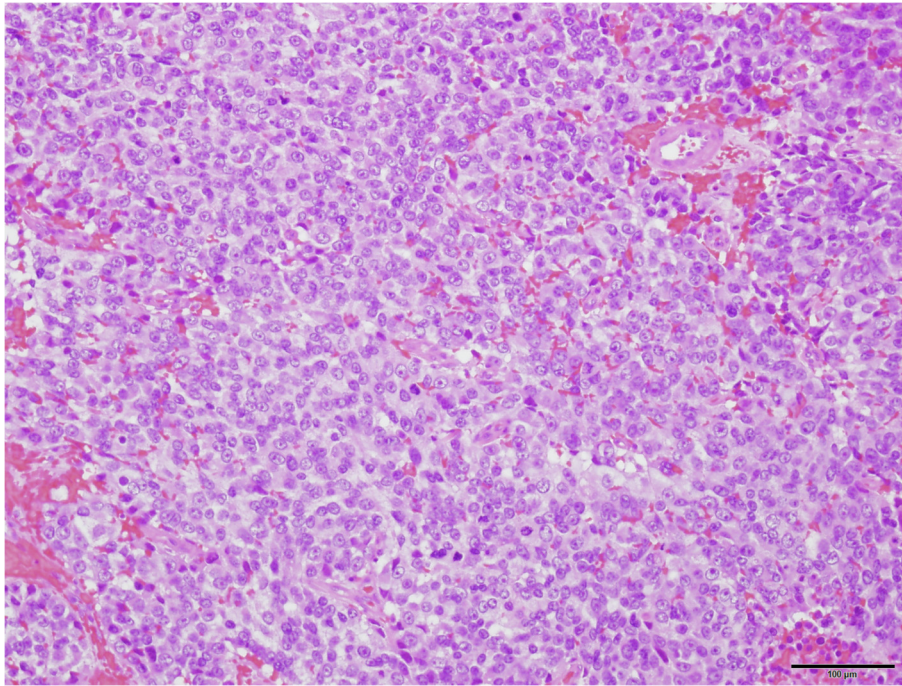


Fig. 2. Histopathology findings. A: H&E stain 10 \times . B: Positive staining for PSA 10 \times

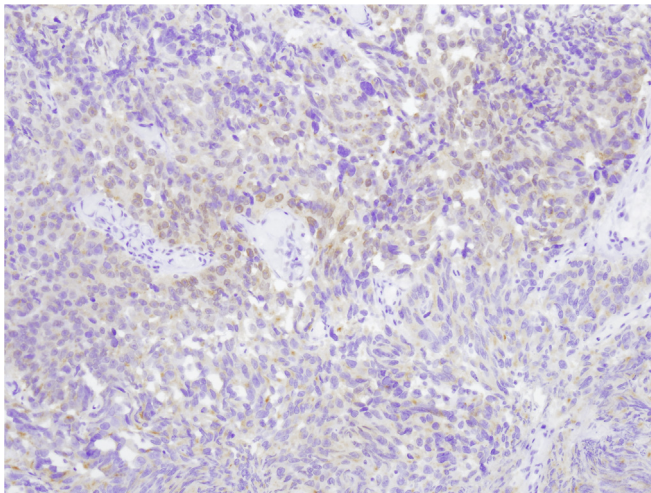


Fig. 2. (continued)

2.8% in the post-docetaxel era, and was only 0.8% in the pre-docetaxel era.³ Part of this increase in frequency could be due to the inability of docetaxel to cross the blood-brain barrier easily since it is a large hydrophobic molecule.⁴ This may be one reason for the sole brain metastasis appearance in this case.

Surgical resection with adjuvant WBRT has been the standard of care for solitary metastasis in the brain. A strategy of combined surgical and radiation treatment has been evaluated in randomized studies and found to significantly reduce the risk of recurrence compared with surgical resection or WBRT alone.⁵ The patient responded well to this combination therapy, as his PSA showed a rapid normalization and

remained undetectable with no evidence of new or recurrent disease.

Conclusion

Brain metastasis rarely occurs in prostate cancer. However, in a new era of improved outcomes for CRPC patients, clinicians should be cautious not to exclude brain metastasis even when the disease has not spread widely or the patient tests negative for PSA.

Conflicts of interest

The authors have no financial or other conflicts of interest to disclose.

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