Case Report

Sarcomatoid carcinoma of the penis: a case report

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Background: Penile cancer is a rare tumour with a global annual incidence of 0.2 to 1 case per 100,000 men. Sarcomatoid carcinoma (SC) of the penis, also known as carcinosarcoma, is a rare form of squamous cell carcinoma (SCC) of the penis, accounting for approximately 1–2% of all penile cancers. We report a case of SC of the penis in a 60-year-old man.

Case Description: A 60-year-old male patient presented, with a penile glans nodule that had developed over a two-month period. The patient was employed in the agricultural sector and had a history of hypertension, which he asserted was effectively managed through pharmacological intervention. A specialist examination revealed an enlarged, cauliflower-shaped penile head with surface ulceration, approximately the size of 2 cm. He underwent a partial resection and bilateral inguinal and pelvic lymph node dissection. Histopathology demonstrated that the tumour cells were p63-positive, while p16 expression was absent. Vimentin and p53 were positive in the sarcomatous component, and the morphology and immunohistochemistry were consistent with penile SC. After six months, there was no evidence of disease progression.

Conclusions: The diagnosis of SC is challenging, and an accurate diagnosis is the first step towards successful treatment, which has a higher probability of success. It presents as a large, aggressive tumour, usually associated with lymph node metastasis and poor prognosis. Our case adds to the literature and reviews the treatment options for this rare disease and the poor prognosis associated with this malignancy.

Keywords: Sarcomatoid carcinoma (SC); penile cancer; penectomy; case report

Submitted Dec 25, 2024. Accepted for publication Feb 23, 2025. Published online Mar 26, 2025.
doi: 10.21037/tau-2024-765
View this article at: https://dx.doi.org/10.21037/tau-2024-765

Introduction

Penile cancer is a rare tumour with a global annual incidence of 0.2 to 1 case per 100,000 men. Sarcomatoid carcinoma (SC) accounts for only 5% of cases and is a very aggressive and rare form of cancer (1). It is a biphasic tumour comprising both carcinomatous and sarcomatous elements (2). The disease has been predominantly documented in developing countries and may be linked to environmental factors, including socioeconomic deprivation, poor hygiene, encopresis, sclerosing lichen planus, and human papillomavirus (HPV) infection (3). It typically manifests as an exophytic mass and affects individuals between the ages of 5 and 60 years. Diagnosis is challenging, and pathology remains the gold standard for its diagnosis. The standard treatment for penile cancer is partial or total resection, or multimodal management (4). A number of rare and highly malignant subtypes of squamous cell carcinoma (SCC) have been identified, including sarcomatoid, basaloid, and

adenosquamous cell. It is therefore imperative to correctly and promptly identify prognostic factors, including clinical staging, histological subtype and grading, pattern of invasion, perineural/vascular infiltration and lymph node metastasis (2,5). We present this article in accordance with the CARE reporting checklist (available at https://tau.amegroups.com/article/view/10.21037/tau-2024-765/rc).

Case presentation

A 60-year-old male presented at our institution with a penile glans nodule that had developed over a two-month period. The patient was employed in the agricultural sector and had a history of hypertension, which he asserted was effectively managed through pharmacological intervention. His smoking history exceeded ten years, and he also had a history of diabetes mellitus, alcohol consumption, and a family history that were not particularly noteworthy. A specialist examination revealed an enlarged, cauliflower-shaped penile head with surface ulceration, approximately the size of 2 cm. The lesion was hard, non-tender, and exhibited poor mobility. Additionally, bilateral inguinal lymph node enlargement was observed, with the nodes exhibiting varying degrees of enlargement. In order to ascertain the nature of the swelling, a penile sclerotomy and biopsy were performed. The microscopic results demonstrated that the mass was composed of fat spindle cells, polygonal cells, and oval cells with notable polymorphism. The tumour cells were arranged in disordered, swirling, and bundled forms, exhibiting coarse chromatin, prominent nucleoli, and pathological karyorrhexis. Additionally, the interstitium was infiltrated by a greater number of inflammatory cells, with evidence of necrosis in select areas and the presence of interstitial fibrotic tissues and vascular hyperplasia (*Figure 1*). The immunohistochemical results are as follows: The immunohistochemical results were as follows: VIM (+), KI-67 (80% +), CD34 (vascular +), CK5/6 (partial +), P63 (more +), DESMIN (–), MyoD1 (–). This is consistent with the diagnosis of SC. Penile SC is considered a rare and highly malignant tumour. Further imaging was conducted using electron computed tomography (CT) and magnetic resonance imaging (MRI) of the lower abdomen and pelvis, which revealed the presence of a penile head mass and enlarged inguinal lymph nodes (*Figure 2*).

With the patient's consent, a partial penectomy was performed in addition to penile reconstruction (*Figure 3A-3C*). A pathological biopsy was also performed and the results were consistent with the preoperative biopsy, confirming the diagnosis of SC of the penis (*Figure 1A-1D*). According to the National Comprehensive Cancer Network 'Penile Cancer' treatment guidelines, our case was T1N2M0 and was treated with bilateral inguinal lymph node dissection (ILND), and the resected lymph node specimen was subjected to pathological biopsy, which confirmed the diagnosis of SC (*Figure 1E,1F*). Considering the patient's stage and age, we did not perform relevant adjuvant therapy for him. In fact, there are no guidelines on neoadjuvant or adjuvant therapy for penile SC, but we can refer to the adjuvant therapies for SCC, including PD-1/PD-L1 immunotherapy and Tyrosine Receptor Kinase (TRK) inhibitor therapy (6).

It is noteworthy that two weeks later, a thrombosis was identified in the patient's right common iliac vein (*Figure 3D-3F*). Given the patient's age and history of multiple surgeries, a conservative medication treatment plan was initiated. This resulted in the thrombus disappearing after one week. At the late follow-up, no evidence of disease progression was observed over a six-month period.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Highlight box

Key findings

- We report a case of sarcomatoid carcinoma (SC) of the penis in a 60-year-old man.

What is known and what is new?

- We list previous cases of SC of the penis, along with the associated clinical presentation, diagnosis, treatment, and follow-up results.
- We have updated all previous literature records of SC of the penis, as well as current relevant clinical presentations, diagnosis, staging, treatment and follow-up results.

What is the implication, and what should change now?

- The diagnosis, staging, grading and treatment of this disease can be referred to the latest guidelines of the World Health Organization (WHO) and Armed Forces Institute of Pathology (AFIP).

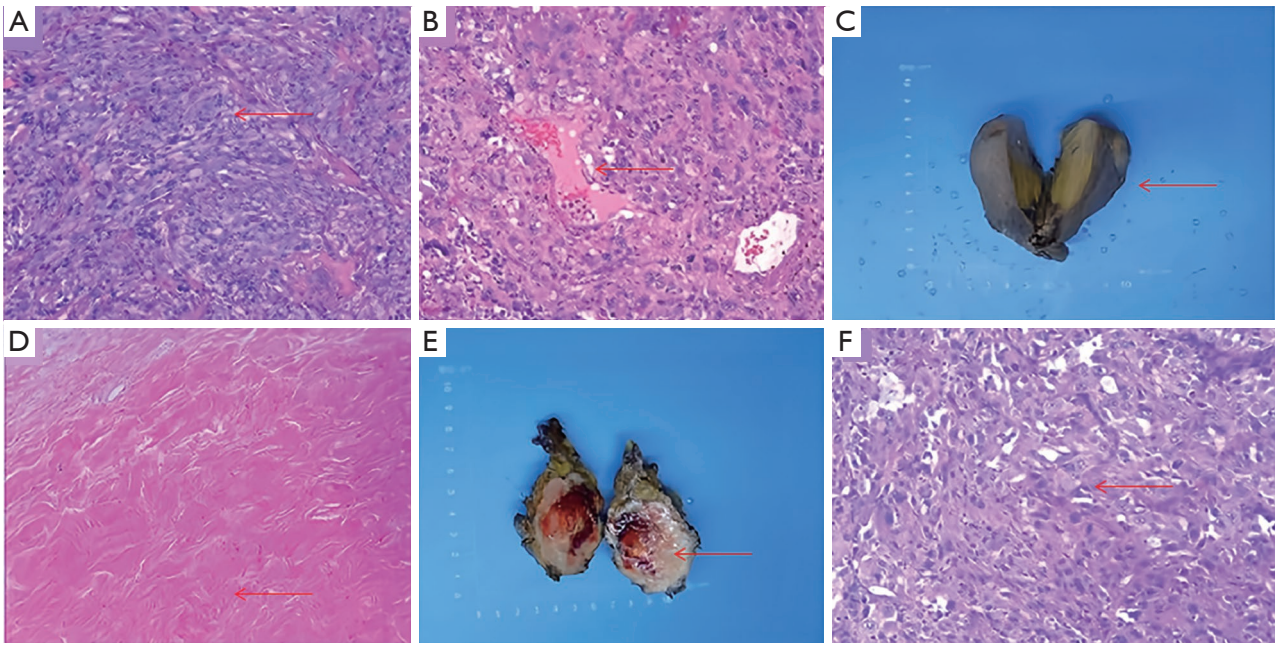

Figure 1 Gross pathology and histopathology. (A) Microscopic image of the tissue section from the preoperative biopsy, showing that the penile mass consists of a piece of dermal tissue and a tumor composed of spindle-shaped adipocytes, polygonal cells, and oval cells, with obvious pleomorphism (indicated by the arrow). The tumor cells are arranged disorderly, in a whorled and fascicular pattern. The chromatin of the tumor cells is coarse. Obvious nucleoli and pathological nuclear fragmentation are clearly visible. There is a large amount of inflammatory cell infiltration in the stroma (indicated by the arrow), and there are signs of necrosis in some areas. In addition, the fibrous tissue and blood vessels in the stroma show a proliferative state (indicated by the arrow). The penile resection specimen (B,C) measures 7.5 cm × 6.5 cm × 6.5 cm in size. (C) Photograph of the physical specimen. A nodule measuring 6.5 cm × 6 cm × 4.9 cm in size can be seen on the cut surface (indicated by the arrow). The nodule is grayish-yellow, solid and hard in texture, and has a relatively clear boundary with the surrounding tissues. The surface is ulcerated, and no involvement of the corpus spongiosum or corpus cavernosum of the penis is observed with the naked eye. At a distance of 1.5 cm from the resection margin, the microscopic examination result is the same as that of the preoperative biopsy. (B) Microscopic image of the tissue section after the operation. The tumor cells are arranged disorderly, and the chromatin is coarse. Obvious nucleoli and pathological nuclear fragmentation are clearly visible. There is a large amount of inflammatory cell infiltration in the stroma (indicated by the arrow), and there are signs of necrosis in some areas. In addition, no signs of malignant lesions are observed in the fibrous connective tissues at the edge of the left corpus cavernosum, the edge of the right corpus cavernosum, and the edge of the urethra (D). The results of the inguinal lymph node biopsy are consistent with those of the surgical specimen, and also confirm the presence of penile sarcomatoid carcinoma (E,F). (E) Photograph of the physical specimen after the operation after incision, with the arrow pointing to the cut surface of the tumor. (F) Microscopic tissue section after the operation, with the arrow pointing to the obvious nucleoli and pathological nuclear fragmentation that are clearly visible, and there is a large amount of inflammatory cell infiltration in the stroma. (C-E) Magnified 40 times; (A,B,D,F) hematoxylin-eosin staining & magnified 100 times.

Discussion

SC of the penis is a biphasic tumour, which some scholars also refer to as carcinosarcoma. They consider carcinosarcoma to be a compact mixture of sarcomatoid and cancer cell components (3,4). Microscopically, SC consists mainly of spindle-shaped cells, sometimes accompanied by heterologous focal components (muscle, bone or cartilage). Immunohistochemically, the sarcomatoid component is predominantly waveform protein and p53 positive, and the carcinoma component expresses p63, whereas p16 expression is absent. Only about 50 cases, mostly case reports, have been reported in the literature (*Table 1*) (2,4,5,7-14), and Lont *et al.* retrospectively studied the clinical, morphological and immunohistochemical features of five cases over a 46-year period in 2004 (10). Velazquez *et al.* described 15 cases of sarcomatoid carcinoma with a prevalence rate of 4% in a retrospective analysis of 400 cancer patients (5). In fact, there are significant

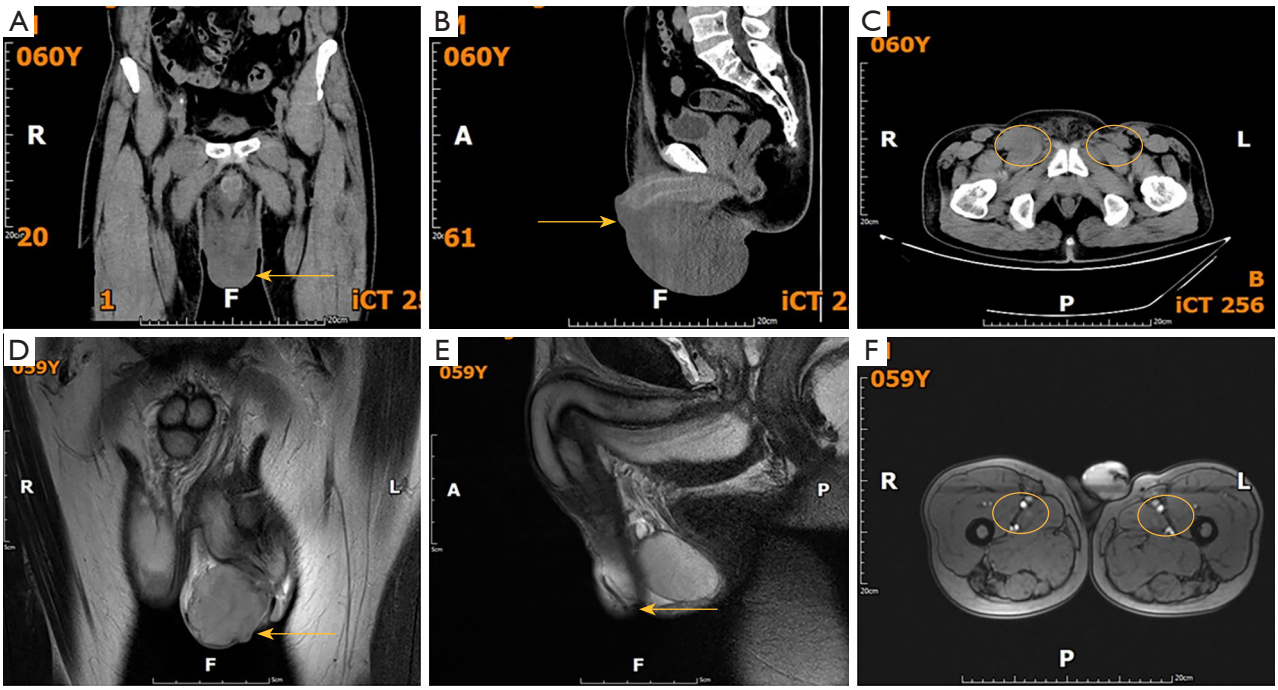

Figure 2 CT scan results. Tomographic CT images (A-C) of the lower abdomen and pelvis and MRI images (D-F) show: (A) coronal CT image of the abdomen of a 60-year-old patient. The arrow indicates an irregular space-occupying lesion; (B) sagittal CT image of the abdomen of a 60-year-old patient. The arrow points to an irregular space-occupying lesion; (C) axial CT image of the abdomen of a 60-year-old patient. The area marked by the yellow circle is an irregular space-occupying lesion; (D) coronal MRI image of the pelvis of a 69-year-old patient. The arrow indicates an irregular space-occupying lesion; (E) sagittal MRI image of the pelvis of a 69-year-old patient. The arrow points to an irregular space-occupying lesion; (F) axial MRI image of the pelvis of a 69-year-old patient. The area marked by the yellow circle is an irregular space-occupying lesion. There is an irregular space-occupying lesion in the coronal and sagittal positions of the head of the penis, measuring approximately 3 cm × 2 cm × 2 cm, without involvement of the surrounding organs of the penis such as the testes and the bladder. The axial images of CT and MRI show enlarged inguinal lymph nodes (marked by circles in C and F), and their exact nature needs to be confirmed by pathological examination. CT, computed tomography; MRI, magnetic resonance imaging.

geographical differences in the distribution of sarcomatoid carcinoma, with a higher incidence in areas where human oncovirus infections are common and unhygienic practices are prevalent (15,16).

The World Health Organization (WHO) does not currently have a separate classification for SC of the penis, so guidelines for the treatment of SCC of the penis can be consulted for its staging and treatment. These guidelines are contained in the 8th edition of the Union for International Cancer Control/American Joint Committee on Cancer (16-18). Patients with SCC are classified as clinically lymph node-negative (cN0) [clinically lymph node-positive (cN+)] based on the ability to palpate bilateral inguinal lymph node enlargement. For patients with clinically lymph node-negative (cN0) inguinal disease, the three-year survival rate for early lymph node dissection was 84 per cent, whereas the three-year survival rate for patients who underwent delayed lymph node dissection was only 35 per cent.

Early detection and early diagnosis are critical to the treatment and prognosis of the disease. However, CT and positron emission tomography-computed tomography results are not very reliable and should not be used routinely in patients with cN0 status. If a patient presents as cN+, it is standard practice to recommend further imaging and biopsy in order to stage the pelvic lymph nodes and determine the presence of distant metastases. CT is a widely used conventional imaging technique, but its sensitivity for detecting pelvic lymph node metastases is only 20–38 per cent. Similarly, early detection of enlarged lymph nodes in patients with cN+ disease is crucial (12-14).

Previously reported literature suggests that in most cases, the clinical presentation of SC is a painful nodule on the

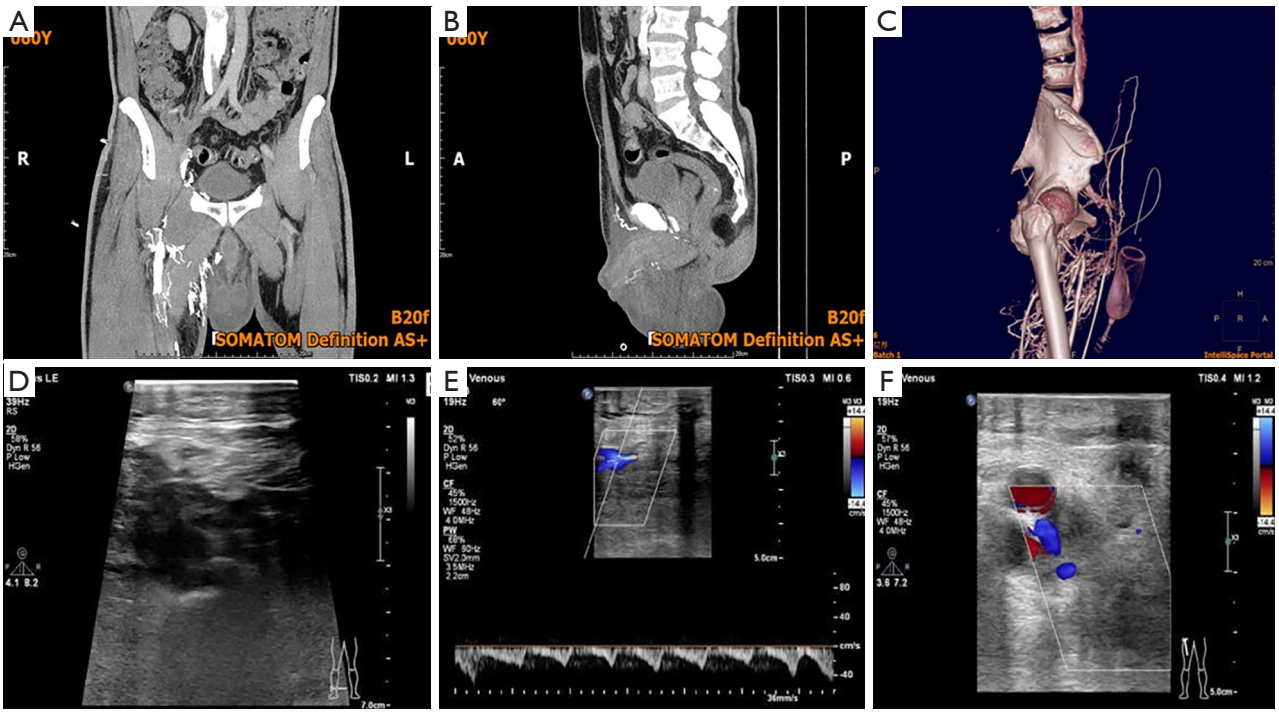

Figure 3 This illustrates that the diameter of the total right femoral vein is slightly widened. (A) Enhanced coronal CT image of the abdomen of a 60-year-old patient, showing the distribution of abdominal organs and structures. It can be seen that the diameter of the right common femoral vein is slightly widened. (B) Enhanced sagittal CT image of the abdomen of a 60-year-old patient, which allows the observation of the structural conditions in the anterior-posterior direction of the abdomen. It can be seen that the diameter of the right common femoral vein is slightly widened. (C) 3D angiography image of the abdominal and pelvic regions, presenting the 3D structural relationship between the bones and blood vessels. It can be seen that the diameter of the common femoral vein is slightly widened. (D) Ultrasonographic image, showing the two-dimensional structure of the right common femoral vein, which can be used to observe the tissue morphology. It shows that the diameter is slightly widened, a hyperechoic lumen can be seen within the lumen, and the lumen cannot be completely deflated by applying pressure with the probe. (E) Color Doppler ultrasonographic image. A thin strip of blood flow signal can be observed in the center of part of the lumen. (F) Color Doppler ultrasonographic image. A thin strip of blood flow signal can be observed in the center of part of the lumen, and the right common femoral vein is in a state of partial thrombosis. The compression of the right external iliac vein and the common femoral vein by the mass leads to a reduction in their diameters and the formation of a hypoechoic area beside the common femoral vein. An area of increased echogenicity is observed near the common femoral vein, which is caused by the compression of the mass. The boundary between this vein and the common femoral vein is indistinct, and there is abundant internal blood flow (caused by the compression of the mass). 3D, three-dimensional; CT, computed tomography.

glans or penile body with or without an inguinal mass (12-17). In patients with early (T1/T2 stage) SC, partial penectomy is usually the intervention of choice (13,14). However, penile preservation surgery has also received significant attention due to the assumption that local recurrence has minimal or no impact on long-term survival (18). Although the full impact of organ preservation surgery remains unclear, the risk of local recurrence is clearly higher than that of partial amputation. Therefore, this information should be communicated to the patient during treatment planning. Radical surgery is usually recommended for cT3 or advanced cases with severe cavernous involvement. If surgical resection is not an option, paclitaxel-platinum combination chemotherapy may be used with an overall objective remission rate of 57%. Non-paclitaxel-platinum combination chemotherapy has an overall objective remission rate of 54% (15). However, this approach is quite toxic. Chemotherapy and radiotherapy may be used as alternative treatment options in cases where the response to surgery is inadequate or the patient refuses to undergo major surgery.

Table 1 Review of literature on previously reported sarcomatoid/carcinosarcoma of the penis

No.	Author	Age (years)	Year	Origin preliminary	Diagnosis	Final diagnosis	Lymph node metastasis	Distant metastasis	Survival (months)
1	Wood *et al.* (7)	80	1972	Glans	Epithelial dysplasia	Saprophytic cell carcinoma	No	No	21
2	Fukunaga *et al.* (8)	49	1994	Glans	Verrucous carcinoma (after radiotherapy)	Sapo-cell carcinoma	–	Lung	10
3	Antonini *et al.* (9)	66	1997	–	Sarcomatoid	Carcinosarcoma (differentiated bone and cartilage)	No	–	–
4	Lont *et al.* (10)	46	2004	Not mentioned	Smooth muscle sarcoma	Sarcomatoid carcinoma	Yes	Lung, carcinomatous pleurisy, pericardium, spine	3
		65	2004	Not mentioned	Sarcomatoid	Sarcomatoid carcinoma	Yes	Lung	2
		37	2004	Glans	Sarcomatoid	Sarcomatoid carcinoma	No	No (localized recurrence)	96
		65	2004	Glans	Sarcomatoid	Sarcomatoid carcinoma	No	Skin, carcinomatous pleurisy, bone	6
		56	2004	Corpus penis	Smooth muscle Sarcoma	Sarcomatoid carcinoma	Yes	Carcinomatous pleurisy, pericardium	2
5	Velazquez *et al.* (15 cases) (5)	59 (range, 28–81)	2005	Glans (93%)	Not mentioned	Sarcomatoid carcinoma	Yes (8/9)	Not mentioned	2 to 8
6	Ranganath *et al.* (4)	50	2008	Glans	Non-metastatic sarcomatoid carcinoma	Sarcomatoid carcinoma	No	Not mentioned	6
7	Vasu *et al.* (11)	61	2013	Corpus penis	Smooth muscle Sarcoma	Sarcomatoid carcinoma	Yes	No	6
8	Shankar *et al.* (2)	60	2017	Glans	Sarcomatoid	Not mentioned	Not mentioned	No	12
9	Bovolim *et al.* (12)	78	2017	Glans	squamous papilloma	Sarcomatoid carcinoma	Not mentioned	Not mentioned	3 weeks
10	Gandhe *et al.* (13)	53	2020	Glans	Sarcomatoid	Sarcomatoid carcinoma	No	Not mentioned	12 (not dead)
11	Dos Santos *et al.* (14)	75	2021	Glans	Mixed SCC and sarcomatoid carcinoma	Sarcomatoid carcinoma	Yes	Lung	7 weeks
12	Huang *et al.* (this article)	60	2024	Glans	Sarcomatoid	Sarcomatoid carcinoma	Yes	No	6 (not dead)

SCC, squamous cell carcinoma.

For patients with cN1 disease, the recommended surgical approach is ipsilateral ILND with preservation of the fascia. For patients with cN2 disease, open radical dissection (ILND) of the affected inguinal lymph node with preservation of the saphenous vein should be performed. In conclusion, surgical treatment of the inguinal and pelvic

lymph nodes should be completed within three months of diagnosis (14-19). Chemotherapy with cisplatin and paclitaxel analogues is also available for patients who are not suitable for the above treatments. In patients with distant metastatic disease, platinum-based chemotherapy is usually preferred as first-line palliative systemic therapy. For patients with advanced or systemic metastases, radiotherapy may be used for symptom control (palliative treatment) (20).

Sarcomatoid penile cancer is a complex disease for which there is currently no definitive immunotherapy (21,22). However, the majority of patients with sarcomatoid penile cancer express programmed cell death ligand 1 (PD-L1), which provides a rationale for considering immunotherapy. Ongoing clinical trials are investigating the combination of anti-PD-1 and anti-cytotoxic T lymphocyte-associated antigen-4 (CTLA-4) in the treatment of rare genitourinary cancers (23). Furthermore, preclinical data indicate a synergistic effect of combining immune checkpoint blockers (ICBs) with myeloid-derived suppressor cell (MDSC) inhibitors, such as cabozantinib or celecoxib, particularly in the context of chemotherapy-resistant disease (24). Furthermore, additional promising avenues of investigation include the use of relay immunotherapy with Chimeric Antigen Receptor T-cell (CAR-T) therapies, T-cell receptor (TCR) therapies and tumour infiltrating lymphocyte (TIL) therapies. However, it should be noted that these approaches have yet to be reported for sarcomatoid cancers (15,25,26).

The most common initial mode of metastasis for penile cancer is lymph node metastasis, whereas SC has two main modes of metastasis, i.e., the cancerous component spreads predominantly by lymphatic spread, and the sarcomatoid component spreads haematogenously, leading to regional and distant metastasis, with the most common site of distant metastasis being the lung (26,27). This also leads to extremely rapid progression and a relatively poor prognosis. Histological grading, anatomical level of infiltration (which determines pathological staging), vascular, lymphatic and perineural infiltrates and inguinal lymph node metastases were considered important prognostic factors. Most patients had regional (60–91%) or distant metastases at the time of presentation, as in our case (26,27). In conclusion, the diagnosis, staging, grading and treatment of this disease can be referred to the latest guidelines of the World Health Organization (WHO) and Armed Forces Institute of Pathology (AFIP) (27).

Conclusions

In conclusion, penile SC is a rare but distinct variant of SCC. It presents as a large, aggressive tumour, usually associated with lymph node metastasis and poor prognosis. Our case adds to the literature and reviews the treatment options for this rare disease and the poor prognosis associated with this malignancy.

Acknowledgments

None.

Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at https://tau.amegroups.com/article/view/10.21037/tau-2024-765/rc

Peer Review File: Available at https://tau.amegroups.com/article/view/10.21037/tau-2024-765/prf

Funding: This study was supported in part by grants from Fujian Provincial Department of Science and Technology (Nos. 2022J011353 and 2020CXB046).

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tau.amegroups.com/article/view/10.21037/tau-2024-765/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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Cite this article as: Huang Q, Huang Y, Xiong D, Zhuang X, Chen Y. Sarcomatoid carcinoma of the penis: a case report. Transl Androl Urol 2025;14(3):855-862. doi: 10.21037/tau-2024-765