

CASE (1 of 95 new or revised cases/450+ pages)

HPI: 65-year-old African-American male with penile lesion for 1 year. Has minimal lower urinary tract symptoms. AUA Sx score is 5/35.

PMH: glaucoma; HTN; NIDDM; hypercholesterolemia; (-) STDs

PSH: none

Allergies: none

Medications: Lasix, Lipitor, Glyburide

FH: (-) prostate cancer

SH: (-) tob; (-) ETOH; retired

ROS: non-contributory

PE:

Vitals	T 98.6	BP 140/60	P 90	RR 12
GA	WDWN AAM INAD			
HEENT	benign			
Heart	RRR			
Lungs	CTA			
Abdomen	mild obese; soft; NT/ND			
Flank	benign			
GU	uncircumcised phallus; adequate meatus; 2 cm fungating mass inner prepuce; (B) testicles WNL			
Prostate	smooth and benign @ 30 g			
Lymph nodes	(bilateral) inguinal adenopathy, mobile, <4 cm			
Ext	(-) CCE			
Neuro	non-focal			

What initial lab tests do you order?

UA	→	WNL
UCx	→	no growth
Chem 7	→	WNL
CBC	→	WNL

What is your differential diagnosis?

1. Squamous cell carcinoma of the penis
2. Verrucous carcinoma (Buschke-Löwenstein tumor)
3. Condyloma acuminata

How does penile carcinoma present?

1. Penile mass (50%)
2. Sore or ulcer on penis (35%)
3. Phimosis
4. Irritative/Obstructive voiding symptoms

What are systemic symptoms of penile carcinoma?

1. Weakness

2. Weight loss
3. Malaise
4. Fatigue

How do you make the diagnosis of penile carcinoma?

You must obtain tissue biopsy.

Prepuce	→	Excisional biopsy with circumcision
Glans	→	Excisional biopsy including margin to assess invasion
Shaft	→	Excisional biopsy including margin to assess invasion

What do you do next?

Excisional biopsy of the penile mass.

Pathology: squamous cell carcinoma; invasion into corpus cavernosum

What is your assessment?

65-year-old AAM with newly diagnosed penile cancer.

What is your next step?

This patient needs metastatic work up and clinical staging.

CXR	→	normal
CT scan (abd and pelvis)	→	(+) inguinal adenopathy; (-) retroperitoneal adenopathy; (-) pelvic adenopathy

Note: While most patients with a diagnosis of penile cancer are staged with a CT scan abdomen/pelvis, only patients with positive inguinal nodes have a strong indication for this study. CT and MRI are limited in patients with non-palpable disease. MRI appears to be the best choice in patients where examination of the inguinal region is difficult (obesity, previous inguinal chemotherapy/radiation, surgery).

LFTs	→	WNL
Serum calcium	→	WNL

Note: Hypercalcemia in the absence of detectable osseous metastasis has been noted. Hypercalcemia appears to be a function of bulk of the disease. It is often associated with inguinal metastasis and may resolve with inguinal lymphadenectomy.

What is minimal diagnostic evaluation for penile carcinoma?

1. Primary tumor
 - a. Physical examination
 - b. Tissue biopsy
 - c. If extensive local invasion, i.e., of corpus cavernosum, is suspected: MRI
2. Regional lymph nodes
 - a. Physical examination
 - b. CT scan if clinically indicated (high risk patients and those who cannot be diagnosed by clinical exam)
 - c. If nodes remain palpable: tissue diagnosis
3. Distant metastasis

- a. CXR
- b. CT scan
- c. Bone scan (optional; main indication is in symptomatic patients)
- d. FDG-PET/CT Scan (optional for evaluation of metastatic disease)
- e. LFTs and serum calcium

What is his clinical stage?

Clinical stage T2cN2Mx penile cancer with possible inguinal metastasis.

What are other important prognosticators aside from tumor stage?

1. Lymph node status (most important prognostic indicator)
2. Tumor grade
3. Presence of lymphovascular invasion

What is your recommendation?

Perform partial penectomy.

First thing to do is to remove the primary lesion. He needs partial penectomy with a negative margin. Studies have shown that surgical margins of 5–10 mm are as safe as traditional 2 cm margins, and 10–20 mm margins provide adequate tumor control.

If a negative margin cannot be obtained or if the penile shaft is too short for the patient to void standing up, you must proceed with total penectomy combined with perineal urethrostomy.

How do you proceed?

You obtained informed consent for partial penectomy; you should also obtain consent for possible total penectomy and perineal urethrostomy if partial is not feasible. Obtain preoperative labs, and give him preoperative antibiotics.

Discuss your surgical technique:**The Operation (Partial Penectomy):**

1. Minimize contamination from the tumor
2. Wrap a glove or sponge around the distal penis
3. Place an occluding tourniquet at the base of penis to minimize blood loss
4. Make a circumferential incision 2–3 cm proximal to tumor
5. Carry incision down to Buck's fascia
6. Ligate neurovascular bundles
7. Mobilize urethra and corpus spongiosum from corpora cavernosa
8. Transect the urethra but allow it to protrude slightly from the penile shaft
9. Transect and suture-ligate each corpus cavernosum
10. Evert and suture the urethral margins to the skin
11. Insert Foley catheter

He tolerated the procedure well and was discharged to home.

What is your follow-up?

In patients with clinically palpable lymph nodes, the likelihood of metastatic nodal disease is very high, and the traditional treatment of a prolonged course of antibiotics to exclude

inflammatory disease is no longer recommended. If cellulitis is clinically present antibiotics may be indicated prior to intervention. You also need to check his pathology.

Pathology: pT2cN2Mx

What are the consequences of untreated metastatic inguinal adenopathy?

1. Distant metastatic spread
2. Local invasion with skin necrosis
3. Infection
4. Sepsis
5. Hemorrhage from erosion into femoral vessels
6. Death from exsanguination

You need to know how to manage the following scenarios:

1. Non palpable inguinal nodes
2. Palpable inguinal lymph nodes (<4 cm, unilateral or bilateral and mobile)
3. Palpable inguinal lymph nodes (>4 cm, multiple, fixed)

Discuss the management of inguinal lymph nodes for clinical stages Tis, Ta, T1-3, N1-3, M0.

1. Non-palpable Inguinal Nodes
 - a. Low risk group (pTis, pTa or pT1a)
 - i. Risk of occult metastases is less than 15%
 - ii. Close, active surveillance
 - iii. If patient unreliable, consider dynamic sentinel lymph node biopsy (DSLNB)
 - b. Intermediate risk group (pT1b)
 - i. Active surveillance in reliable patients without evidence of vascular or lymphatic invasion or in select patients who are compliant with vigorous follow up
 - ii. Modified bilateral superficial inguinal node dissection with frozen section
 - iii. If any nodes are positive, perform standard (superficial and deep) ilioinguinal lymph node dissection (ILND) on that side
 - iv. Consider DSLNB in select patients
 - c. High risk group (pT2 or G3)
 - i. Risk of occult metastases up to 70%
 - ii. Modified bilateral (or standard) inguinal node dissection with frozen section. If any nodes are positive, perform standard (superficial and deep) ilioinguinal lymph node dissection on that side
2. Inguinal nodes become palpable on one side
 - a. See treatment for palpable nodes
 - b. Unilateral palpable inguinal node (<4 cm): Perform bilateral superficial ILND (or radical) with standard ILND (superficial and deep) on ipsilateral side
 - c. If contralateral positive on frozen section, proceed with standard (superficial and deep) ILND
3. Multiple, >4 cm fixed inguinal nodes, + pelvic nodes
 - a. Neoadjuvant chemotherapy
 - b. Consolidative surgery if clinical response
 - c. Proceed with pelvic lymph node dissection if >2 inguinal nodes positive on frozen section or in delayed procedure in patients with extranodal extension

Your patient asks you what you intend to do with his bilaterally enlarged lymph nodes. He is extremely concerned they may harbor cancer.

How do you proceed?

He needs bilateral ILND with intraoperative frozen sections.

1. State that you would obtain an informed consent by discussing the surgical procedure, indications, potential risks and complications
2. Remark that you would obtain preoperative labs and tests
3. In addition you would anticoagulate this patient and place sequential compressive devices (SCD)
4. Measure for Jobst stockings 1 week before surgery

Labs: → Chem 7, CBC, PT/PTT
 Tests: → CXR, EKG
 Blood: → T&C, autologous, or cell saver
 SCDs: → place before induction of anesthesia
 IV antibiotics: → 1 hour before surgery

Discuss the limits of ILND:

1. Modified dissection
 - a. Excludes area lateral to the femoral artery and caudal to the fossa ovalis with preservation of the saphenous vein and elimination of need to transect Sartorius muscle to decrease morbidity associated with standard ILND
 - b. Empty space

Note: Remember the mnemonic NAVEL: nerve, artery, vein, empty space, lymphatics. The premise is to remove the **superficial** cluster of lymph nodes around the sapheno-femoral junction above the fascia lata.
2. Standard dissection
 - a. Femoral triangle
 - i. Lateral boundary → Sartorius muscle
 - ii. Medial boundary → adductor longus
 - iii. Base of the triangle → inguinal ligament (Poupart's ligament)
 - iv. Apex of the triangle → apex of femoral triangle
 - b. Sartorius flap—Sartorius muscle is detached from anterior iliac spine to cover up the femoral vessels

Note: The idea is to remove the cluster of lymph nodes around the sapheno-femoral junction above and below the fascia lata.

IMPORTANT: The node of Cloquet or Cabanas' sentinel node is totally unreliable and should not be performed.

What are the complications of ILND?

1. Skin slough
 - a. Flap necrosis is common because of insufficient subcutaneous tissue
 - b. To avoid this, a thick skin flap should be raised using atraumatic technique
 - c. Viability of the flap depends on the anastomotic vessels that run in the Camper's fascia
2. Infection
 - a. Wound infection and seromas may occur in devascularized areas and dead spaces
 - b. This is avoided by proper surgical technique, gentle handling of tissues, appropriate use of closed suction drains and antibiotics
3. Bleeding

- a. Bleeding from the femoral vessels is rare
- b. If the skin flap is too thin and necrotic, arterio-cutaneous or veno-cutaneous fistula may develop in the absence of Sartorius muscle interposition
4. Lymphocele
 - a. Lymphocele may be prevented by ligating all lymphatics and tacking the skin flap down to the muscle
 - b. Because the lymphatic drainage of the penis to the groin runs in Camper's fascia, this layer should be preserved and left attached to the skin flap
5. Nerve injury
 - a. Femoral nerve injury is rare
 - b. Proper identification and preservation of femoral nerve should assure its anatomic and functional integrity
6. DVT
 - a. Postoperative immobilization is a risk factor for DVT formation
 - b. Pneumatic compression boots and early cautious ambulation should prevent occurrence of DVT
 - c. Although anticoagulation may be used, realize the risk of lymphocele
7. Lymphedema
 - a. Postoperative use of Jobst stockings (elastic stockings) should minimize leg edema
 - b. Feet should be elevated when sitting down or lying in bed

When do you perform pelvic lymph node dissection?

Proceed with PLND if any positive pelvic lymph nodes, >2 inguinal nodes are positive for malignancy on frozen section or presence of extranodal extension on final pathology.

What is the lymphatic drainage of the penis?

1. Prepuce and penile skin → superficial inguinal nodes
(nodes above the fascia lata)
2. Glans, urethra, corpora → superficial inguinal nodes;
deep inguinal nodes
(nodes below the fascia lata);
pelvic nodes
(external iliac, internal iliac, obturator)

Note: Squamous cell carcinoma spreads via lymphatic system. Lymphatic drainage of the penis crosses the midline.

What are prognostic factors of survival for penile carcinoma?

1. Number and site of positive nodes
2. Tumor stage and grade
3. Size of the primary tumor
4. Presence of extranodal extension

What types of cancers arise from the penis?

1. Squamous cell carcinoma (95%)
 - a. Most common
 - b. Aggressive
 - c. Need inguinal lymph node dissection
2. Basal cell carcinoma
 - a. Rare
 - b. Wide local excision is curative

3. Melanoma
 - a. Rare
 - b. two-thirds occur on glans
 - c. Carries poor prognosis
 - d. Surgery is primary therapy
 - e. Radiation, chemotherapy and immunotherapy are adjunctive and palliative
4. Kaposi's sarcoma
 - a. Only 50% malignant
 - b. Must biopsy before treatment
 - c. Perform wide local excision and partial penectomy
 - d. Inguinal lymph node dissection not needed unless adenopathy is palpable

Where do metastatic tumors to the penis originate?

1. Prostate
2. Bladder
3. Rectum

Note: Symptoms of metastatic tumors include priapism and local swelling.

Discuss the TNM staging system for penile cancer:

Penile Cancer (AJCC 7th edition TNM Stage Classification):

- Tx Cancer stage unknown
- To No evidence of cancer
- Tis Carcinoma in situ
- Ta Verrucous carcinoma (non-invasive)
- T1a Tumor invades subepithelial connective tissue and is not poorly differentiated
- T1b Tumor invades subepithelial connective tissue and is poorly differentiated
- T2 Tumor involves corpus cavernosum or spongiosum
- T3 Tumor invades urethra or prostate
- T4 Involvement of adjacent structures
- cNx Regional lymph nodes cannot be assessed
- cNo No evidence of nodal involvement
- cN1 Palpable mobile unilateral lymph node
- cN2 Palpable mobile multiple or bilateral lymph nodes
- cN3 Palpable fixed inguinal nodal mass or pelvic lymphadenopathy unilateral or bilateral deep inguinal or pelvic lymph nodes (unilateral or bilateral)
- pNx Regional lymph nodes cannot be assessed
- pN1 Metastasis in a single inguinal node
- pN2 Metastasis in multiple or bilateral lymph nodes
- pN3 Extranodal extension of lymph nodes or pelvic lymph node(s) unilateral or bilateral
- Mx Distant metastasis unknown
- Mo No evidence of distant metastasis
- M1 Distant metastasis present