AMSER Case of the Month October 2025

63-year-old woman with history of recurrent Proteus UTI presenting with flank pain and fatigue

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Patient Presentation

- HPI: A 63-year-old woman with recurrent acute right flank pain and fatigue
- PMH: Recurrent UTIs, nephrolithiasis status post laser lithotripsy
- Social history: Never smoked, does not drink alcohol or use drugs
- PSH: Appendectomy
- Medications: Metoprolol, Atorvastatin
- Family history non-contributory

Pertinent Labs

- Complete blood count: Hemoglobin of 9.9, WBC count of 21.4
- Basic metabolic panel: BUN of 32 and creatinine of 1.86 (eGFR = 28)
- Urinalysis: Positive leukocyte esterase, moderate blood
- Urine culture: Proteus mirabilis

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

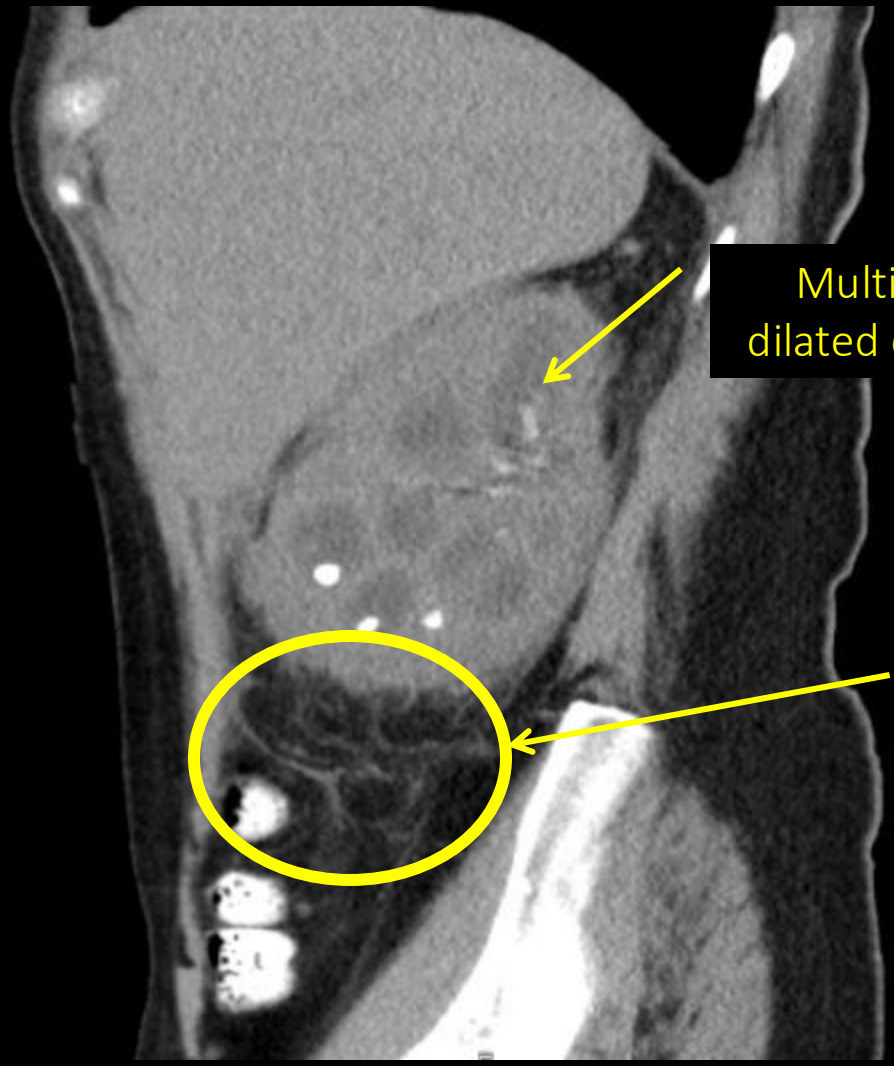
Variant 1: **Acute onset flank pain. Suspicion of stone disease. No history or remote history of stone disease. Initial imaging.**

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

This imaging modality was ordered by the ER physician

Findings

Findings



Multiple hypoattenuating dilated calyces (bear paw sign)

Perinephric stranding

Bilateral staghorn calculi

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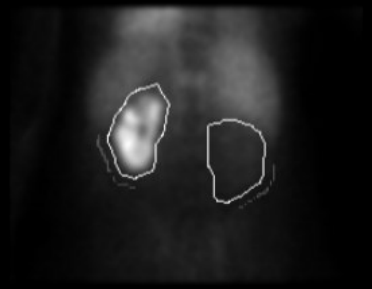
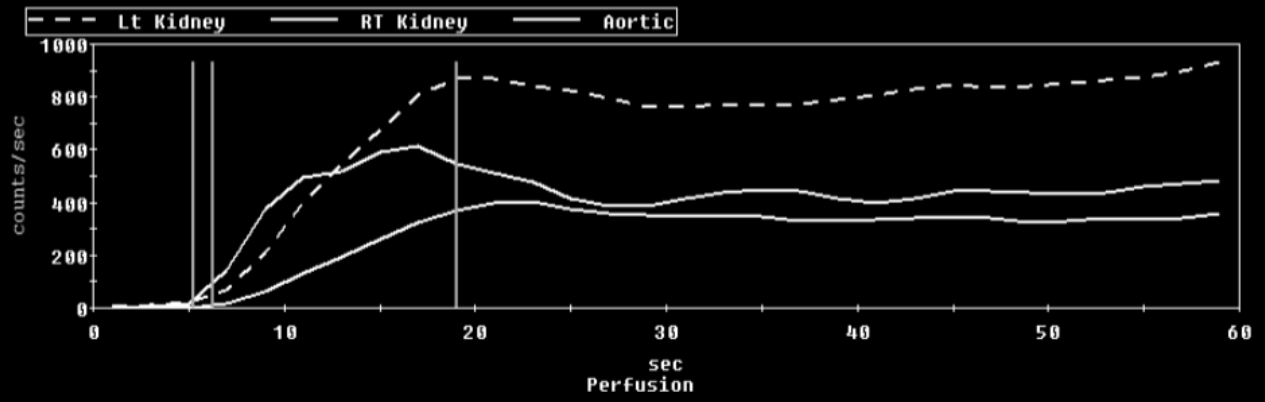
Findings



Uptake Interval



Kidney	Left	Right
Kidney Area (cm^2):	82.7	81.94
Perfusion% (Int):	72.86	27.14
Uptake% (Int):	85.82	14.18
Time to peak:	3.4	1.4
Peak to 1/2 peak:	21.	8.
Diuretic T1/2:	17.46	385.16

Tc-99m MAG3 dynamic renal scan

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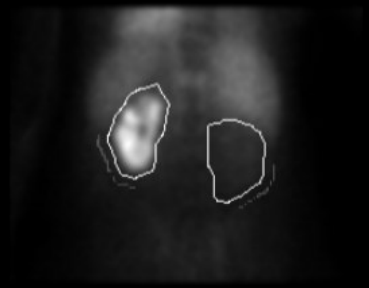
Findings



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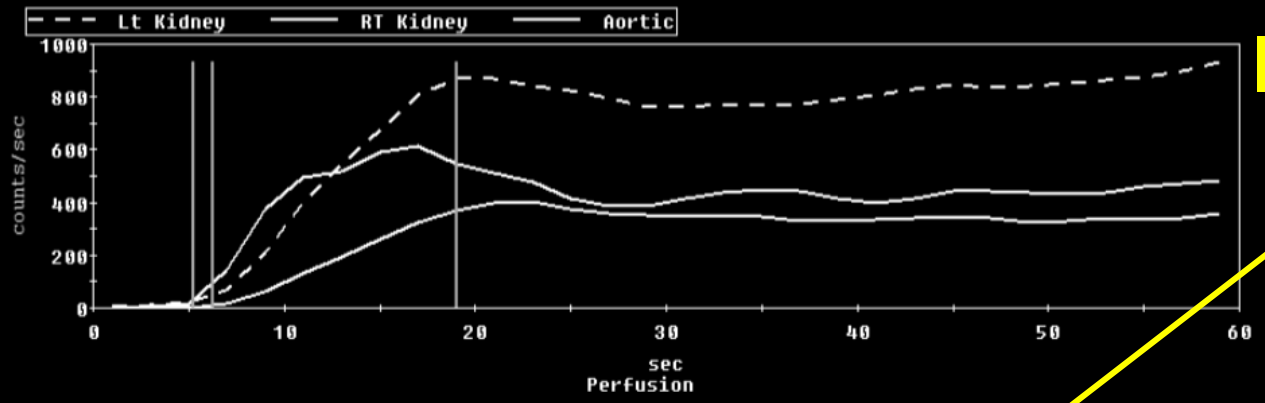

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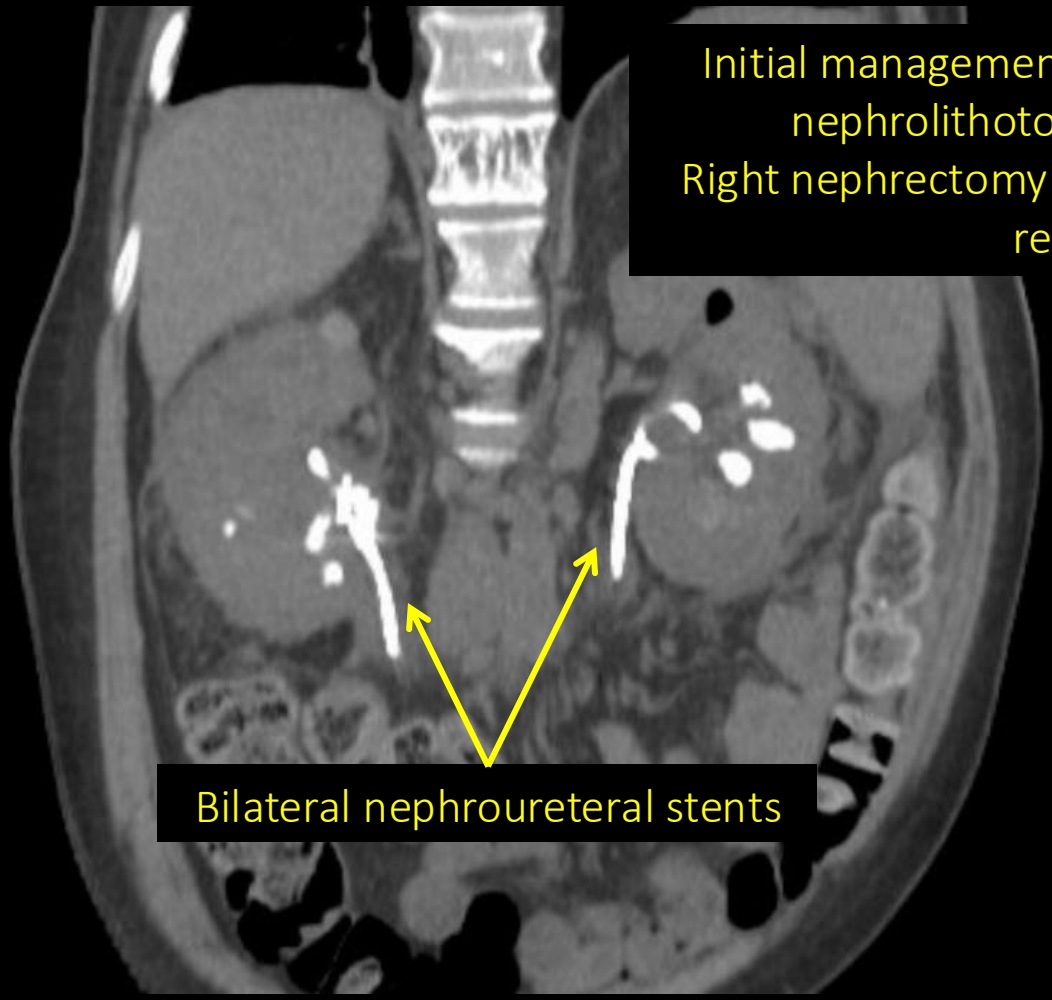
About 86% of the effective renal plasma flow is to the left kidney and about 14% is to the right

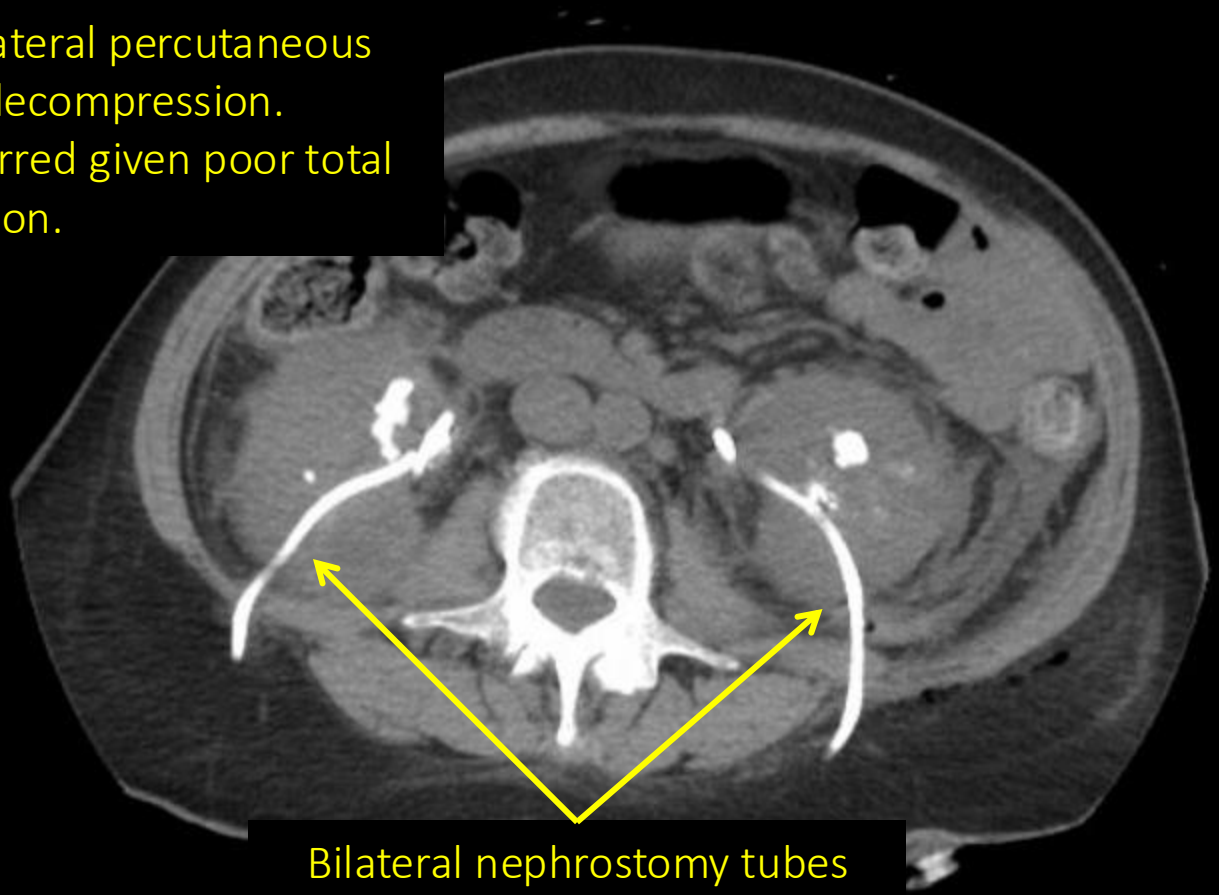
Findings post-procedure

Findings

Initial management was bilateral percutaneous nephrolithotomy and decompression.
Right nephrectomy was deferred given poor total renal function.



Bilateral nephroureteral stents



Bilateral nephrostomy tubes

Final Dx:

Xanthogranulomatous Pyelonephritis (XGP), stage 2

Case Discussion

Typical findings on CT

- Staghorn calculus visible in around 80% of cases
- The calyces are typically dilated while the pelvis is contracted
  - This gives the kidney the bear's paw appearance
- In about 10% of cases, disease can be focal or segmental, affecting only a portion of the kidney or only the cortex
- Diffuse cases can be staged based on involvement of regional tissue
  - Stage 1 involves only renal parenchyma
  - Stage 2 involves perinephric fat
  - Stage 3 involves pararenal space, the retroperitoneum, or adjacent organs

Case Discussion

Signs on history, physical, and labs

- Dull and persistent flank pain, malaise, fever, and anorexia/weight loss
- May not have lower urinary tract symptoms
- Elevated WBC count, anemia, elevated ESR and CRP
- Urine culture may be negative

Etiology

- Caused by chronic UTI and renal obstruction. About 80% of cases have a staghorn calculus. Most common pathogens are Proteus mirabilis and Escherichia coli.
- Histology shows granulomatous inflammation and lipid-laden macrophages

Case Discussion

Complications

- Renal function is typically severely impaired by the time the diagnosis is made
- If untreated, can spread extrarenally to the retroperitoneum or local organs and cause fistulae, deep sinuses, or abscesses

Treatment

- Treated initially with antibiotics and percutaneous drainage
- Most often treated with radical nephrectomy following clinical improvement
- Further surgery to treat fistulae and/or sinuses as needed
- In the case of localized disease, may be treated with partial nephrectomy or nonsurgically

Case Discussion

Prognosis

- Surgery prevents recurrence and improves long-term prognosis
- However, surgery is often technically difficult with a complication rate of about 22% and a mortality rate around 5%
- Bilateral cases are often fatal

Differential diagnosis

- The bear paw sign is moderately specific for XGP
- In focal cases, it can be difficult to distinguish from primary renal malignancy
- Other considerations include malakoplakia, renal tuberculosis, or complicated cyst
- Histology may be helpful when the diagnosis is unclear

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2. Li L, Parwani AV. Xanthogranulomatous pyelonephritis. *Archives of Pathology & Laboratory Medicine*. 2011;135(5):671-674. doi:10.5858/2009-0769-RSR.1

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4. Bolger MP, Hennebry J, Byrne C, et al. Xanthogranulomatous pyelonephritis: a narrative review with current perspectives on diagnostic imaging and management, including interventional radiology techniques. *IJNRD*. 2021;Volume 14:359-369. doi:10.2147/IJNRD.S236552

5. Neel R, Justin B, Leslie Selden L, Joel V, Ramakrishna Venkatesh R, Robert S F. Complications of laparoscopic versus open nephrectomy for xanthogranulomatous pyelonephritis: a contemporary series. *Int Complic.* 2020;6(1). doi:10.23937/2469-5742/1510071

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