Case Report

Relevance of computed tomography and magnetic resonance imaging for penile metastasis after prostatectomy: uncommon case report and brief review of the literature

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\textbf{Case report}

In December 2006, a 77-year-old male patient was treated with radical prostatectomy and dissection of lymph nodes, total adrenergic block (BAT), and cycles of radiation therapy for prostate adenocarcinoma (Gleason score 5 + 4 = 9; T3b N0 Mx).

During routine oncologic follow-up, his levels of serum prostate-specific antigen (PSA) had remained below 1 ng/mL for 6 years (normal values for PSA at our institution: 0-4.4 ng/mL). In March 2012, the patient’s value of PSA was 0.98 ng/mL.

In June 2012, laboratory tests revealed hematic level of PSA of 3.24 ng/mL. His value of PSA had tripled in only 3 months, about 5 years after radical surgery and therapies.

After this unexpected increase, complete clinical examination of the patient happened to be negative, without any skin alteration on the penile glans or any evidence of palpable inguinal lymph nodes.

Competing Interests: The authors have declared that no competing interests exist.

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In October 2012, the value of PSA had reached 6.16 ng/mL, almost twice compared to June 2012. Follow-up computed tomography (CT) scan did not reveal any metastatic localization in the abdomen, but scans showed osteolytic areas: one area with osteolytic features was visualized on the vertebral body of L2 and one on the left femur. Bone scintigraphy confirmed the positivity of these 2 lesions. Thus, oral therapy with estramustine phosphate was started.

During further follow-up, the patient did not complain any local complications or penile pain, but a continuous increase of his values of PSA was observed. Nevertheless, the disease remained stable until January 2013 (PSA values of 8.07 ng/mL), when another CT examination showed an oval subcutaneous nodule (maximum diameter 21 mm) that was located on the left margin of corpus cavernosum. After injection of iodinated contrast agent, this mass had homogenous and early contrast enhancement, indicating high angiogenesis. Furthermore, left scrotal hydrocele was observed (Fig. 1).

Magnetic resonance imaging (MRI) of the penis was performed on a 1.5-T scanner (GyroscanIntera; Philips Medical Systems, Best, The Netherlands) equipped with 8-channel dedicated coil. MRI images were acquired on axial, sagittal, and coronal planes using T1-weighted and T1 spectral presaturation with inversion recovery–weighted sequences and T2-weighted and T2 spectral presaturation with inversion recovery–weighted sequences; T1-weighted dynamic study after injection of gadolinium was also performed. MRI confirmed the previous findings, showing nodular area of altered signal intensity, hypointense on T1-weighted and T2-weighted sequences, characterized by an early and persistent contrast enhancement on dynamic sequences after injection of gadolinium (Fig. 2).

In February 2013, penile biopsy was performed. Pathology report from biopsy specimens was fibromuscular adipose tissue with infiltration of poorly differentiated carcinoma, all positive for PSA at the immunohistochemistry (Fig. 3). Levels of PSA at this time were 8.81 ng/mL.

In August 2013, values of PSA reached 13.57 ng/mL and another bone scintigraphy revealed new sites of metastatic localization.

Twelve months after the diagnosis of penile metastasis, due to cardiologic toxicity and bad general conditions of the patient, multidisciplinary group of our institution decided to treat him with best supportive care. The patient died about
30 months after the diagnosis of penile metastasis because of his bad general conditions.

**Discussion**

Penile metastases are relatively uncommon, event though the penis is provided by rich and complex vascular supply, well connected to the pelvic organs. In 1870, Eberth [1] first described a case of penile metastasis. In 1997, a Japanese Scientific Review reported only 110 described cases (Table 1). About 75% of all cases originate from the genital tract [2].

Clinical signs and symptoms associated with penile metastases are priapism, urinary retention, penile palpable masses or skin alterations, pelvic and perineum pain, dysuria, and hematuria [3]. Although prostatic carcinoma is the most common cancer in males and the second leading cause of cancer-related death in the United States [4], prostatic carcinoma metastases to the penis are rare and have been reported in less than 1% of all cases [5].

**Fig. 2** – MRI T1-weighted images on the axial plane (A) and T2-weighted images on the axial and sagittal planes (B, C) showing an oval-shaped area, hypointense on both sequences (white arrow) that is localized on the left side of corpus cavernosum. On dynamic sequences, after paramagnetic contrast agent injection, the lesion shows early contrast enhancement in the arterial phase (D), and persistent enhancement in the delayed phases (E, F). MRI, magnetic resonance imaging.

**Fig. 3** – Histologic findings of surgical biopsy. Fibromuscular tissue characterized by an infiltration from a poorly differentiated carcinoma (panel A, hematoxylin-eosin, 10×), showing a positive reaction with the anti-prostate-specific antigen antibody at the immunohistochemistry (panel B, 10×).
In prostatic cancer, the clinical management and follow-up is aided by laboratory testing of values of PSA and radiologic examinations.

Serum levels of PSA enable not only the early detection of prostatic adenocarcinoma but also the identification of eventual metastases during follow-up [14]. Despite this, we could find in the literature, a reported case of penile metastases without any increase of PSA levels [15,16].

Radiologic diagnosis of penile metastasis involves several steps: CT scan has an important role for the detection of secondary lesions at diagnosis and during the follow-up. MRI represents the most reliable technique in the differentiation of penile lesions and for staging: due to its soft-tissue contrast high capability, it can evaluate the invasion of tunica albuginea, corpora, and urethra. Typical MRI features of penile metastases are hypointensity on both T1- and T2-weighted sequences and nonspecific enhancement after gadolinium injection [17].

Currently the use of ultrasound has not been standardized yet.

The final diagnosis is made by needle core biopsy.

Our case is extremely rare: a presentation of penile metastasis 6 years after radical prostatectomy has not been previously reported in the literature. The average interval of presentation of penile metastatic localizations is reported to be about 38-50 months after the first diagnosis of prostate carcinoma [18].

In conclusion, metastatic prostatic cancer may present different localizations, including penile structures. Despite the rarity of this disease, considering its poor prognosis and its capability to metastasize after several years, it emerges the crucial role of radiologic examinations during oncologic follow-up, especially after significant increases of PSA levels.

### Acknowledgments

Conception and design of the study was done by VF, VL, GL and GC. Acquisition of data was carried out by VL, GC, VF, VF, and AM. Revision of the article was performed by VF, VF, GL, MR, and RF. Final approval was done by VF, MR, AM, RF.

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