AMSER Case of the Month

84 year-old presents to the urology clinic after episode of gross hematuria and flank pain

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Patient Presentation

- 84 year-old male who presented to the urology clinic after an incident of gross hematuria one month prior that lasted for several days.

- History of
  - Urothelial Carcinoma of the Bladder in 2005 treated with 33 Doses of BCG and multiple TURBT's
    - Surveillance Cystoscopy Biannually. One in February 2021 was Negative
  - CAD – s/p CABG in 1997
  - AAA – To have stent placed in 6-8 weeks
  - 40 Pack Year Smoking history, stopped in 1997
  - Kidney Stones
  - DMII

Patient Presentation

- Urologic ROS Negative for
  - Gross Hematuria
    - Episode lasted for 2-3 days one month prior to clinic visit
  - Flank Pain
    - Episode lasted for 2-3 days one month prior to clinic visit
  - Obstructive Symptoms
  - Irritative Symptoms
  - Incontinence
- All other ROS were negative
- Physical Exam
  - Normal including Negative for
    - CVA Tenderness
    - Abdominal Tenderness
    - Abdominal Masses

Pertinent Labs

- CBC: Hemoglobin 13.4
- CMP: Glucose 185, BUN 29, Creatinine 1.3, EGFR 50
- Urinalysis
  - PH 7.0
  - Blood “Large”
  - Nitrites Negative
  - Protein 30+
  - Glucose 250
  - Leukocyte Esterase Negative
- Urine Culture: Negative

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 4: **Gross hematuria. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CTU without and with IV contrast	Usually Appropriate	☢☢☢☢
MRU without and with IV contrast	Usually Appropriate	O
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	O
MRI abdomen and pelvis without IV contrast	May Be Appropriate	O
US kidneys and bladder retroperitoneal	May Be Appropriate	O
CT abdomen and pelvis with IV contrast	May Be Appropriate	☢☢☢
CT abdomen and pelvis without IV contrast	May Be Appropriate	☢☢☢
Radiography abdomen and pelvis (KUB)	Usually Not Appropriate	☢☢
Arteriography kidney	Usually Not Appropriate	☢☢☢
Radiography intravenous urography	Usually Not Appropriate	☢☢☢

This study was ordered by the urologist

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CT Urogram Findings (unlabeled)

CT Urogram – Non-Contrast Phase looking for kidney stones and other potential sites of calcifications

No areas in the kidney suspicious for kidney stones

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CT Urogram Findings (unlabeled)

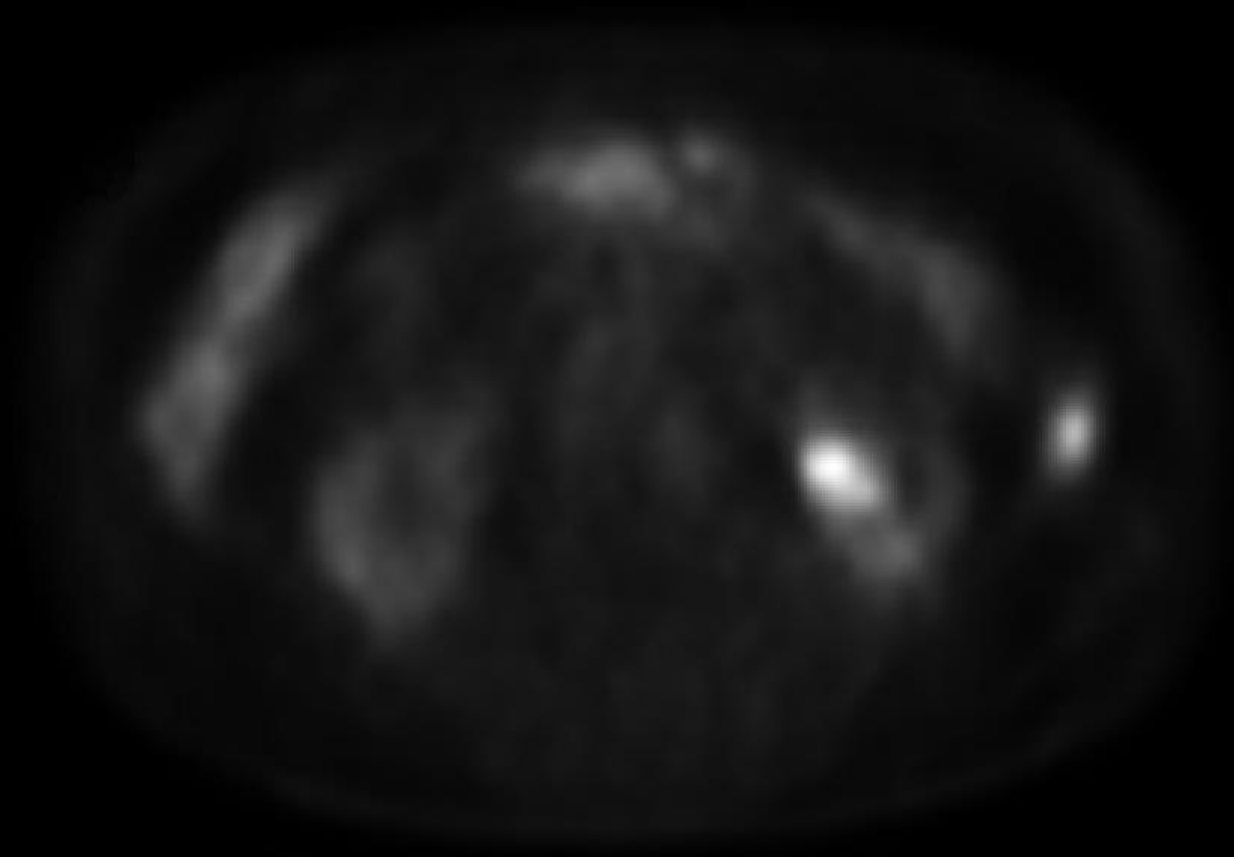
CT Urogram – Delayed Contrast Phase looking for potential filling defects in the collecting system

CT Urogram Findings: (labeled)

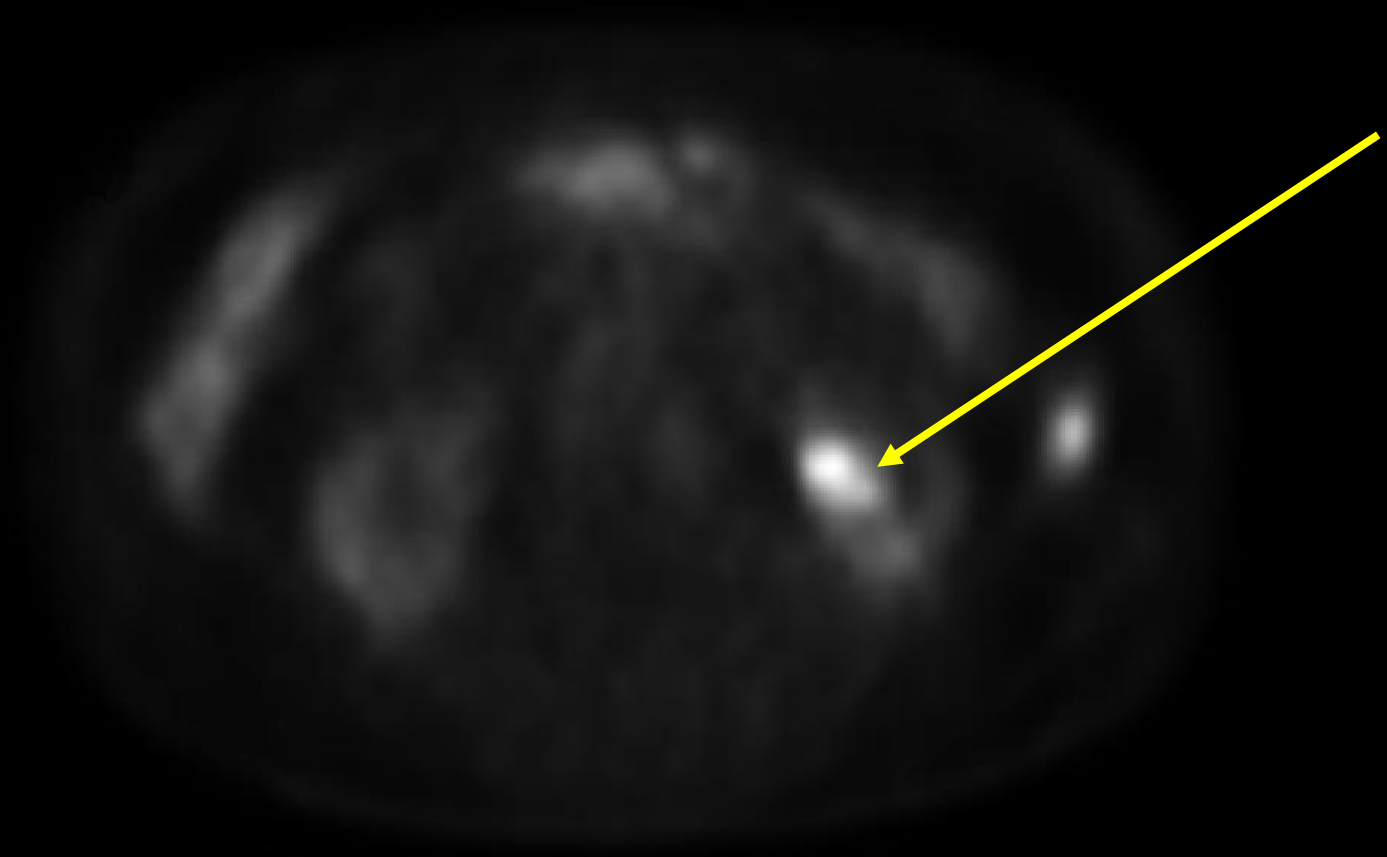
CT Urogram – Delayed Contrast Phase looking for potential filling defects in the collecting system

Filling Defect can be seen between areas of contrast.

PET Findings (Unlabeled)



PET Findings (Labeled)



Kidney – Focal hypermetabolism with maximum SUV of 13.6 corresponding to high attenuation mass in the lower left renal pelvis/anterior lower pole calyx

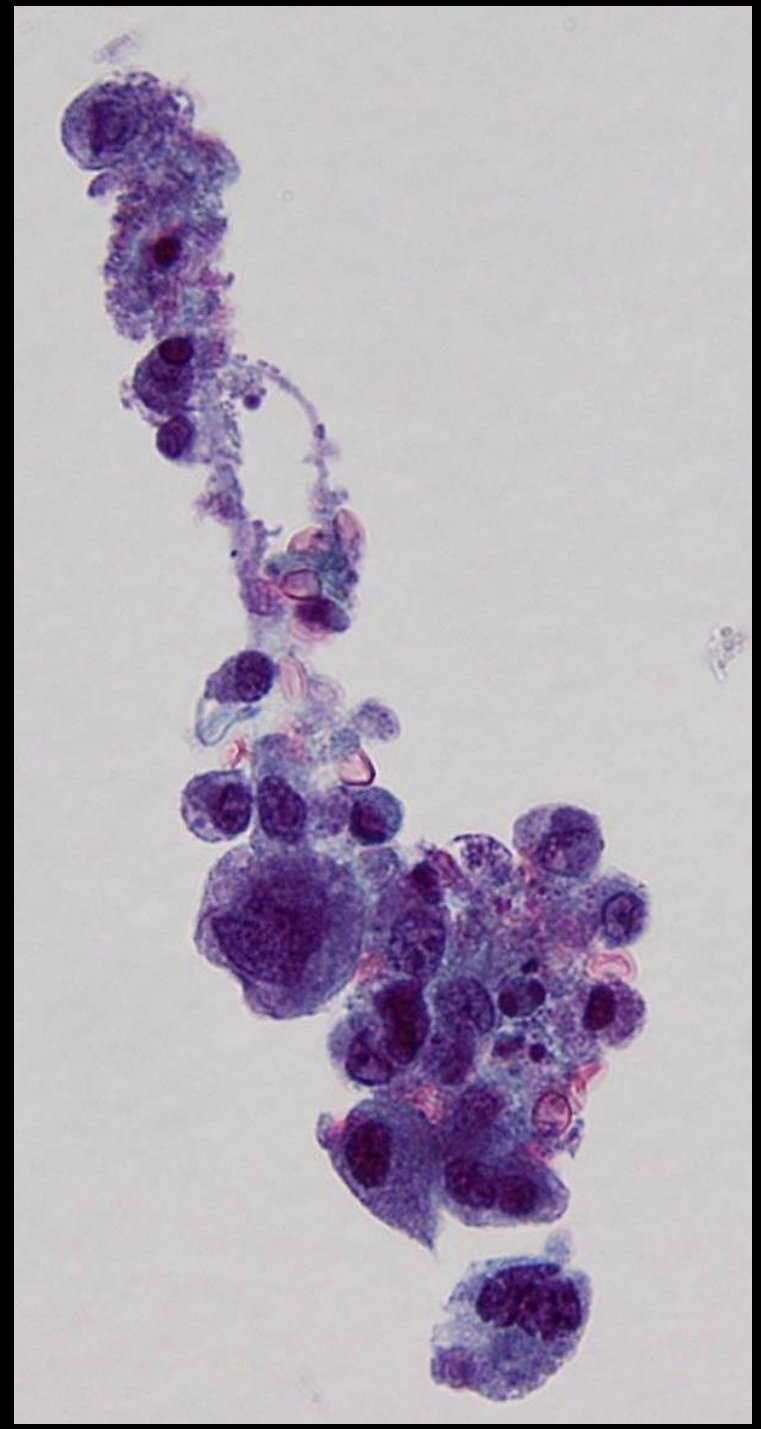
Lymphatics – No hypermetabolism or lympadenopathy

Differential Diagnosis

1. Upper Tract Papillary Urothelial Carcinoma
2. Kidney Stone/Staghorn Calculus
3. Renal Cell Carcinoma (Clear Cell vs. Papillary vs. Chromophobe)
4. Oncocytoma
5. Collecting Duct Carcinoma
6. Angiomyolipoma
7. Renal Cyst
8. Papillary Adenoma
9. Pseudotumor

Urine Cytopathology

- Source: Clean Catch Urine
- Suspicious for High Grade Urothelial Carcinoma
  - Atypical urothelial cells with enlarged, irregular shaped nuclei, coarse chromatin, and increased nuclear to cytoplasmic ratios are present singly in a background of microscopic hematuria



Gross Pathology

- Fluffy, white, heterogenous, slightly hemorrhagic mass that is in the pelvicalyceal system, not invading the hilar fat

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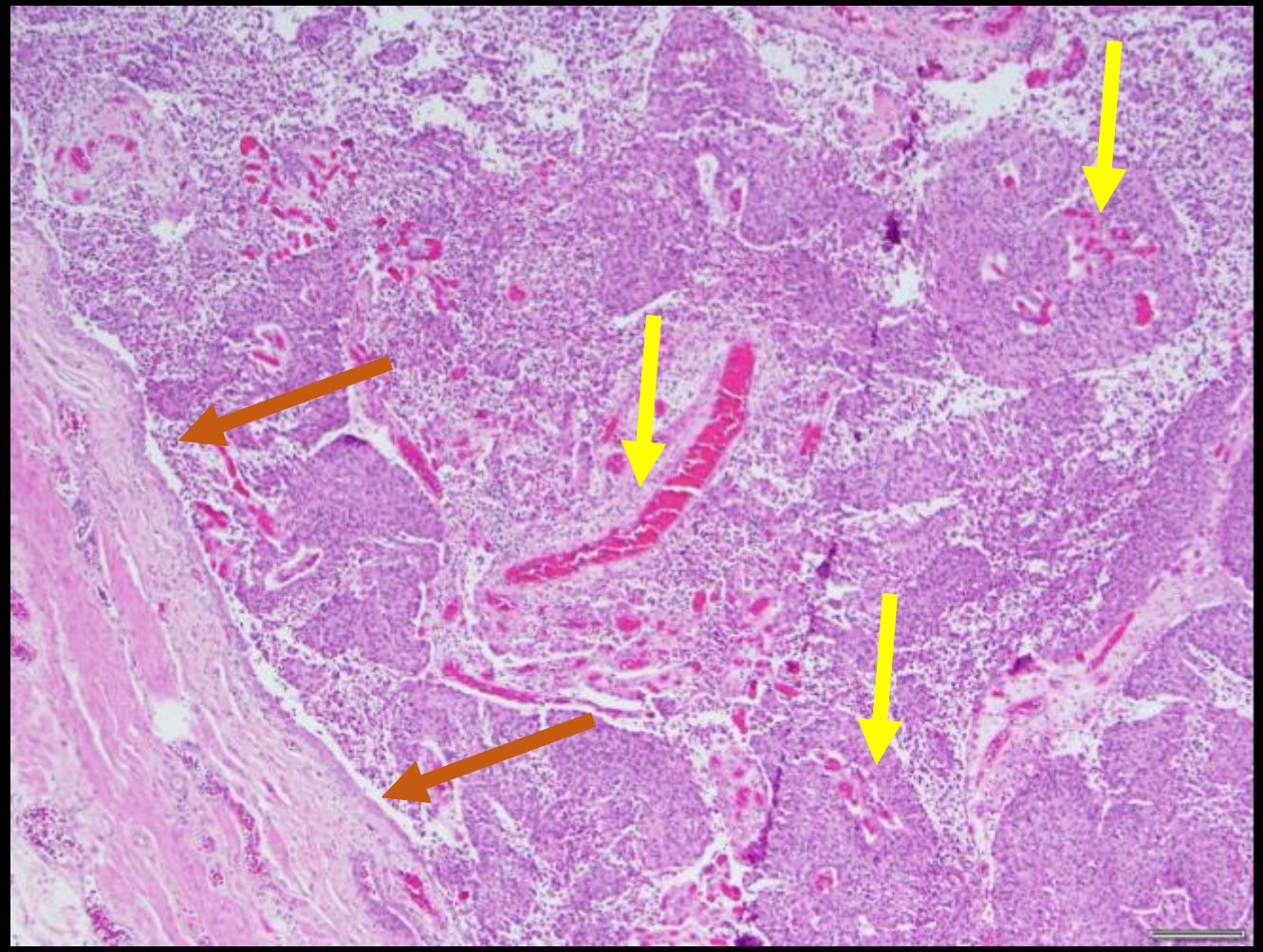
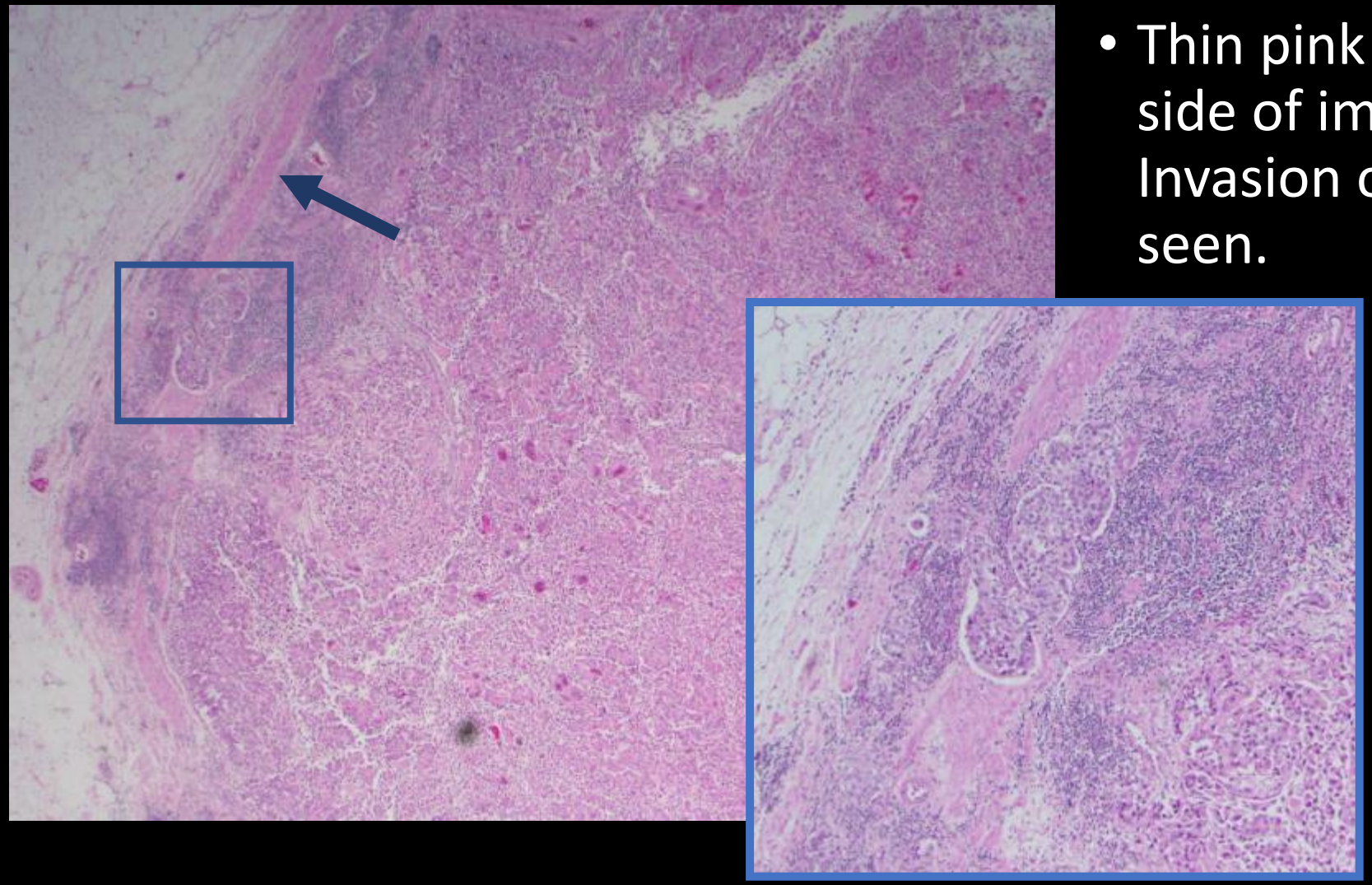
Histopathology



- Cells with pink cytoplasm, growing lining fibrovascular cores (yellow arrow), consistent with a papillary urothelial carcinoma. The urothelial lined renal pelvis is marked by the orange arrows.

Histopathology



- Thin pink stripe (arrow) on left side of image is ureter muscle. Invasion of the muscle can be seen.

Final Dx:

High Grade Upper Tract Papillary Urothelial Carcinoma
Muscle Invasive
Metastatic Carcinoma to Periaortic Node
pT2 pN1

Case Discussion

- The most common presenting symptom of Upper Tract Urothelial Cancer(UTUC) is hematuria(75% of patients) and flank pain(30% of patients) from obstruction
- The most common location of UTUC is the renal pelvis. When it occurs in the ureter, it is usually the distal ureter.
- History of urothelial carcinoma of the bladder is a major risk factor for upper tract urothelial carcinoma

Case Discussion cont'd

- Approximately 22-47% of patients with a UTUC subsequently develop urothelial carcinoma of the bladder
- After treatment of UTUC, the risk of recurrence in the contralateral upper urinary tract is 2-6%
- History of urothelial carcinoma of the bladder is a risk factor for UTUC as anywhere from 15-50% of patients will develop UTUC. The below risk factors increase the risk of UC bladder cancer patients developing UTUC
  - CIS or high grade UC of the bladder
  - History of bladder cancer at the ureter orifice, trigone, or bladder neck
  - History of multifocal bladder cancer
  - Vesicoureteral reflux
  - Placement of ureteral stent immediately after transurethral resection of the bladder cancer

Case Discussion – Staging UTUC

Tx	Primary Tumor cannot be assessed
T0	No evidence of primary tumor
Ta	Papillary Noninvasive carcinoma
Tis	Carcinoma in situ
T1	Tumor invades subepithelial connective tissue
T2	Tumor invades muscularis
T3	Tumor Invades into peripelvic fat, renal parenchyma, or periureteric fat
T4	Tumor invades into adjacent organs or perinephric fat

Nx	Regional Lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis ≤ 2 cm in greatest dimension in a single lymph node
N2	Metastasis > 2 cm in greatest dimension or in multiple lymph nodes

M0	No distant metastasis
M1	Distant metastasis

- Staging is the most important prognostic factor with UTUC
- The most common places for distant metastasis are the lungs, liver, bone, and retroperitoneal lymph nodes

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Case Discussion cont'd

- Originally the patient was scheduled for endoscopic resection of the pelvic mass but after the urine cytology came back positive, a nephroureterectomy was recommended at tumor board.
- A subsequent CT of the Chest showed potential sites of metastasis to the lung and adrenal gland. These will be biopsied.
- Depending on results of the lung and adrenal gland biopsies, he will be offered systemic therapy
  - First Line: Cisplatin based combination therapy but our patient has an EGFR less than 60 so second line therapy will most likely be the recommendation
  - Second Line: Carboplatin combination therapy (ex. carboplatin and gemcitabine)

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