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CASE REPORT

Malignant melanoma of the prostate: Primary or metastasis? A case report

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Abstract

BACKGROUND

Malignant melanoma of the prostate is rare. Twenty-five studies describing 45 cases have been reported. Prostate melanoma is characterized by an insidious onset and poor prognosis. The prognosis and treatment vary according to primary or secondary melanoma.

CASE SUMMARY

A 75-year-old man attended the hospital due to low back pain of 2 mo duration. He denied a history of trauma or abnormal urinary symptoms. Digital rectal examination showed indentation in the left lobe of the prostate, 1 cm in diameter. His prostate-specific antigen was 5.6 ng/mL and ^{18}F-fluorodeoxyglucose positron emission tomography computed tomography (^{18}F-FDG-PET/CT) showed focal glucose metabolism in the left lobe. Imaging showed bone metastases to T12 and bilateral ribs. Transperineal prostate biopsy was done and three tissue specimens on the left side showed prostate adenocarcinoma (Gleason score 3 + 3 = 6), but the specimen on the right side showed malignant melanoma. The patient underwent T12 tumor resection and pathology findings indicated metastatic malignant melanoma. The patient underwent gastroscopy and colonoscopy, and gastroscopy revealed multiple mucosal black spots in the gastric body and fundus. The patient was diagnosed with secondary malignant prostate melanoma and primary gastric disease.

CONCLUSION

Diagnosis of primary prostate melanoma requires caution and ^{18}F-FDG-PET/CT may result in false-negative detection of melanoma.

Key Words: Melanoma; Prostate; Primary; Metastases; Diagnosis; Case report

Core Tip: Malignant melanoma of the prostate is rare. To date, 25 studies describing 45 cases have been reported. There is a significant difference in prognosis between primary and secondary cases. We report a case of secondary malignant prostate melanoma with primary gastric disease. We also review the literature on 10 cases of primary prostate melanoma, and found that most cases did not receive sufficient tests and ^{18}F-fluorodeoxyglucose positron emission tomography computed tomography (^{18}F-FDG-PET/CT) was false-negative. We conclude that caution should be used in the diagnosis of primary prostate melanoma, and ^{18}F-FDG-PET/CT may result in false-negative detection of melanoma.

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INTRODUCTION

Malignant melanoma, derived from melanocytes, mainly occurs in the skin, but can also be seen in the mucosa and internal organs, accounting for approximately 3% of all tumors[1]. Melanoma of the genitourinary tract is a rare disease, representing < 1% of all melanomas in men[2]. The majority develop from the penis and distal urethra, and melanoma of the prostate is even rarer; most are of prostatic urothelial origin or secondary to metastatic disease[3], and only 10 cases of primary melanoma of the prostate[4-13] and several cases of metastasis[14-17] have been reported in the English-language literature.

CASE PRESENTATION

Chief complaints

A 75-year-old man attended the hospital due to low back pain of 2 mo duration.

History of present illness

The patient had no history of trauma, tumor, and skin melanoma, and no recent weight loss. He also had no urinary symptoms.

History of past illness

The patient had a free previous medical history.

Personal and family history

The patient denied family history of melanoma.

Physical examination

Digital rectal examination showed an indentation in the left lobe of the prostate, which was 1 cm in diameter.

Laboratory examinations

Laboratory tests showed an abnormal level of prostate-specific antigen (PSA), which was 5.6 ng/mL, and free PSA/total PSA was 13.19%. His hemoglobin was 114 g/L and lactate dehydrogenase was 376 U/L. Other biochemical tests were within the reference range.

Imaging examinations

Lumbar magnetic resonance imaging (MRI) showed multiple abnormal signals in the bone, indicating possible metastatic tumors, and compressed bone in thoracic (T12) vertebrae (Figure 1), with a high T1 signal and a low T2 signal. Bone single photon emission computed tomography showed T12 compression of whole body bone, with a concentration of radioactivity in bilateral ribs, and bone metastases were considered (Figure 2).

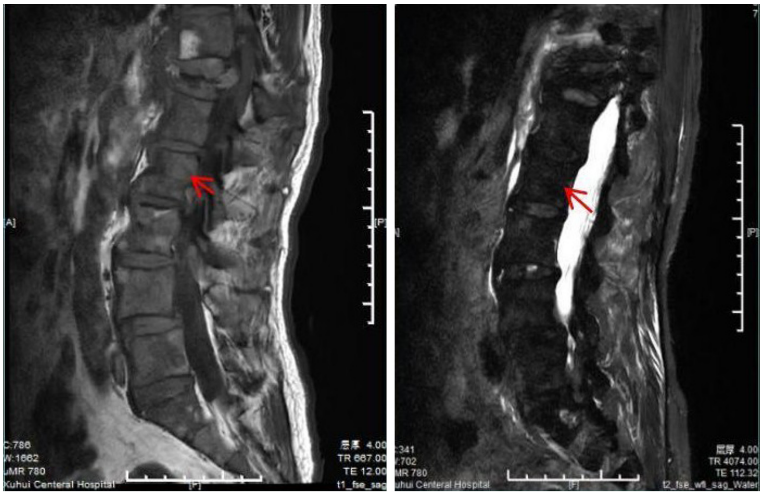

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Figure 1 Compressed bone of thoracic 12 vertebrae showing a high T1 signal and low T2 signal.

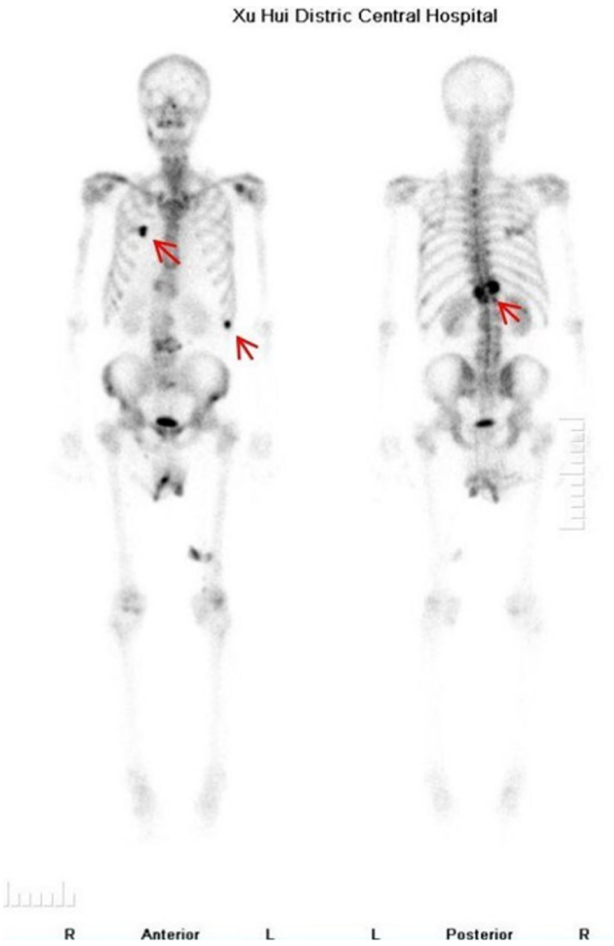

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Figure 2 Bone single photon emission tomography/computed tomography showing T12 compression of the whole body bone, and the concentration of radioactivity in bilateral ribs, thus bone metastasis was considered.

Positron emission tomography (PET)/computed tomography (CT) showed benign prostate hyperplasia, focal glucose metabolism in the left lobe, a malignant tumor waiting to be excreted, and puncture biopsy was recommended. Extensive bone lesions in the whole body were considered large metastases, and multiple small lymph nodes in the retroperitoneal and left pelvic wall required close follow-up (Figure 3).

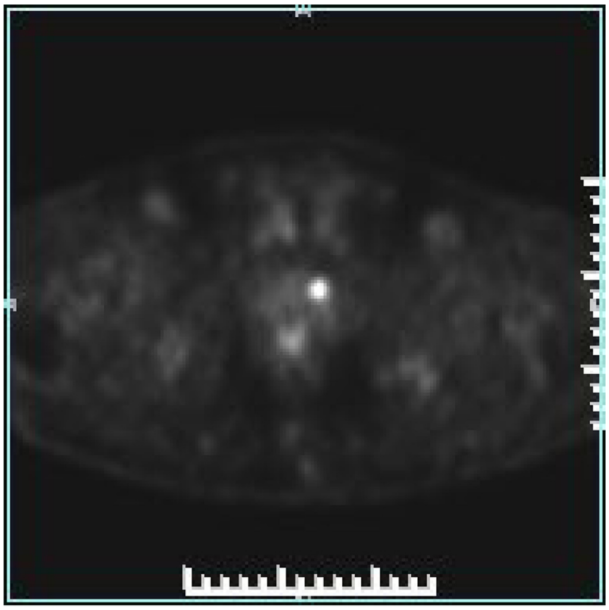

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Figure 3 ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography showing focal glucose metabolism in the left lobe of the prostate, and a malignant tumor waiting to be excreted.

Further diagnostic work-up

The patient underwent a transperineal prostate biopsy. Six tissue specimens were obtained. Three on the left side showed prostate adenocarcinoma (Gleason score 3+3=6), grade 1 (Figure 4A), and one on the right side showed small foci of melanocytes in the proliferative prostate tissue (Figure 4B). Immunohistochemical results were as follows: S100$^+$, Ki-67$^+$ 10%, CD68, SOX10$^+$, Melan A$^+$, P40, and HMB45$^+$ (Figure 4C).

The patient underwent gastroscopy and colonoscopy, and gastroscopy revealed multiple mucosal black spots in the body and fundus of the stomach (Figure 5A). A mucosal biopsy showed acute chronic nonatrophic gastritis in the antrum. Alcian Blue-Periodic Acid-Schiff in the gastric body suggested malignant melanoma. Immunohistochemical results were as follows: tumor cells S100$^+$, HMB45$^+$, AE1/AE3, p53$^+$, Ki-67$^+$ 3%, CD68, SOX10$^+$, and Melan A$^+$ (Figure 5B).

The patient underwent T12 tumor resection, spinal canal decompression and vertebroplasty. Black lesions were found on the thoracic vertebrae and lumbar appendages. Pathology findings indicated metastatic malignant melanocytoma.

FINAL DIAGNOSIS

This patient was diagnosed with primary prostate adenocarcinoma, gastric melanoma with bone metastases, and prostate metastases.

TREATMENT

Following bone surgery (T12 tumor resection, spinal canal decompression and vertebroplasty), the patient received dacarbazine + cisplatin chemotherapy and (Rh-endostatin) targeted therapy for four courses.

OUTCOME AND FOLLOW-UP

The patient died within 11 mo.

DISCUSSION

Melanoma is a malignant tumor arising from pigment-containing cells, known as melanocytes, which are mainly located in cutaneous tissue. Prostate malignant melanoma may be primary or secondary[2], and a total of 46 cases have been reported to date including our patient. The median age of the patients was 61 years ranging from 29 to 84 years[1].

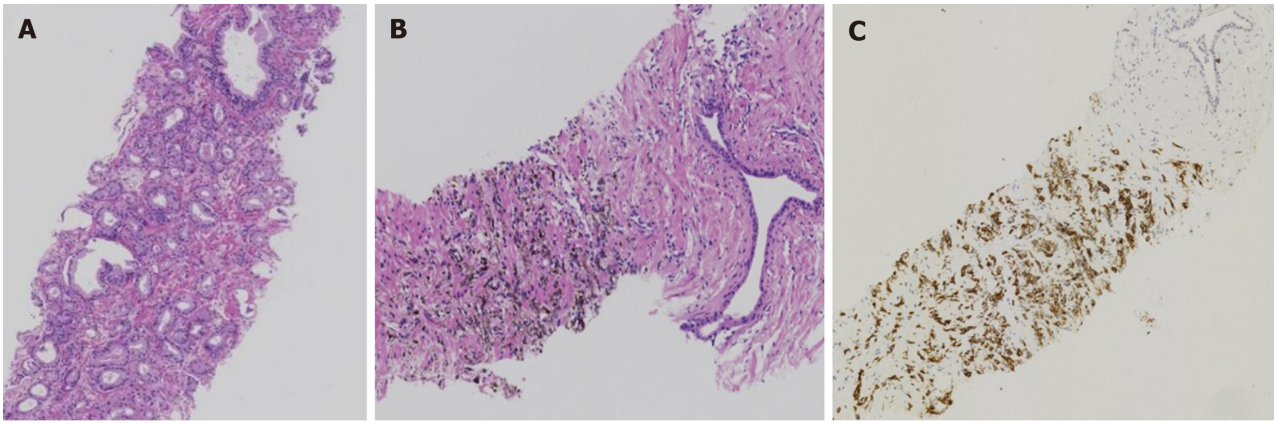

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Figure 4 Histopathology. A: Prostate adenocarcinoma [Hematoxylin and eosin (HE), original magnification, 25 ×]; B: Small foci of melanocytes in the proliferative prostate tissue (HE, original magnification, 25 ×); C: Immunohistochemical results: HMB45$^+$ (HE, original magnification, 25 ×).

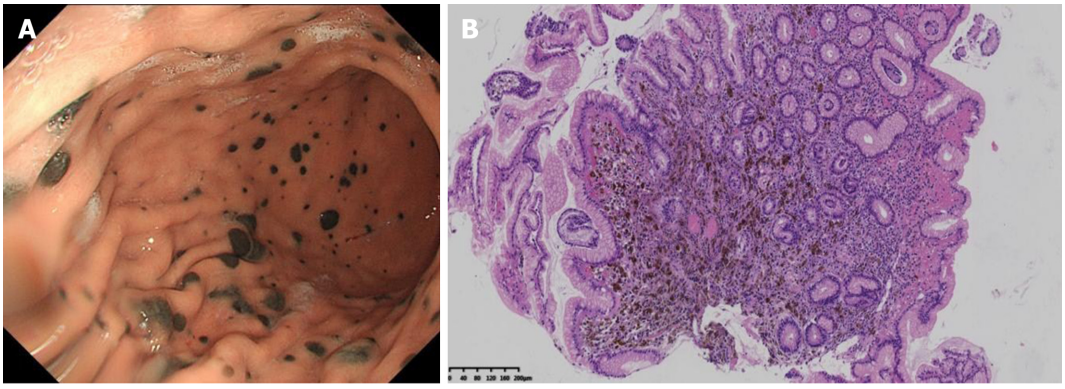

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Figure 5 Gastroscopy findings. A: Multiple mucosal black spots in the body and fundus of the stomach; B: Microscopic small foci of melanocytes in the gastric mucosa (hematoxylin-eosin, original magnification, 25 ×).

The most common presentation is obstructive lower urinary tract symptoms. Diagnosis needs histological analysis during transurethral resection of the prostate or core-biopsy material. When a diagnosis of prostate melanoma is made, it is important to distinguish between primary and secondary lesions, so it is important to look for melanoma lesions in other sites.

Our patient had primary gastric malignant melanoma with multiple metastases to the prostate and bone. In this case, ^{18}F-FDG-PET/CT showed high glucose metabolism on the left side of the prostate. The final pathological findings confirmed that it was prostate carcinoma. Melanoma has the lowest glucose metabolism of all malignant tumors. The lesions in the right prostate, gastric mucosa and ribs were not observed by ^{18}F-FDG-PET/CT. ^{18}F-FDG-PET/CT may result in a false-negative diagnosis. Teoh *et al*[18] and colleagues found that glutamine metabolism was more specific than deoxyribose metabolism both in melanoma and prostate cancer. In 2017, the United States Food and Drug Administration approved ^{18}F-FDG-PET/CT for imaging of recurrent prostate cancer. Fluciclovine also has the potential ability to selectively image T-cell modulation in the tumor microenvironment. Thus, ^{18}F-FDG-PET/CT may perform better than ^{18}F-FDG-PET/CT in the detection of prostate melanoma.

MRI manifestations of bone metastases from prostate carcinoma are generally T1 signal hypointensity and T2 hyperintensity. MR images in our patient were characterized by T1 enhancement and T2 attenuation, which can be used to differentiate between melanoma and prostate carcinoma of bone metastasis.

Following MRI, PET/CT and prostate biopsy, our patient underwent gastroenteroscopy, which revealed the primary lesion in the stomach. In the 10 cases of primary prostate melanoma reviewed in the present study (Table 1), it was found that there was a lack of thorough examination in most cases. Only three cases underwent endoscopy of the gastrointestinal tract and two received ^{18}F-FDG-PET/CT. The prognosis in these patients also varied, ranging from 1 to 84 mo[1-14]. We suggest that some patients diagnosed with primary prostate melanoma may have metastatic lesions at the time of diagnosis.

In the only systematic review presented to date on all cases of prostate melanoma, Caputo *et al*[14] summarized 45 cases both in English and non-English literature. The median age of patients was 61 years and only 10 primary prostatic cases have been reported so far. Caputo's team found that patients with prostatic metastases from melanoma had a dismal prognosis with a median survival of 3 mo (range 7 d to 6 mo). The prognosis of primary prostatic melanoma was

Table 1 Clinicopathological characteristics of the 10 primary prostatic melanomas included in the present review

Ref.	Age	History disease	Symptoms	Other test	Treatment	Stage	Time to recurrence	Metastases	Secondly treatment	OS
Berry and Reese[4], 1953	38	No	Luts	n/m	Cystoprostatectomy	n/m	7 mo	n/m	n/m	36 mo
Hübler *et al*[5], 1980	n/f	n/f	n/f	n/f	n/f	n/f	n/f	n/f	n/f	n/f
Wang[6], 2001	61	n/m	BPH	(1) Physical examination of the whole body skin surface, oral cavity, and mucosa and optic fundus; (2) CT and MRI of the brain, abdo_x005f men and pelvic cavity; and (3) endoscopy of gastrointestinal tract	TURP	T1N0Mo	n/m	n/m	No	84 mo
Wong and Bell[8], 2006	71	n/f	Urinary retention	n/f	TURP	n/f	n/f	n/f	n/f	5 mo
Wong *et al* [7], 2008	n/f	n/f	n/f	n/f	n/f	n/f	n/f	n/f	n/f	n/f
Doublali *et al*[9], 2010	75	n/m	Urinary tract obstruction. Urethroscopy had revealed black discoloration of the prostate	(1) Physical examination of body skin surface, mucosa; (2) CT of brain, abdomen and pelvis; and (3) colonoscopy and gastroscopy	TURP	n/m	n/m	n/m	No	1 mo
Ma *et al* [10], 2010	29	n/m	Disuria Digital rectal examination and Transrectal Ultrasound of a mass	Pelvic CT scan with contrast	Radical prostatectomy	T2N0M0	n/m	n/m	n/m	3 mo
Tosev *et al* [11], 2015	37	Hodgkin's disease	Hematuria and urinary retention. In-house cystoscopy showed an asymmetric prostate enlargement with purple discoloration Prostate biopsy	(1) Skin of the body; (2) colonoscopy and gastroscopy; (3) CT of chest and abdomen; and (4) pelvic MRI	Open retropubic radical prostatectomy with extended lymph-node dissection	n/m	4 mo	Lung	Dacarbazine, ipilimumab, nivolumab	16 mo
Li *et al* [12], 2019	42	No	Hematuria Accepy PVP. Intraoperatively, a dark lesion was noted in the patient's prostatic urethra	(1) CT of the chest, abdomen, and pelvis; (2) brain MRI; (3) bone scan; and (4) ^{18}F-FDG PET/CT scan	RRP and PLND	T2N1M0	3 mo	Lesion along the right iliac artery, pulmonary nodule	Biochemotherapy for 6 cycles dacarbazine, vinblastine, cisplatin, IL2	84 mo
Parmar *et al*[13], 2019	65	No	Acute urinary retention	(1) Physical examination of whole body skin surface, oral cavity and anal mucosa; and (2) PET-CT	TURP, Dacarbazine, Chemotherapy	n/m	3 mo	n/m	n/m	n/m

n/f: Full text not found; n/m: Not mentioned; no: None; LUTS: Lower urinary tract symptoms; TURP: Transurethral resection of the prostate; PVP: Photoselective vaporization of the prostate; RRP: Radical retropubic prostatectomy; PLND: Pelvic lymph node dissection; MRI: Magnetic resonance imaging; ^{18}F-FDG PET/CT: 18F-fluorodeoxyglucose positron emission tomography computed tomography; IL: Interleukin.

not as bad as expected. Of the seven available cases with at least 1 year of follow-up, two survived for > 5 years, while the remaining five died after an average of 1 year.

It is important to distinguish between primary and secondary melanoma. Radical surgery followed by adjuvant chemo-/immunotherapy represents the most reasonable therapeutic strategy. For patients with primary disease, a more aggressive approach may provide better benefits.

CONCLUSION

Malignant melanoma of the prostate is rare. There have been 46 cases reported including our patient. There is a significant difference in the prognosis between primary and secondary cases[14] (3 mo *vs* 12 mo). The diagnosis of primary prostate melanoma has important implications for treatment. For accurate diagnosis, physical examination of the body skin surface, CT of the whole body, and endoscopy including the urinary tract and gastrointestinal tract should be conducted. ^{18}F-FDG-PET may result in false-negative findings in the detection of melanoma both in the prostate and gastric mucosa.

FOOTNOTES

Author contributions: Zhao H contributed to study protocol and manuscript writing; Liu C contributed to the manuscript writing; Li B contributed to data collection; Guo JM contributed to project development; Zhao H and Liu C contributed equally to this work; All authors have read and approved the final version to be submitted.

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