Image study of penile pathology

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Learning objectives

If we review the radiologic literature about penile pathology, we can see that is a part of the anatomy little studied, since the pathology that affects the penis is usually diagnosed and treated directly by the urologist.

Our aim is to review the pathology of the penis, explaining its imaging study and indications.

We have conducted a review of the cases evaluated in our hospital with a didactic view.
Background

We have focused our review on one side in neoplastic diseases (primary and metastatic) and on the other in a compendium of non-neoplastic conditions, including breaking or thrombosis of the corpora cavernosa and prosthetic breakage.

As for the techniques used until today, ultrasound has been the main evidence for the study of the penis, since radiologists have basically studied the urgent pathology. However, the higher spatial resolution and better tissue differentiation that provides MRI, has led in recent years a change in the imaging evaluation of this organ.

In our environment we continue giving preferential use to ultrasounds to study urgent pathologies, the most frequent penile fracture.

The number of indications for MRI has grown in recent years, aiming an increasing use in the study of neoplastic disease (primary or metastatic) or other rarer as thrombosis of the cavernous body, or prosthetic breakage.

Also is documented its usefulness for assessing postoperative infection or penis fibrotic diseases.

Finally, the use of CT is reserved in general for the analysis of tumor extension.
Findings and procedure details

1. Primary Neoplasms.

Penile cancer is a relatively rare neoplasm in the developed world. Despite accounting 10% - 20% of all malignant tumors in men in Asia, Africa and South America, it has a prevalence of only 1% in Western countries. In the US, penile cancer represents approximately 0.4% of all malignancies. Have been described as risk factors, not being circumcised (by chronic irritative effect of smegma) and HPV subtypes 16 and 18. The main prognostic factors are the degree of invasion of the primary tumor and lymph node involvement. In addition to help predict survival, these two factors are crucial in making appropriate treatment decisions.

Palpation of the primary tumor and inguinal nodes have been the usual method of assessment of local invasion and inguinal lymph node metastases. The assessment of the extent of the primary tumor by palpation often determines understaging of the disease. In addition, lymph node evaluation based on palpation of the inguinal lymph nodes can produce both false positives and false negatives. Although physical examination may help predict the size of the primary tumor and the degree of cavernosa infiltration with high positive predictive value, several studies have shown that magnetic resonance imaging (MRI) is the most sensitive method for making these determinations. For this reason, the image has an important role in the staging and assessment of penile cancer, complementing the initial clinical assessment and improving preoperative staging. MRI shows the anatomy of the penis in detail, including its relationship to surrounding structures.

When diagnosed early (stage II) is made, penile cancer is often curable. The healing capacity decreases sharply in the advanced stages of the disease (stages III and IV). Therefore, it is important to accurately study the primary disease and detect the local extension and distant lymph nodes. Accurate assessment of the local or remote neoplasia in patients with carcinoma of the penis is crucial to determine the appropriate surgical approach and prediction of survival.

Case 1. Squamous penis cancer.

69 year old patient who comes to urology clinics for because of foreskin injuries. Physical examination reveals a glans affected by squamous cell carcinoma (confirmed by biopsy), with suggestive palpation of involvement of the penis. Lymphadenopathy clear right and left doubtful palpated.
We performed an abdominopelvic CT in which we could see a mass in the penis body of about 6 cm in diameter, with involvement of spongy and cavernous body (Fig. 1, Fig. 2, Fig. 3), with multiple bilateral inguinal lymphadenopathys, predominantly placed left, femoral, iliac and retroperitoneal (Fig. 4).

2. Metastasis.

Penile metastases are rare and can manifest as a "malignant priapism". Approximately in 70% of cases, metastases come from primary neoplasms of the genitourinary tract such as kidney (Case 2), prostate (Case 3 and 4) or bladder. Rectum (Case 5), colon, stomach and esophagus metastases are less frequently described. Metastatic spread to the penis is a sign of advanced disease and overall survival prognosis is poor.


62 year old patient with a previous history of left radical nephrectomy for clear cell adenocarcinoma. Came to emergency because of erection of 14 hours of evolution with pain and inability to urinate.

We reviewed the last control TC, where a hyperintense image in the penis was evident, consistent with metastasis (Fig. 5, Fig. 6).

Case 3. Prostate cancer metastasis.

Patient of 83 years with a previous history of prostate adenocarcinoma treated with androgen blockade, with good control of the disease. Came to the emergency regarding genital pain with urination of two months of duration, with associated urethral bleeding. Physical examination revealed a penis with tumescence and three rounded nodules of increased consistency at the level of the root of both corpora cavernosa.

RM was performed, revealing a mass involving penis root and invading the spongy body and extending towards the base of both corpora cavernosa (Fig. 7, Fig. 8). Urethral invasion (Fig. 9, Fig. 10) is appreciated as well.
Case 4. Prostate cancer metastasis.

87 year old patient who comes to urology clinic for review of locally advanced prostate cancer. He had received hormonal treatment before surgery. Presents recurrent hematuria and a hard nodule on the penis base suggestive of metastases.

RM is performed, revealing a node of 1.6 x 2 cm affecting dorsal penile and cavernous bodies (Fig. 11, Fig. 12, Fig. 13, Fig. 14).

Case 5. Rectal cancer metastasis.

Control CT of stage IV rectal adenocarcinoma. A rectal mass with infiltration of pelvic muscles and perineum (Fig. 15) and multiple metastatic lesions in the root of the penis (Fig. 16, Fig. 17, Fig. 18) is evident.

3. Thrombosis of the cavernous body.

It is a condition commonly studied by MRI. The most common physical finding are priapism or partial induration of a portion of one of the corpora cavernosa. On MRI, the thrombosed segment is relaxed and can compress the contralateral cavernous body. The signal strength depends on the time of evolution of the thrombus, being generally hyperintense on T1 and hypointense on T2.

Case 6.

Patient came to ER because of prolonged erection of two hours of evolution with pain in the penis base. Physical examination revealed a thickening of the proximal third of the left cavernous body with physical examination pain.

RM is performed, finding an increased caliber of the root of the left cavernous body with altered signal in sequences T1 and T2, compatible with the diagnosis of acute thrombosis (Fig. 19, Fig. 20, Fig. 21, Fig. 22). Shown along the lesion, there was an hypointense ring in relation to degradation products of hemoglobin (Fig. 23). A slight protrusion of thrombosed cavernous body on the contralateral (Fig. 24, Fig. 25) was also appreciated.
4. Fracture of the cavernous body.

Penile fracture is a relatively rare urological emergency. It consist on a breakage of the cavernous body and fibro-elastic tissue around it, the tunica albuginea. It is usually caused by a sudden increase of intracorporeal pressure due to the action of an external force over the erect penis. The most common causes are usually the sexual act, the self-manipulation and direct trauma.

The integrity of the tunica albuginea is the determining factor when choosing surgical treatment.

Case 7.

36 years old patient who comes to the emergency room for crack and pain in his penis erect after handling, followed by sudden drop of the erection and inflammation of penis. A physical examination revealed edema of the penis with "pad" in the proximal portion of the right corpus cavernosum.

We performed an ultrasound study, appreciating in the middle third a discontinuity in the dorsal portion of the right cavernous body with adjacent hematoma (Fig. 26, Fig. 27, Fig. 28).

5. Prosthesis breakage.

Penile prosthesis have been implemented along last 30 years, both inflatable and semirigid. The latter are more complex because they require the introduction of a reservoir, usually placed in the prevesical space.

The inflatable prosthesis components are connected by a silicone tube and typically filled with saline and sometimes contains a radiocontrast part.

With improved prosthesis, mechanical failure is rare and is usually less than 10% during the first 5 years of use.
MRI allows an assessment of both components intrapenile and intraabdominal of the prosthesis.

Case 8.

47 years old man, carrier of a penile prosthesis that has stopped working.

RM is performed, shown a breakage and leakage of liquid from the intraabdominal reservoir of the prosthesis (Fig. 29), without locating alterations at the scrotal and intrapenile portion of the prosthesis (Fig. 30, Fig. 31).
**Fig. 1:** Squamous penis cancer

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Fig. 2: Squamous penis cancer

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Fig. 3: Squamous penis cancer

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Fig. 4: Squamous penis cancer. Lymphadenopathys.

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Fig. 5: Metastatic renal cancer

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Fig. 6: Metastatic renal cancer

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Fig. 7: Metastatic prostate cancer

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Fig. 8: Metastatic prostate cancer

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Fig. 9: Metastatic prostate cancer. Urethral invasion

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Fig. 10: Metastatic prostate cancer. Urethral invasion

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Fig. 11: Metastatic prostate cancer

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Fig. 12: Metastatic prostate cancer

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Fig. 13: Metastatic prostate cancer

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Fig. 14: Metastatic prostate cancer

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**Fig. 15:** Rectal cancer

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**Fig. 16:** Rectal cancer metastasis

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Fig. 17: Rectal cancer metastasis

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**Fig. 18:** Rectal cancer metastasis

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Fig. 19: Thrombosis of the cavernous body

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Fig. 20: Thrombosis of the cavernous body

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Fig. 21: Thrombosis of the cavernous body

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Fig. 22: Thrombosis of the cavernous body

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Fig. 23: Thrombosis of the cavernous body

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**Fig. 24:** Thrombosis of the cavernous body

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Fig. 25: Thrombosis of the cavernous body

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**Fig. 26:** Fracture of the cavernous body

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Fig. 27: Fracture of the cavernous body

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Fig. 28: Fracture of the cavernous body

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Fig. 29: Prosthesis breakage

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Fig. 30: Prosthesis breakage

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**Fig. 31:** Prosthesis breakage

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Conclusion

Although ultrasound has traditionally been the primary modality for studying the pathology of the penis, the superiority of the spatial resolution and the contrast between tissues of the magnetic resonance have been a change and a breakthrough in imaging evaluation of this organ, being today the modality of choice for the diagnosis and follow-up of tumoral pathologies.
References


