

AMSER Rad Path

Case of the Month:

76 year old man with gross hematuria

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Patient Presentation

HPI:

- 77 year old man presented to urology clinic with gross hematuria
- He was treated with ciprofloxacin for concern of UTI
- After two weeks, gross hematuria had resolved but microscopic hematuria persisted

Medical History: hypertension, BPH, scleredema

Surgical History: None

Medications: lisinopril, atorvastatin , tamsulosin

Social History: 17 pack year (smoke 0.25 packs since 17 years old), 7 glasses of wine /week

Pertinent Physical Exam: Prostate 1+ benign without tenderness/nodularity

Clinical Differential Diagnosis for Gross Hematuria

- Malignancy – renal cell carcinoma, urothelial carcinoma, squamous cell carcinoma
- Infection – cystitis, pyelonephritis
- Urolithiasis

Hematuria: ACR Appropriateness Criteria

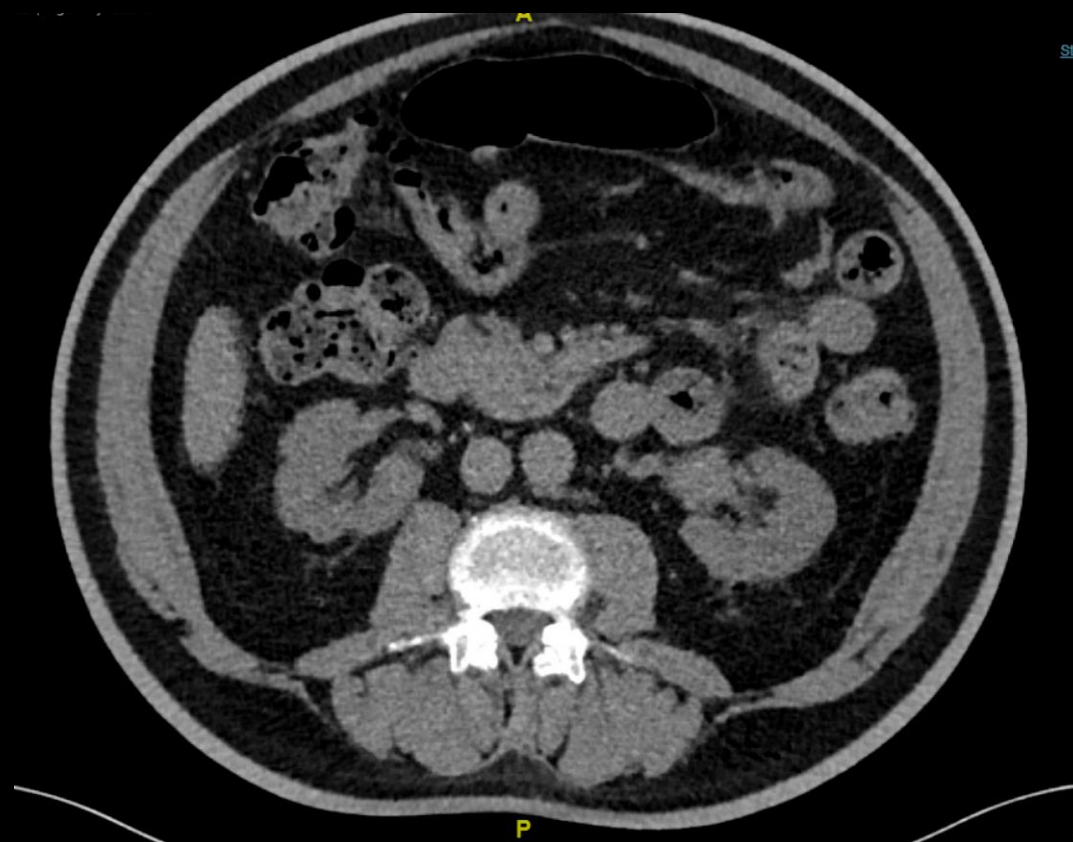
Variant 3: All patients except those described in variant 1 or 2.
 (Hematuria: not related to exercise, infection, viral illness or renal parenchyma disease)

Procedure	Appropriateness Category	SOE	Adult RRL	Peds RRL	Rating
CT abdomen and pelvis without and with IV contrast	Usually appropriate		☹☹☹☹☹ 10-30 mSv	☹☹☹☹☹ 10-30 mSv [ped]	9
CT abdomen and pelvis without IV contrast	May be appropriate		☹☹☹☹☹ 10-30 mSv	☹☹☹☹☹ 3-10 mSv [ped]	6
X-ray retrograde pyelography	May be appropriate		☹☹☹☹ 1-10 mSv		6
US kidneys and bladder retroperitoneal	May be appropriate		0 0 mSv	0 0 mSv [ped]	5
CT abdomen and pelvis with IV contrast	May be appropriate		☹☹☹☹☹ 10-30 mSv	☹☹☹☹☹ 3-10 mSv [ped]	5
MRI abdomen and pelvis without and with IV contrast	May be appropriate		0 0 mSv	0 0 mSv [ped]	5
MRI abdomen and pelvis without IV contrast	May be appropriate		0 0 mSv	0 0 mSv [ped]	4
X-ray abdomen and pelvis (KUB)	Usually not appropriate		☹☹☹ 0.1-1mSv		2
Arteriography kidney	Usually not appropriate		☹☹☹☹ 1-10 mSv		2
X-ray intravenous urography	Usually not appropriate		☹☹☹☹ 1-10 mSv	☹☹☹☹ 0.3-3 mSv [ped]	1

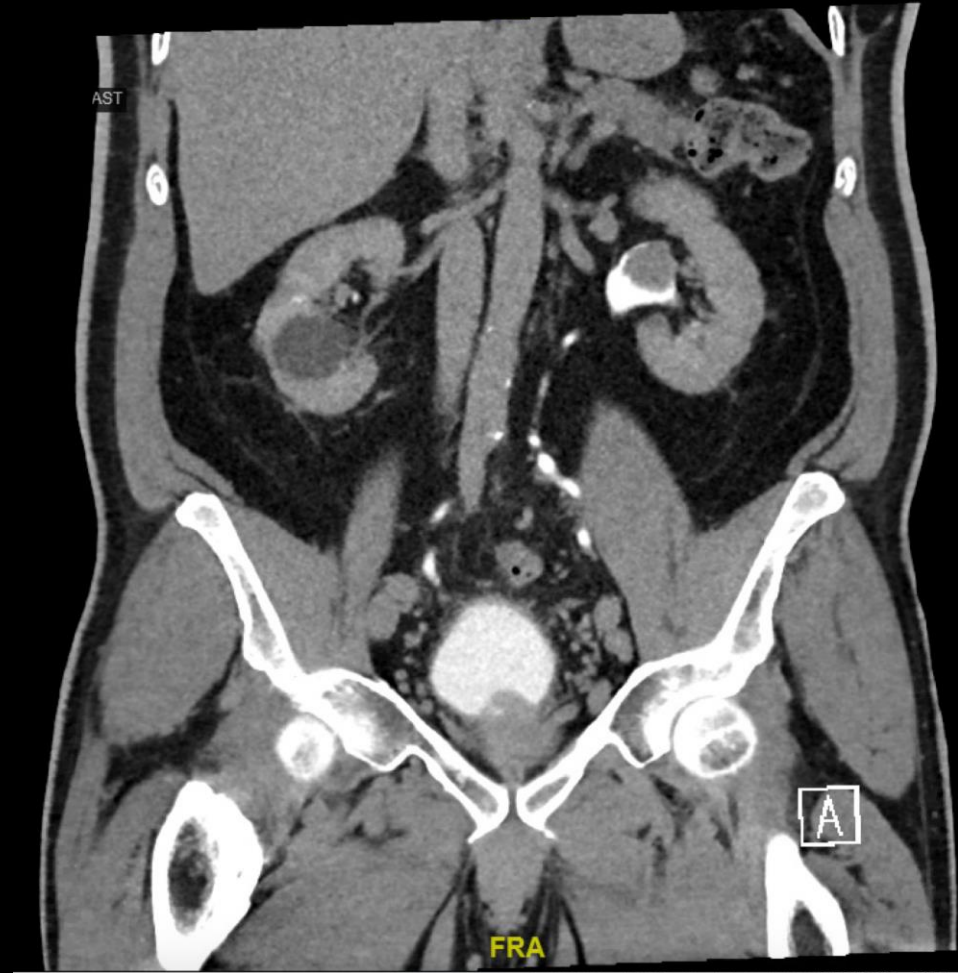
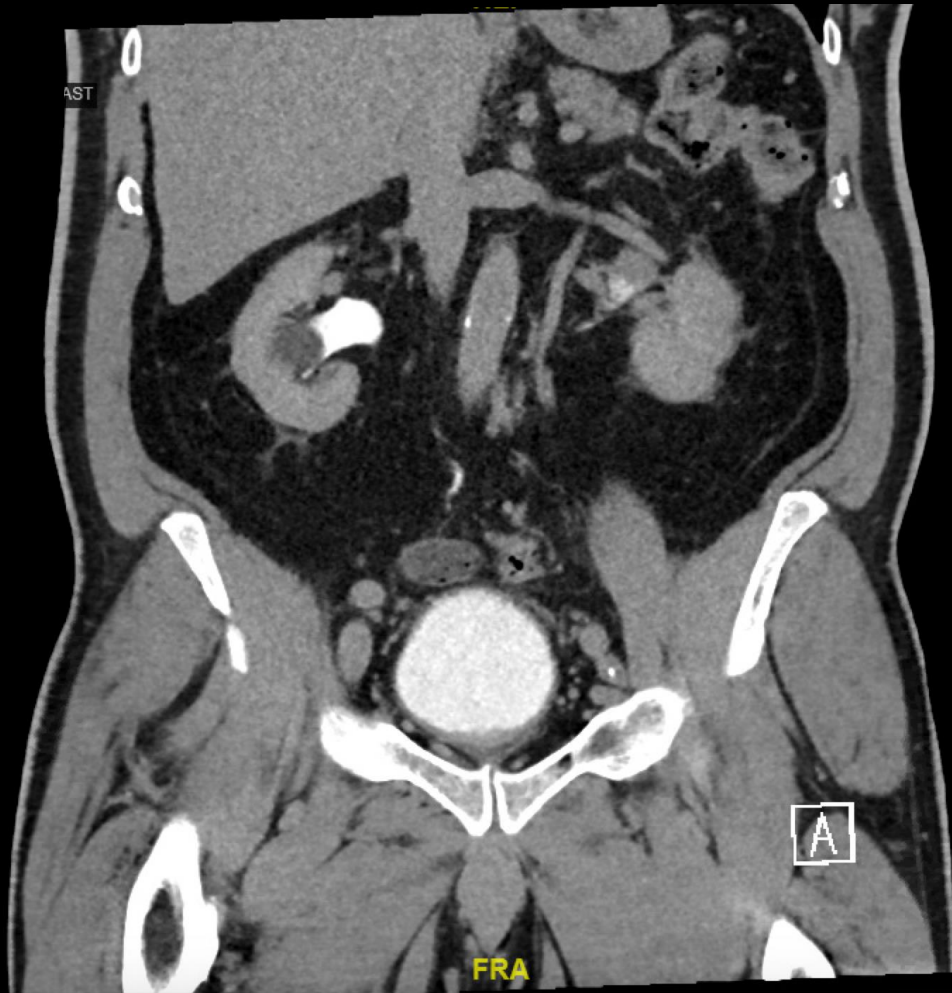
CT Urography was performed

Non-contrast images (axial)

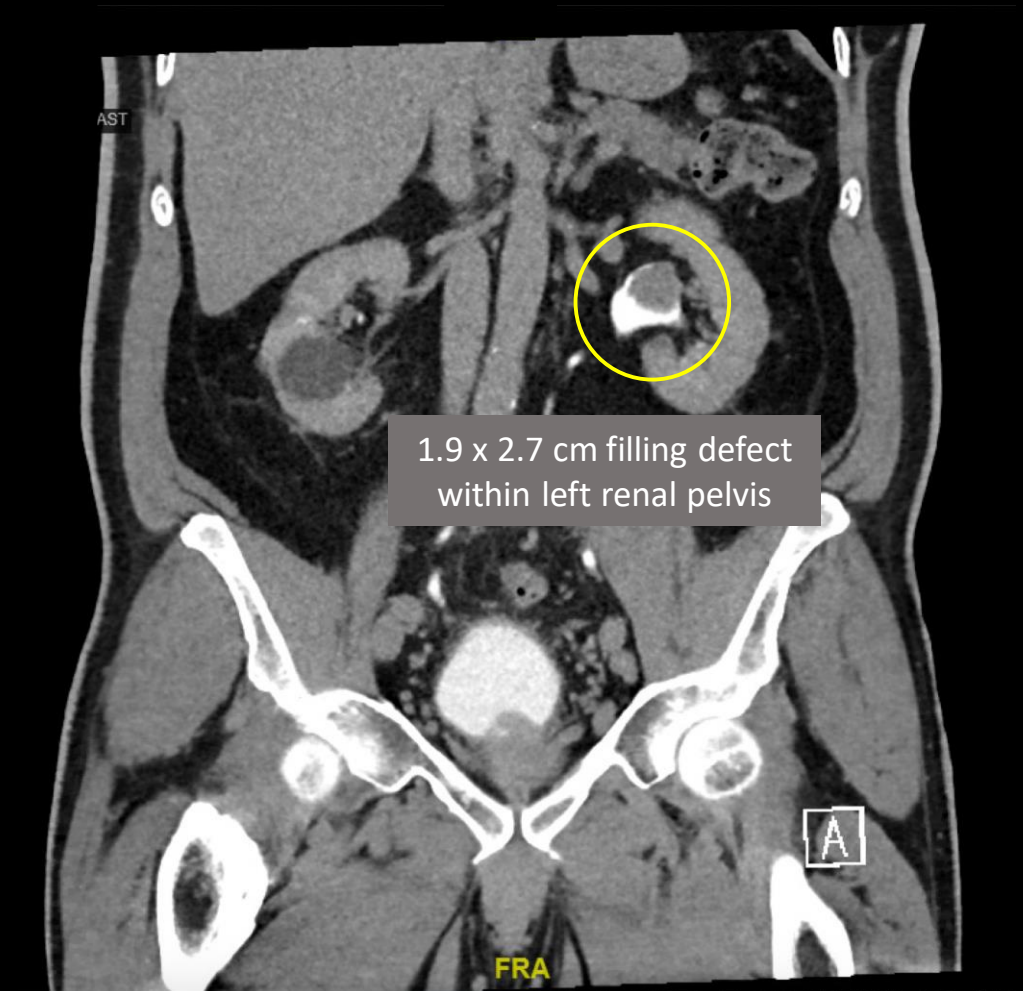
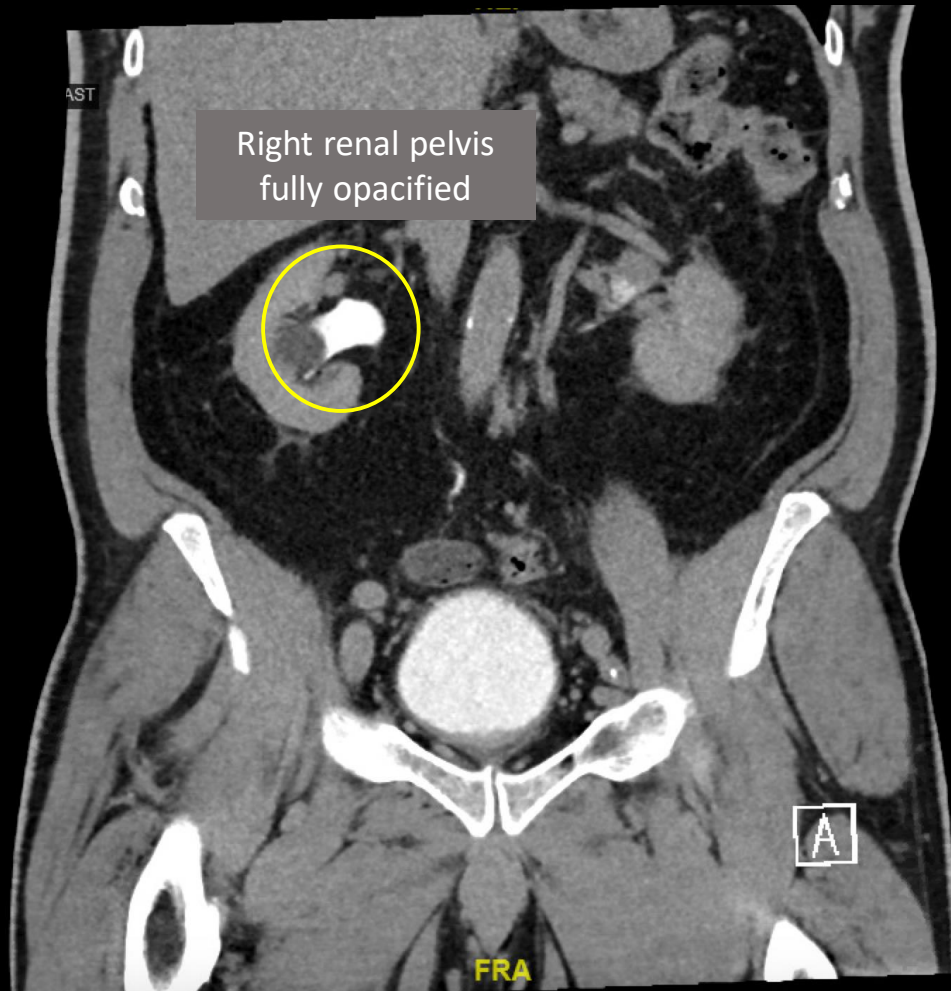
No nephrolithiasis



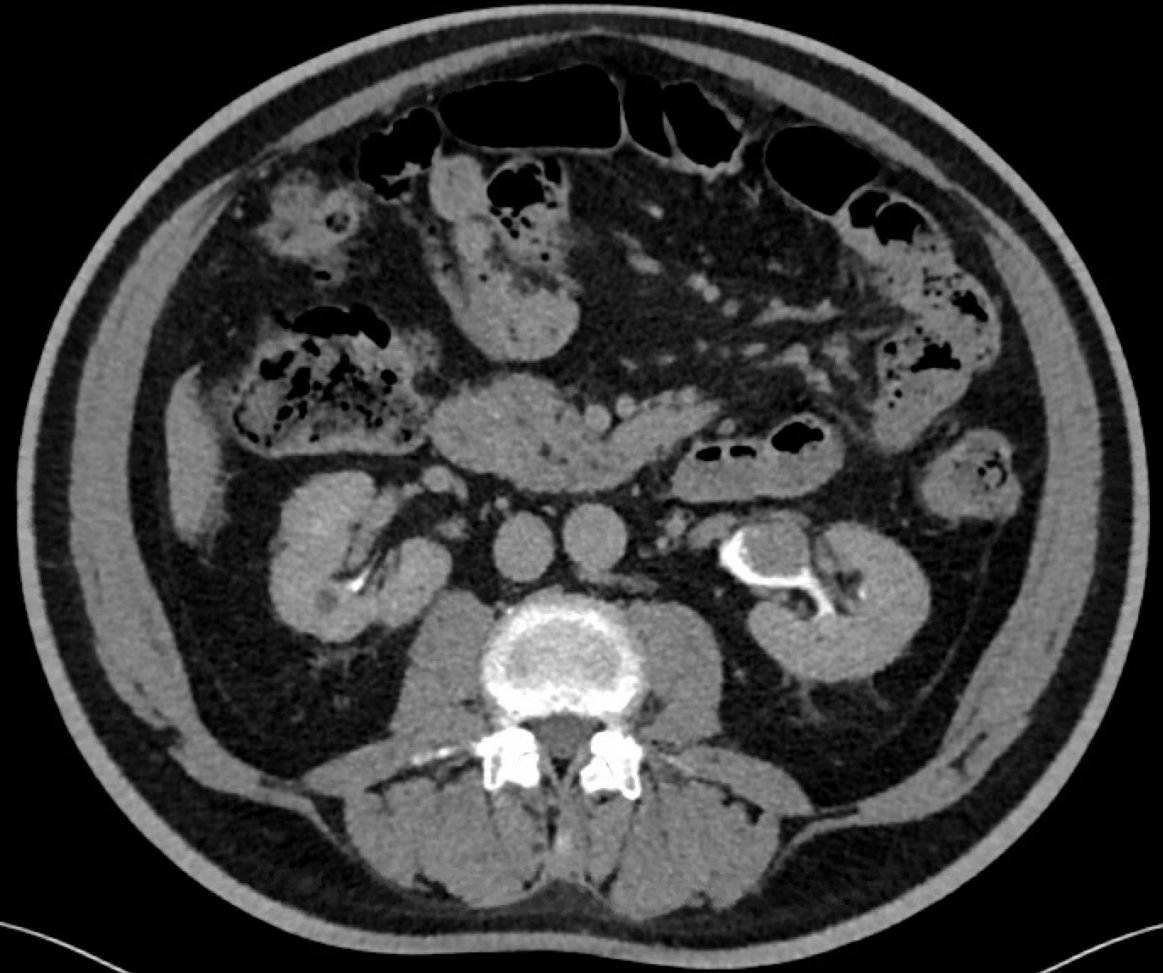
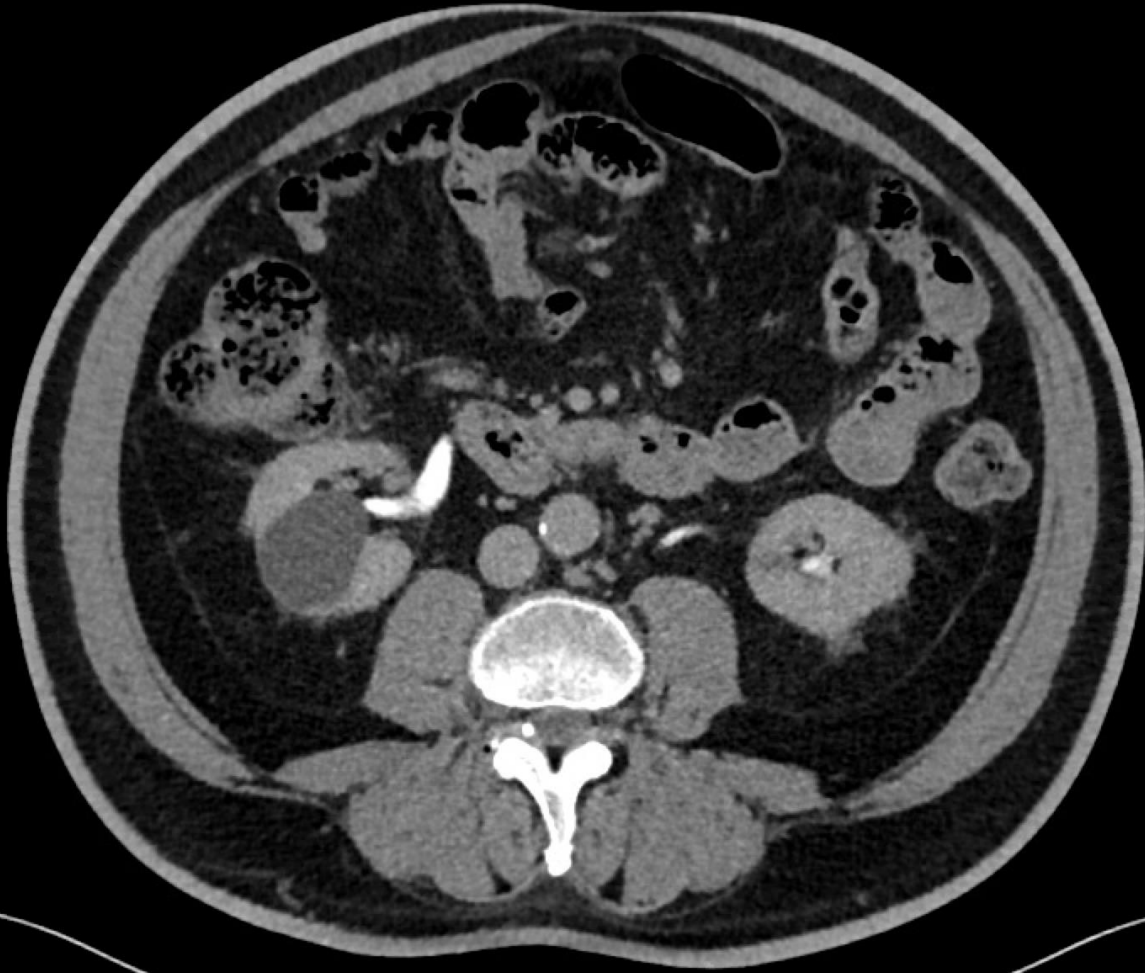
Contrast enhanced images (coronal unlabeled)



Contrast enhanced images (coronal labeled)

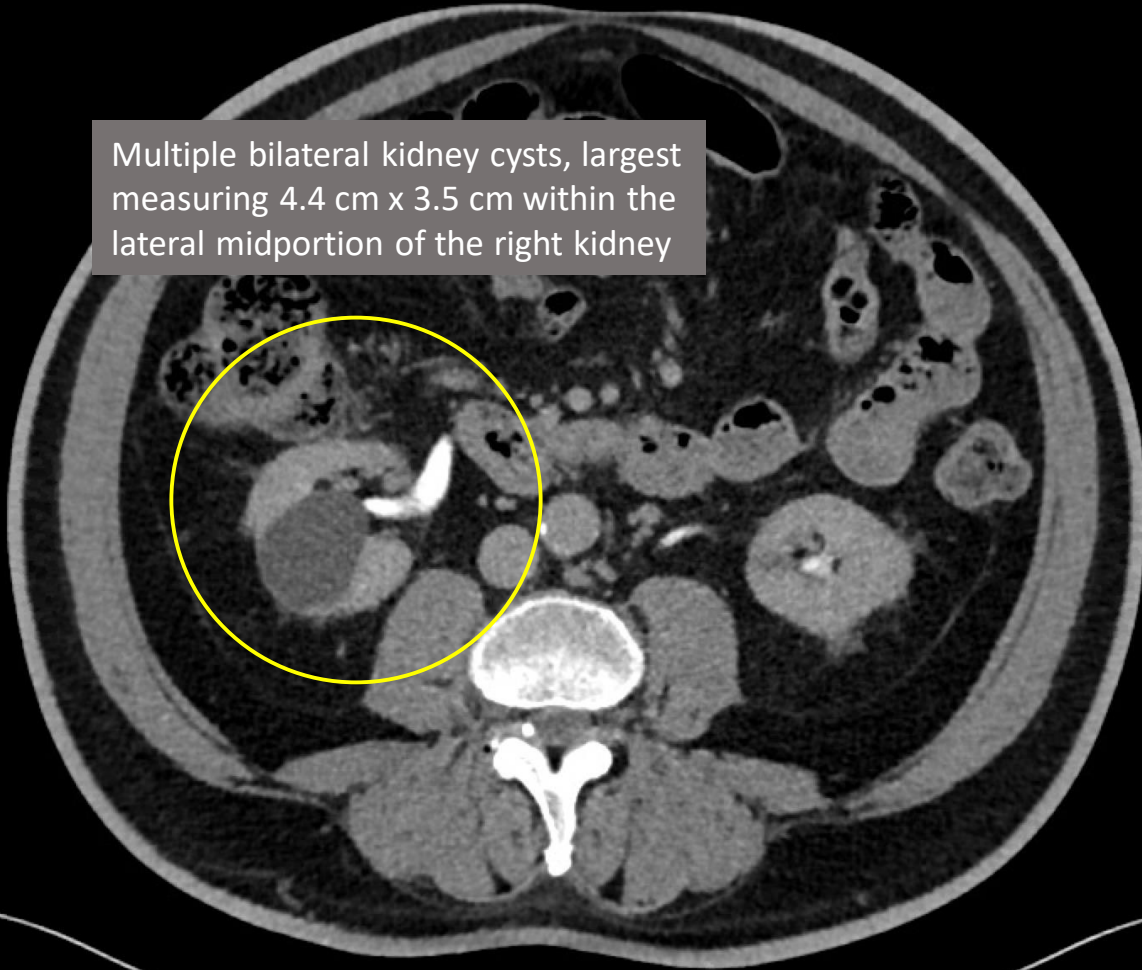


Contrast enhanced images
(axial unlabeled)

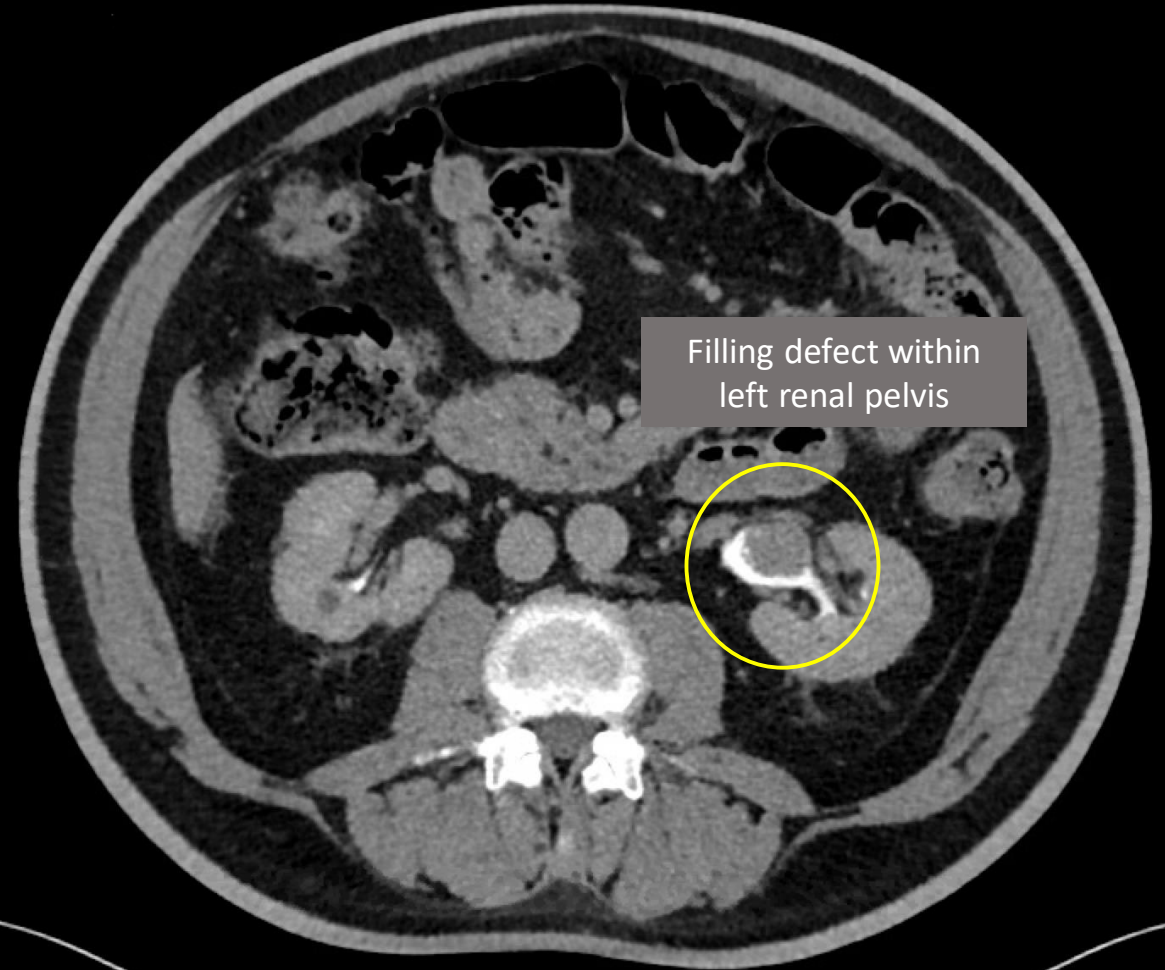


Contrast enhanced images (axial labeled)

Multiple bilateral kidney cysts, largest measuring 4.4 cm x 3.5 cm within the lateral midportion of the right kidney



Filling defect within left renal pelvis



Imaging Differential Diagnosis for Urinary Pelvic Filling Defect

- Tumor
- Clot
- Polyp

More Data...

Urine Cytology:

- showed malignant cells

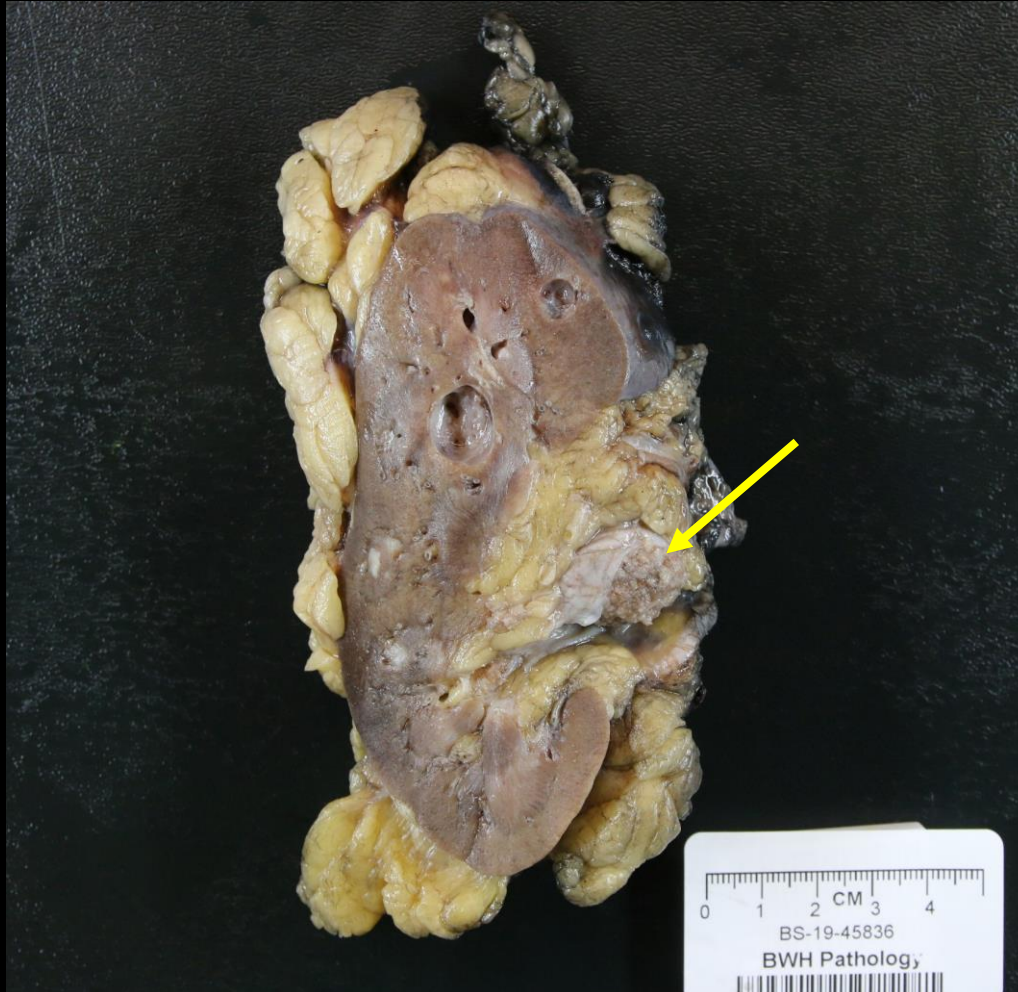
Ureteroscopy with Ureteral Biopsy + Retrograde Urography:

- showed large papillary tumor occupying left renal pelvis

Left nephroureterectomy was performed

Gross Pathology

(left nephroureterectomy specimen)

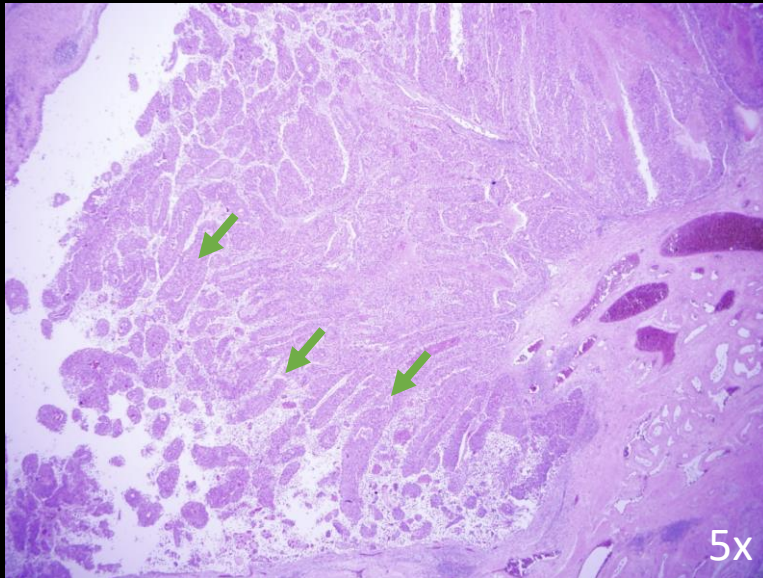


Gross Description of circled mass:

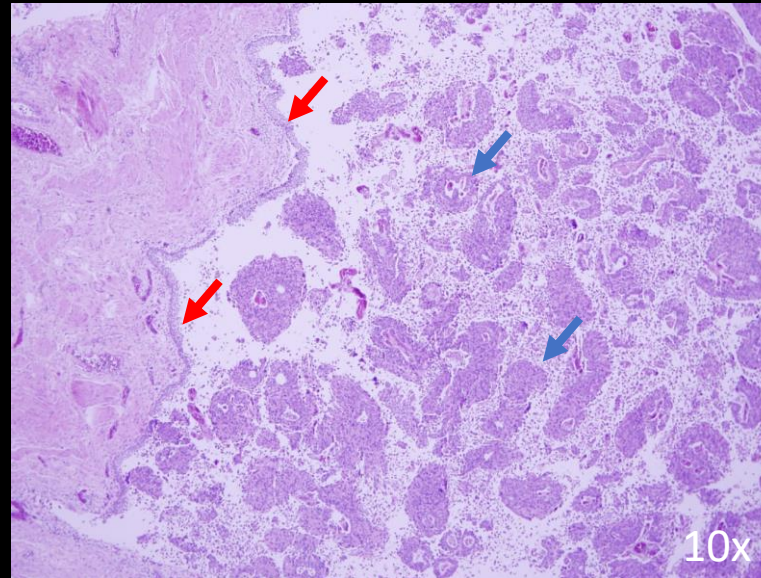
Soft, tan-pink, focally hemorrhagic, friable mass (2.5 x 2.0 x 1.6 cm) located within the renal pelvis and major calyces, coming to within 0.4 cm of the inked outer surface, 3.5 cm of renal vein margin, and 2.1 cm of the renal artery margin. The mass does not appear to involve the renal sinus fat, renal parenchyma, or ureter.

Pathology/Histology

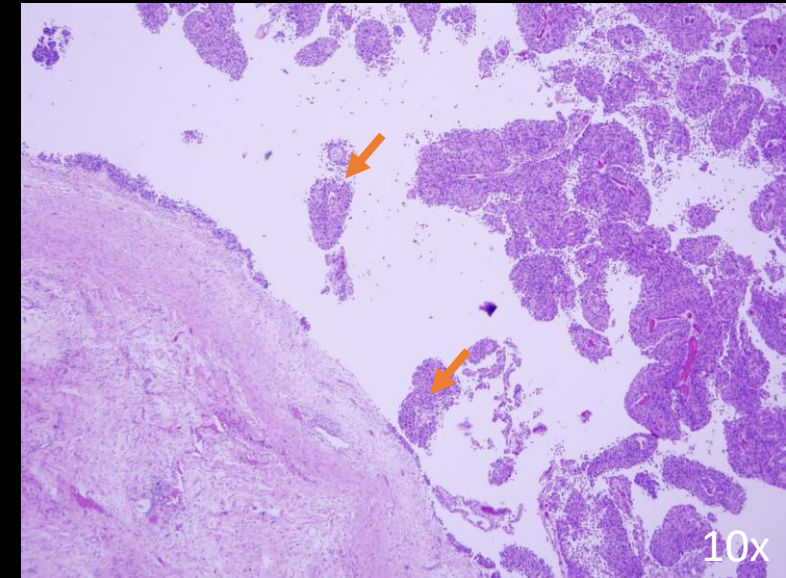
Papillary structure of tumor



Healthy Urothelium (7 cells) vs. Tumor

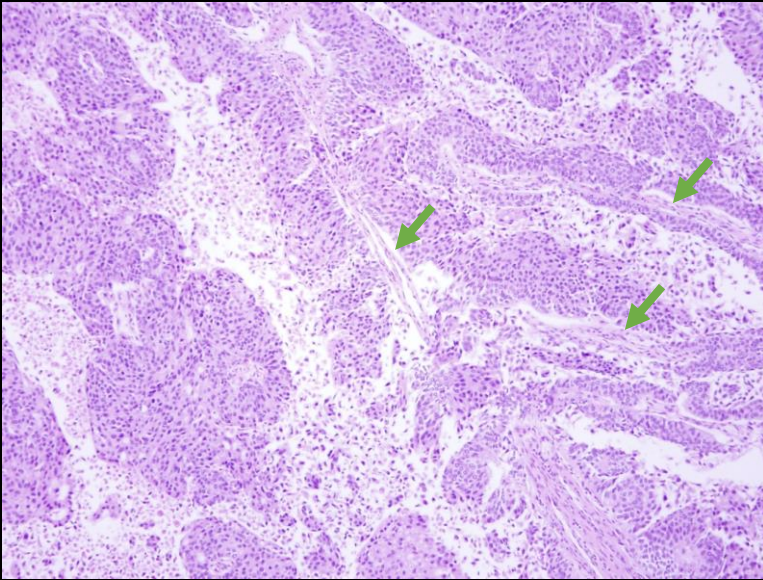


Tumor sloughing off urothelium

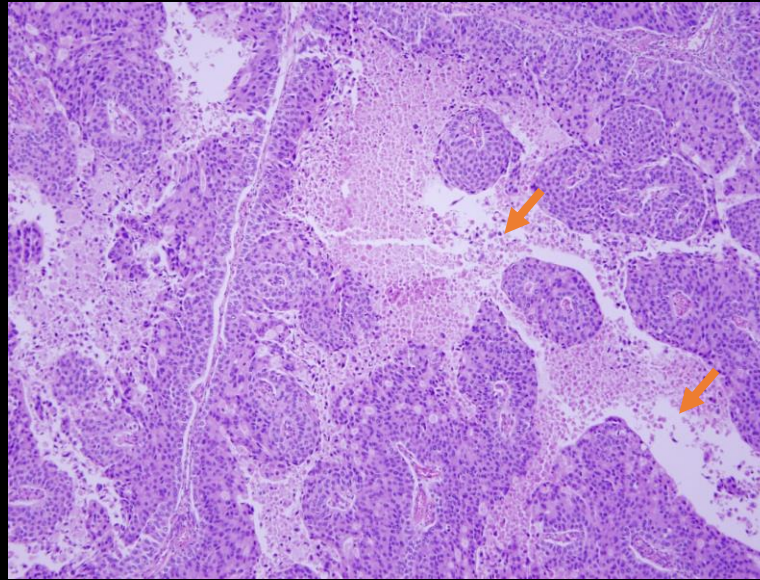


Pathology/Histology

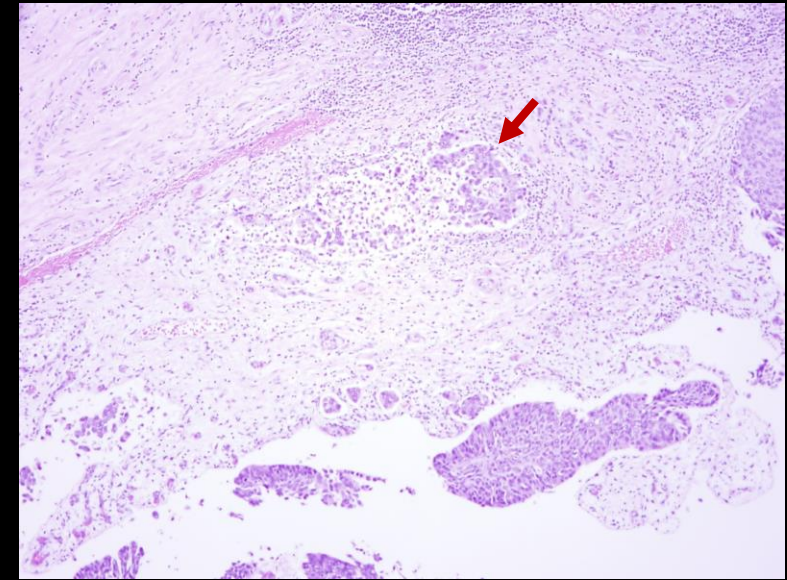
Fibrovascular cores of tumor papilla



Necrotic areas within tumor



Tumor infiltrating connective tissue



Histological Grade: High Grade (3)

Mismatch repair IHC (PMS2, MLH1, MSH2, MSH6) with intact nuclear staining in tumor cells

Final Diagnosis:

Papillary Urothelial Carcinoma

High Grade with invasion into subepithelial connective tissue

Urothelial Cancer – Overview

- Urothelial Cancer (previously Transitional cell carcinoma, TCC): most common primary malignancy of the urinary tract and may be found along its entire length
 - Bladder (most common): ~97%
 - Renal pelvis: ~2-3%
 - Ureter: ~1%
- Clinical presentation: relatively non-specific
 - Hematuria and/or flank pain due to obstructive hydronephrosis
 - Clots may cause renal colic that mimic ureterolithiasis
- Risk Factors:
 - Older age: average age of presentation being 65
 - Male: Female ration is 4:1 (at least in part due to industrial exposure)
 - Chemical exposure: smoking, azo dye/pigment manufacturing
 - Factors causing stasis (prolonging exposure to carcinogens): horseshoe kidney, calculi, ureteral pseudodiverticula

Urothelial Cancer – Pathology

- Two main morphologic patterns
 - *Papillary*: account for >85% tumors
 - broad base with many frond-like papillary projections
 - tends to be low grade and invasion beyond the mucosa is a late feature
 - *Non-papillary*:
 - sessile or nodular tumor
 - tends to be high grade with early invasion beyond the mucosa
- Tumors are divided into three histological grades (stage is more important for prognosis than tumor grade):
 - grade I: well differentiated
 - grade II: moderately differentiated
 - grade III: poorly/undifferentiated
- MMR IHCs can help guide therapy for urothelial cancers of the renal pelvis

Urothelial Cancer – Radiology

- CT urography is mainstay of both diagnosis and staging with sensitivity (96%) and specificity (99%).
 - CT urography of urothelial cancer in renal pelvis will show:
 - small masses → filling defect
 - large masses → distortion/obliteration/amputation of calyces
- Urothelial cancers are typically soft tissue density with only mild enhancement, usually less enhancing than renal parenchyma or RCC
 - Papillary tumors appear as soft tissue density filling defects
 - Non-papillary tumors are harder to detect as they are sessile

Urothelial Cancer – Treatment

- Treatment options vary with the location of the tumor, but in general, require surgical excision.
 - Tumor in renal pelvis → nephroureterectomy, resecting not only the kidney but also the ureter and a cuff of the bladder at the vesicoureteric junction
- Installation of bacille Calmette-Guerin (BCG) or mitomycin C may be used in selected cases as an alternative to surgery in some cases
- TCC have high rates of recurrence due to field effect on the urothelium
 - ~ 40% of patients with an upper urinary tract TCC will go on to develop one or more TCCs of bladder
 - ~ 2-4% of patients with a bladder TCC will go on to develop one or more TCC of urinary bladder or ureter

References

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