

## Mesane Kanserinin Penil Metastazı: Diffüzyon-ağırlıklı Görüntüleme ile Tanı

*Penile Metastasis of Bladder Cancer: Diagnosis with Diffusion-Weighted Imaging*

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### ÖZET

Penil metastaz nadir görülen bir durumdur. Genelde orijin genitoüriner malignitelerdir. Manyetik rezonans görüntüleme (MRG) preoperatif görüntüleme için kullanılabilir bir tanı metodudur. Son dönemde tümör görüntüleme için MRG tekniklerinden olan difüzyon ağırlıklı görüntüleme (DAG) kullanılmaktadır. Bu olgu sunumunda nadir görülen bir durum olan mesane kanseri penil metastazı radyolojik bulgularını özellikle tanıda yardımcı olduğunu düşündüğümüz DAG bulgularıyla ilgili literatür eşliğinde sunmayı amaçladık.

**Anahtar kelimeler:** Diffüzyon ağırlıklı görüntüleme, Penil neoplaziler, Mesane neoplazileri, Manyetik rezonans görüntüleme

### ABSTRACT

Penile metastasis is a very rare entity that mostly the origin of the tumor is the genitourinary malignancies. Magnetic resonance imaging (MRI) is the method of choice in the preoperative diagnosis. Recently, diffusion weighted imaging (DWI) is used in tumor imaging which is an advanced technique of MRI. We report a case of bladder carcinoma with penile metastasis which is diagnosed by DWI with the review of the literature.

**Key Words:** Diffusion weighted imaging, Penile Neoplasms, Urinary Bladder Neoplasms, Magnetic resonance imaging

### INTRODUCTION

Metastases to the penis are very rare. It was first described by Eberth in 1870 in a patient with primary rectal carcinoma (1). In approximately, 70% of cases, penile metastases arise from other primary malignancies of genitourinary tract such as prostate and urinary bladder. Metastases from the colon, stomach, esophagus and pancreas have been less reported. Usually metastatic penile spread represents an advanced stage of disease and the prognosis is poor (2). Magnetic resonance imaging (MRI) is the most accurate imaging modality in the assessment and the staging of the disease while detecting the local or distant extension (3). Diffusion-weighted imaging

(DWI) is an advanced MRI technique, exploring the random motion of water molecules in the body which was initially used in brain especially in the diagnosis of acute stroke, but recently gained importance in body for tumor detection and characterization (4). In the current report, a patient with a bladder malignancy complicated with isolated penile metastasis diagnosed with DWI was presented with a review of the literature.

### CASE REPORT

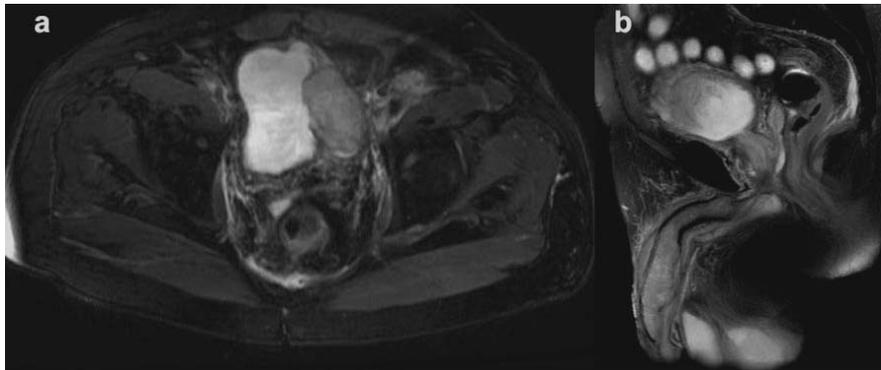
A 75-year-old man was admitted to the hospital with a painful swelling at the left side of the penis, weakness and fatigue for 2 months. Physical examination revealed a tender mass at the penile shaft without any ulceration. No palpable lymph nodes were observed. Urinary analysis revealed microscopic hematuria.

MRI (Intera Achieva 3T, Philips, NL) was performed with an eight-channel phased-array coil with the following sequences: turbo spin-echo (TSE) T1-

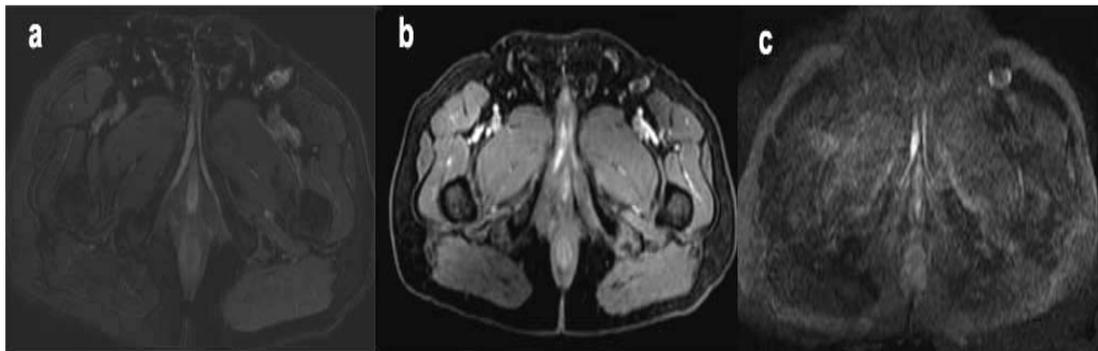
weighted axial (TR [repetition time] 565, TE [echo time] 10), fat-saturated T2-weighted axial and sagittal (TR 7182, TE 100, FA), gadolinium-enhanced fat-saturated T1-weighted GRE THRIVE axial and coronal (TR 565, TE 10, FA 10) and diffusion-weighted single-shot spin-echo echoplanar imaging sequence in axial plane (TR 4861, TE 55, FOV 450, slice thickness 4 mm, b value 1000 sec/mm<sup>2</sup>). The examination demonstrated a mass lesion on the left lateral wall of the bladder and on the mid-part of the left corpus cavernosum in the penis, demonstrating marked increased signal intensity on fat-saturated T2 weighted images, peripheral rim enhancement on contrast-enhanced sequences with restricted diffusion on DWI images (Figure 1). Apart from these, another abnormal enhancing area on the root of right cavernosal body with restricted diffusion also was observed on contrast-enhanced and DWI sequences

which was not seen on conventional sequences (Figure 2). Especially negative DWI images depicted the lesions more clearly (Figure 3). Low ADC values were measured in mass lesions (normal bladder wall 1,94x 6x10<sup>-3</sup>mm<sup>2</sup>/sec, bladder cancer 0,63x10<sup>-3</sup>mm<sup>2</sup>/sec, normal penis corpus cavernosum 0,98x10<sup>-3</sup>mm<sup>2</sup>/sec, penile shaft mass 0,44x10<sup>-3</sup>mm<sup>2</sup>/sec, and right penile root mass 0,58x10<sup>-3</sup> mm<sup>2</sup>/sec) due to restricted diffusion. Also some of the obturator and pelvic lymph nodes demonstrated restricted diffusion signal alterations on DWI.

The patient underwent radical cystectomy and penectomy operation with an ileal conduit construction. Pathological examination revealed low-differentiated urothelial carcinoma of the bladder with the metastatic lesions in both penile body and the root of right cavernosal body.

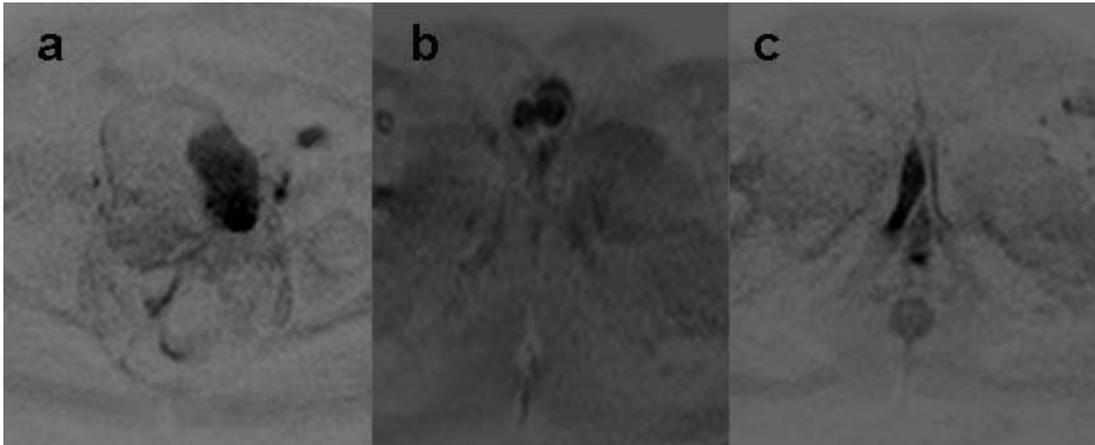


**Figure 1:** Left lateral wall bladder mass was seen hyperintense on fat-saturated T2-weighted image (a). Penile shaft lesion demonstrated volume increase and increased signal intensity on fat-saturated T2 image (b).



**Figure 2:** Penile metastatic deposit on the right penile root demonstrated no signal change but a mild volume increase on fat-saturated T2 image (a). Besides, a significant contrast enhancement on contrast-enhanced sequence (b) and restricted diffusion on DWI image (c) was seen.





**Figure 3.** Negative DWI images depicted the bladder mass (a), penile shaft mass (b) and right penile root masses (c) more clearly.

### DISCUSSION

DWI is an advanced MRI technique which is sensitive to molecular translation of water in biologic tissues due to random thermal motion of molecules which is called Brownian motion. The apparent diffusion coefficient (ADC) is a quantitative parameter that reflects the diffusion of water and tissue perfusion (4,5). In a highly cellular environment, cell membranes and reduced extracellular space act as barrier to water movement. Therefore, the degree of restriction to water diffusion in biologic tissues is inversely correlated to the tissue cellularity and the integrity of cell membranes (4). Recently it has been applied in extracranial sites especially abdomen for tumoral imaging (6,7).

There are a few studies for the feasibility of using DWI for the evaluation of urinary bladder cancer. It was demonstrated that ADC values of urinary bladder carcinoma was lower than bladder wall and other surrounding structures (7-10). In detection and differentiation of metastatic disease of bladder or penile tumor by DWI, no study was found in the literature, to our knowledge.

The interesting point in the report is the clear depiction of penile metastases on DWI and contrast enhanced images while conventional sequences demonstrating no signal change. It is useful since tumor focuses may be detected easily with increased conspicuity against suppressed back-ground signal like PET-CT images. DWI is clearly more advantageous to contrast-enhanced imaging because of lack of

complications due to gadolinium administration, reduced scan time. Therefore DWI should be added to routine imaging in the suspect of urinary bladder carcinoma not only for the detection of the primary tumor but also detection of the metastatic deposits.

### CONCLUSION

Our report emphasizes the importance of DWI in the diagnosis of penile metastasis of urinary bladder carcinoma. For this purpose, we believe that negative DWI images may improve the interpretation.

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