

# Imaging Findings of Sonography and Computed Tomography for a Penile Leiomyosarcoma: A Case Report<sup>1</sup>

Jin Chung, M.D., Jae-Joon Chung, M.D., Jeong-Sik Yu, M.D., Joo Hee Kim, M.D.

We report the ultrasonographic and computed tomography (CT) findings of a deep type of penile leiomyosarcoma that helped characterize a penile mass along with a review of the published literature. Leiomyosarcoma of the penis is a very rare disease characterized by a lobulated, expansile, soft tissue mass in CT images, with peripheral rim enhancement and internal homogeneous low density. The ultrasonographic findings revealed a lobulated and heterogeneously hypoechoic solid mass at the distal tip of the penis.

**Index words :** Leiomyosarcoma  
Penis  
Ultrasonography  
Tomography, X-Ray Computed

Penile leiomyosarcoma is a very rare disease and clinically and pathologically classified into the superficial and deep type (1). To our knowledge, the imaging findings of penile leiomyosarcoma are rarely reported in the existing radiological English literature. We report the ultrasonographic and CT findings of a deep type of a penile leiomyosarcoma that helped characterize a penile mass and review the published literature.

## Case Report

A 47-year-old male presented at our hospital with a palpable penile mass, which was present for the last 10 years. The patient's medical history was not remarkable with symptoms limited to pain during palpation, which

developed one week prior. Upon physical examination a non-mobile hard mass was palpated on the distal shaft of the penis (Fig. 1).

An ultrasonographic examination showed an expansile and heterogeneous hypoechoic solid mass measuring  $1.9 \times 1.9 \times 2.5$  cm involving the distal shaft of the left side of the penis (Figs. 2A, B). The corpus spongiosum and urethra were not involved, and the overlying skin appeared normal. A color Doppler study examination revealed no vascularity in this mass (Fig. 2C). Subsequent CT imaging showed an expansile, soft tissue mass on the left side of distal penile shaft. This mass showed slightly thick, peripheral rim enhancement on the contrast-enhanced CT images, with an internal homogeneous low density, compared to the adjacent normal shaft of the penis (Fig. 3). The enlarged lymph node was not visualized in either the inguinal areas or pelvic cavity on contrast-enhanced pelvic CT images without distant metastasis.

According to the physical examination and radiologic findings, the penile mass was determined to be a benign lesion, in which the patient underwent a local excision

<sup>1</sup>Department of Radiology, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

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Address reprint requests to : Jae-Joon Chung, M.D., Department of Radiology and Research Institute of Radiological Science, Yonsei University College of Medicine, Gangnam Severance Hospital, 146-92 Dogok-dong, Gangnam-gu, Seoul 135-720, Korea.

Tel. 82-2-2019-3512 Fax. 82-2-3462-5472 E-mail: jjchung@yuhs.ac

for. A gross pathologic examination of the specimen showed a lobulated, rubbery, solid mass involving the left corpora cavernosa (Fig. 4). The overlying skin was grossly normal. However, a resection revealed a homogeneously white and rubbery to firm irregular mass. Histologically, this mass was identified as a grade 2 leiomyosarcoma with a 2.7 cm maximum diameter, 15 mitoses /10 high power fields, and about 20–30% tumor necrosis. The immunohistochemical stain was found to be positive for smooth muscle actin (SMA), focal positive for desmin, and negative for S-100. The excision was not completed due to the presence of tumor cells in the resection margins.

The patient was referred to the department of radiation oncology for radiotherapy. However, he wanted to

change hospital for his radiotherapy treatment. As a result, the postoperative course was not available.

### Discussion

Penile cancer is a rare neoplasm and accounts for approximately 0.4% of all male malignancies in the United States (2, 3). Penile neoplasms generally fall into 2 categories: epithelial and soft tissue tumors. Skin-based superficial lesions constitute the vast majority and represent various types of benign and malignant epithelial neoplasms such as condylomata acuminata and squa-

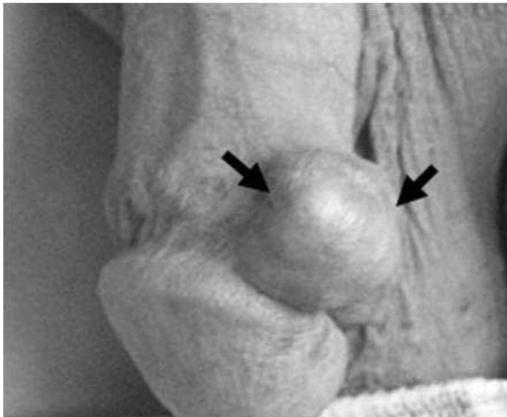


Fig. 1. Appearance of penis at presentation. A non-mobile hard mass (arrows) was palpated on the distal shaft of left penis.

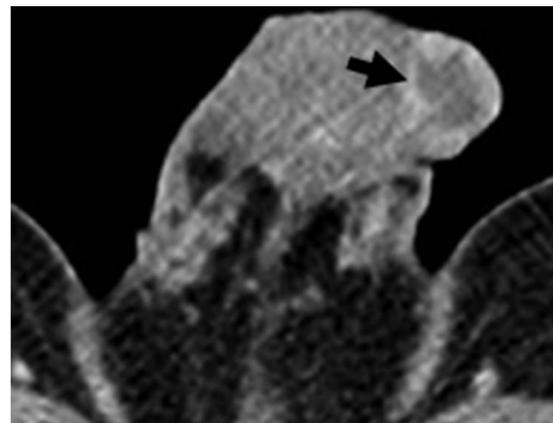


Fig. 3. Contrast-enhanced axial CT image reveals an expansile contour and a relatively thick, peripheral rim enhancing lesion (arrow) with an internal, homogeneous, low density, compared with the adjacent normal shaft of the penis in the distal shaft of left side of penis.

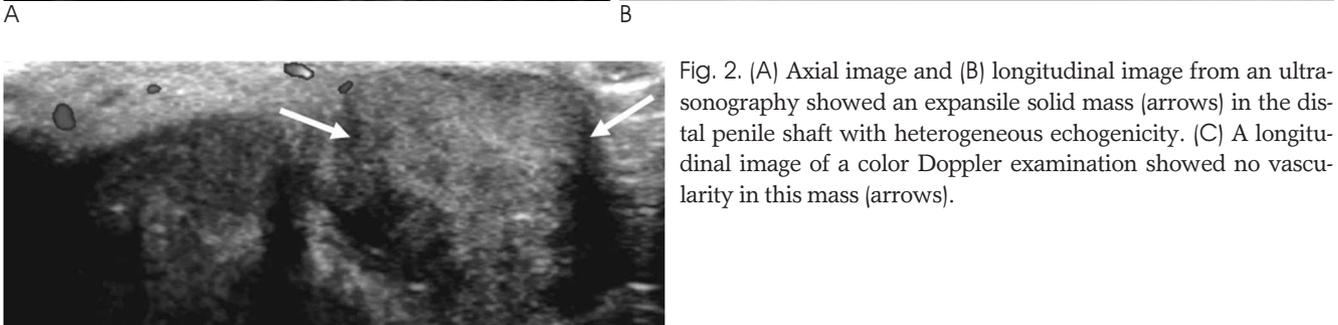
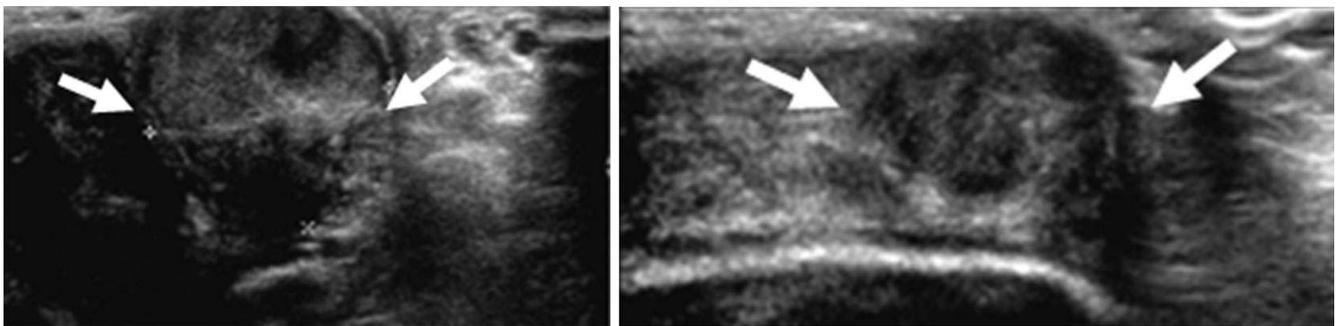


Fig. 2. (A) Axial image and (B) longitudinal image from an ultrasonography showed an expansile solid mass (arrows) in the distal penile shaft with heterogeneous echogenicity. (C) A longitudinal image of a color Doppler examination showed no vascularity in this mass (arrows).



Fig. 4. Gross pathology of the surgical specimen shows a lobulated, rubbery solid mass.

mous cell carcinoma. Soft tissue penile tumors tend to be deeply seated and centered in the shaft. These represent the benign and malignant counterparts of tumors with a vascular, neural, and smooth muscle derivation (4).

The most common primary malignant neoplasm of the penis is squamous cell carcinoma, constituting more than 95% of cases, followed by metastatic neoplasms of the prostate, bladder, rectum, kidney, and testis, as well as those spreading by direct extension from the adjacent structures (5). The remaining types are sarcoma, melanoma, basal cell carcinoma, and lymphoma (6). Sarcomas are uncommon penile neoplasms, which include epithelioid sarcoma, Kaposi sarcoma, leiomyosarcoma, and rhabdomyosarcoma (3).

As per the Armed Forces Institute of Pathology files (7), penile leiomyosarcoma is the second most common primary sarcoma of the penile mesenchymal tissue after Kaposi sarcoma. The differential diagnoses for leiomyosarcoma of the penis includes squamous cell carcinoma, leiomyoma, nodular Kaposi sarcoma, and malignant fibrous histiocytoma (7). However, it is very difficult to differentially diagnose those tumors by imaging findings only.

There are a number of potential sources within the penis from which leiomyosarcoma can arise: 1) the dartos muscle layer of the prepuce and shaft, 2) the arrector pili muscle associated with lanugo hairs on the penile shaft, 3) the muscular walls of the superficial vessels situated outside of the tunica albuginea, and 4) the muscular

walls of the deep vascular complex that make up the corpus cavernosum and corpus spongiosum (7). The first three are considered to be the source of the superficial type, and the last, the deep type.

Penile leiomyosarcomas have been classified into the superficial and deep types (1, 8). The deep type tumors involve the glans penis and the proximal portions of the corpora cavernosa or corpus spongiosum, and are likely to grow rapidly. Patients with deep type tumors are generally more elderly and are often symptomatic with urethral obstruction. Despite intense treatment, most patients die with distant metastases within 1 or 2 years after surgery (5, 7). The superficial tumor type, which most often occurs in middle-aged men, likely originates from smooth muscle cells of the superficial layers of the distal shaft or the penile prepuce, and has a high salvage rate and good prognosis (4). It seems that the leiomyosarcomas of mesenchymal penile tumors are more prone to recur and become more undifferentiated with each recurrence (9). The recurrence rate is relatively similar in both groups, but the metastatic potential is higher in the deep lesions (8).

Our case was a deep type involving the left corpora cavernosa without distant metastasis at diagnosis, even though the tumor mass showed an expansile and bulging contour. The presented case was found to be positive for an immunohistochemical stain identifying smooth muscle actin, focal positive for desmin, and negative for S-100. In general, penile leiomyosarcomas show an immunohistochemical stain for muscle markers such as vimentin, actin, smooth muscle myosin, and desmin as well as basal lamina elements such as lamina and collagen type IV (7).

The CT findings of penile leiomyosarcoma are rarely reported in the existing English literature (5). An abdomen-pelvic CT scan is usually performed to find a metastatic lesion in abdomen and pelvis. For contrast-enhanced CT images, our case showed a relatively thick, peripheral rim enhancement with internal homogeneous low density, compared to the adjacent normal shaft of the penis. Another penile leiomyosarcoma was depicted as a soft mass lesion on CT (5). CT imaging is useful for differential diagnosis and for finding distant metastases in the abdomen and pelvis. Imaging by ultrasonography and MRI is useful for a correct diagnosis and to show subclinical lesions, which may affect treatment management.

The ultrasonographic findings of penile leiomyosarcoma were reported in a previous case report with a hy-

poechoic mass and two satellite metastatic nodules at the proximal penile shaft (4). Our case showed a lobulated and heterogeneously hypoechoic solid mass without an evident satellite nodule from the ultrasonographic results. Another case report showed vascularity on a color Doppler image; however, our case showed no such vascularity (4).

In conclusion, leiomyosarcoma of the penis is a very rare disease, which is depicted as a lobulated, expansile, soft tissue mass on CT images, with peripheral rim enhancement and an internal homogeneous low density. The ultrasonographic findings revealed a lobulated and heterogeneously hypoechoic solid mass at the distal tip of the penis. These imaging findings could be helpful to characterize the penile mass.

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## 음경 평활근육종의 초음파와 CT 소견: 증례 보고<sup>1</sup>

<sup>1</sup>연세의대 강남세브란스병원 영상의학과

정 진 · 정재준 · 유정식 · 김주희

심부 음경 평활근육종의 초음파 검사와 CT 소견을 보고함으로 음경의 종괴를 구분하는 데 도움을 주고 기존의 문들을 정리하였다. 음경 평활근육종은 매우 드문 질환이며 CT 상 여러 소엽 모양으로 팽창성의 연조직 종괴로 보이면서 주변부에 조영 증강을 보이며 내부는 균질한 저음영으로 보인다. 초음파 검사에서는 음경의 말단 끝 부분에 소엽 모양을 보이며 비균질한 저에코의 고형 종괴로 보였다.