

# Xanthogranulomatous Pyelonephritis

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RAD 3030 Elective

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# History

## **PMH:**

- 61 y/o F w/ NIDDM, stage 4 CKD, chronic anemia, and sarcoidosis

## **Hx:**

- ED 6/7 with weakness, fatigue, and abd bloating x 2 wks

## **PE:**

- Tender to deep palpation of LUQ
- HR 100, BP 106/66, Temp 98.3F

## **Labs:**

- Na 130, K 5.4
- BUN 21 / CR 1.16
- AST 52 ALT 25 Alk phos 142
- WBC 11.1, H&H 9.5 & 29.3
- Urine: Slightly cloudy with trace protein, trace leukocyte esterase, 21-50 WBC/HPF

# 6/7 CT abd/pelvis

Large, lobulated L kidney

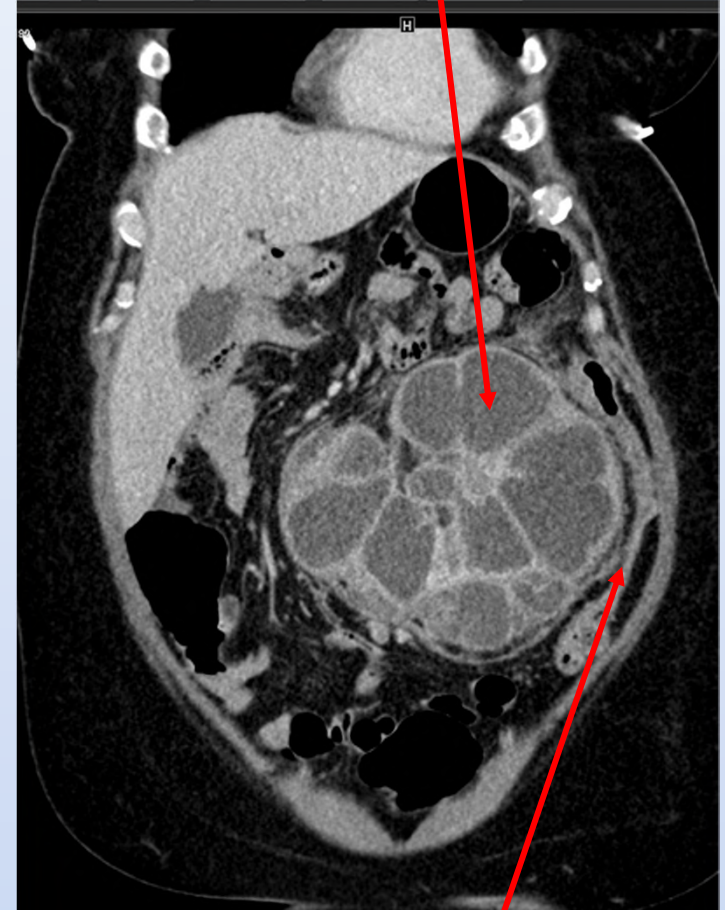


Grossly normal R kidney

Large stone

Dilated, fluid filled calyx

Large, lobulated L kidney



Perinephric stranding

Large, lobulated left kidney with well defined, but significantly atrophic, cortex and parenchyma. Dilated, fluid filled calyces and large obstructing stone. On the right, coronal recon, there is perinephic stranding and collapsed bowel loop.

# Differential Diagnosis



- **Xanthogranulomatous pyelonephritis**
  - Muliloculated appearance of the kidney. Classic "bear's paw sign." Associated with an obstructing stone.
- **Renal carcinoma**
  - Thickened/irregular septa and post-contrast enhancement
- **Renal abscess**
  - Intrarenal walled-off cavity

## **Bosniak Classification of Cystic Renal Masses by CT Scan**

- Round and sharply demarcated with smooth walls
- Anechoic
- Strong posterior wall echo (good transmission through a cyst)

Image from Pinterest.com

# Discussion

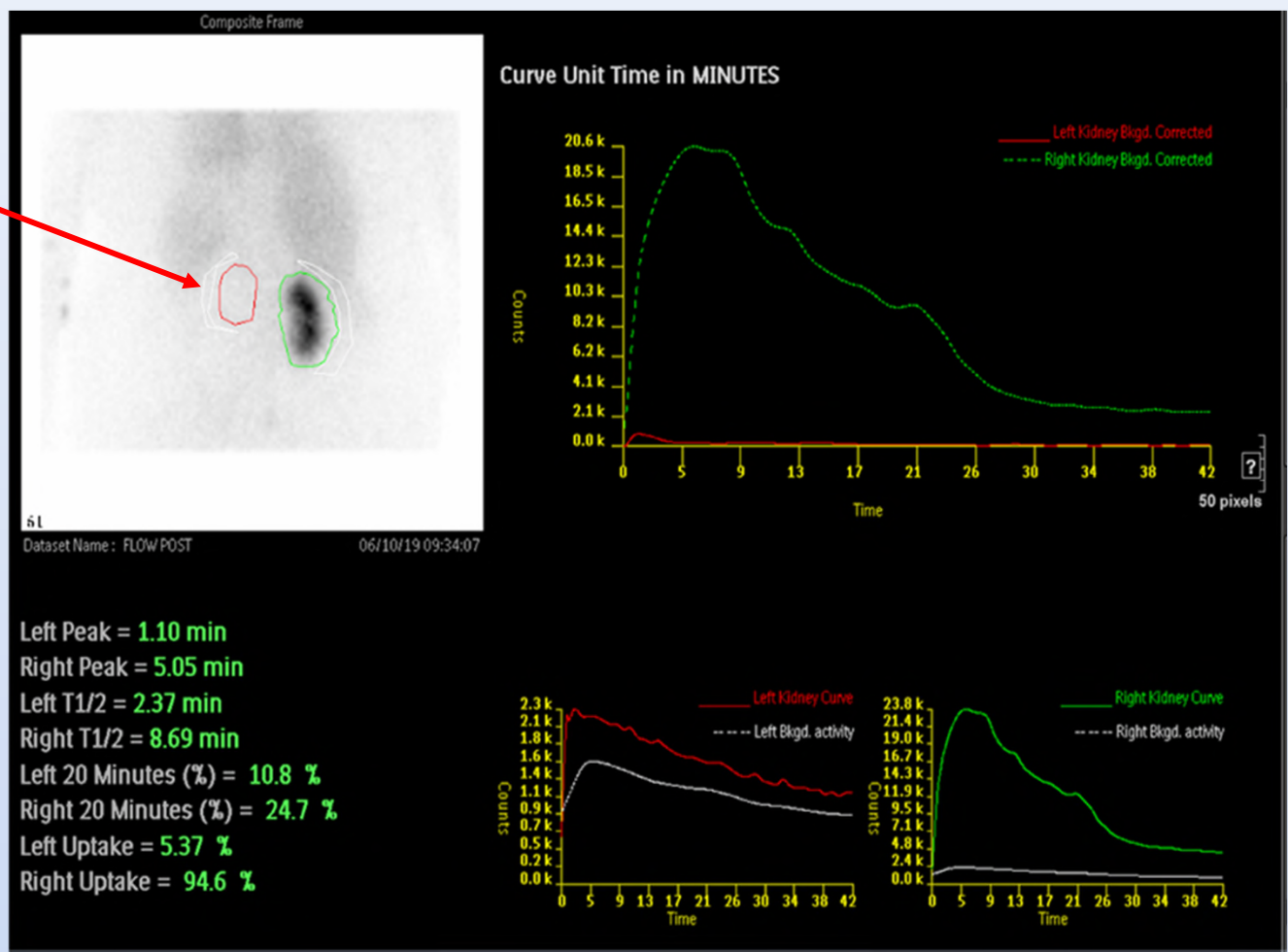
- **Xanthogranulomatous pyelonephritis** is a variant of chronic pyelonephritis, usually secondary to an obstructing and infected renal stone.
- Pathophysiology involves a defect in the processing of bacteria by macrophages.
- Most common microbes are *Escherichia coli*, *Proteus mirabilis*, *Pseudomonas*, *Enterococcus faecalis*, and *Klebsiella*.
- CT imaging is the preferred diagnostic tool in xanthogranulomatous pyelonephritis.

# History

- Diagnosed w/ xanthogranulomatous pyelo and staghorn calculus; discharged 6/10 on Vantin
- Had a renal Lasix scan for further urology assessment

# 6/10 Renal Lasix scan

No contrast uptake by left kidney



This imaging is taken from a posterior approach (the left kidney is on our left and the right kidney is on our right). The right kidney demonstrates adequate uptake of tracer, and based on the curve, it excretes it appropriately. The left kidney doesn't light up at all, so it is non-functioning (not even taking up contrast).

# History

## **Hx:**

- Return to ED 7/10 with fatigue, nausea, abd discomfort x 1 wk and tachycardia at PCP

## **PE:**

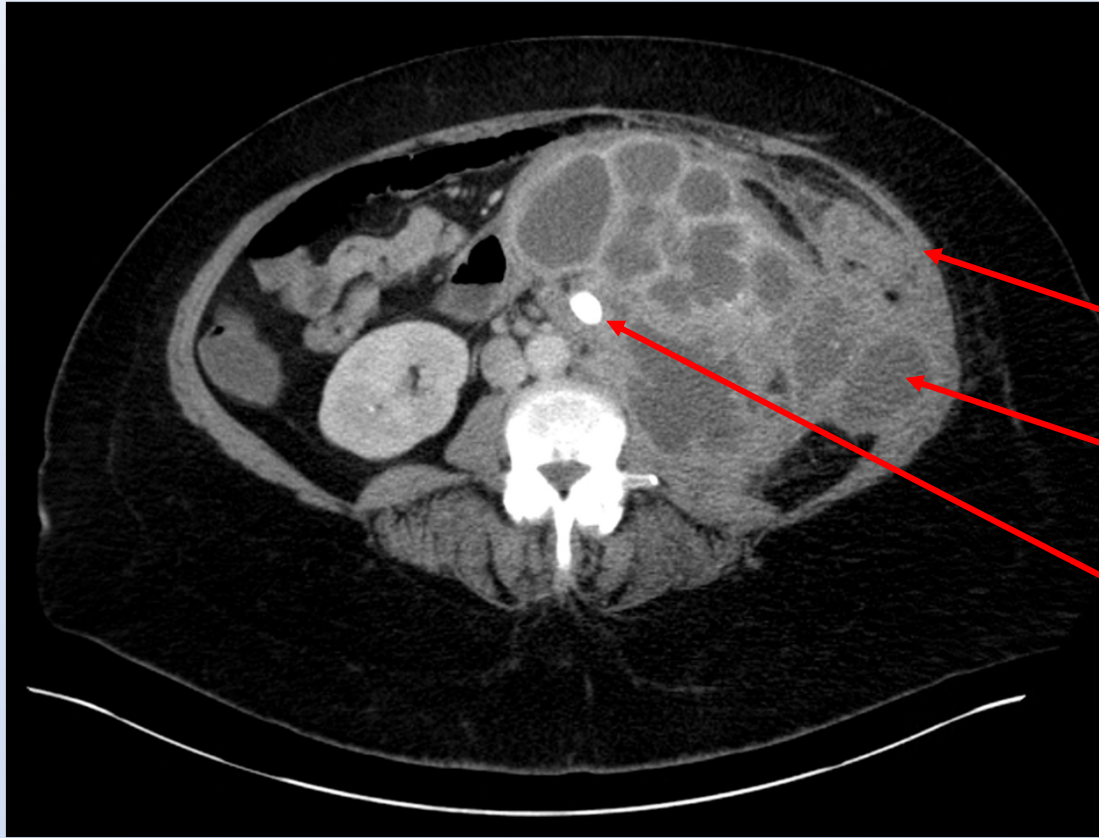
- L flank pain
- HR 121, BP 106/74, Temp 98.3F

## **Labs:**

- Na 130
- BUN 23 / CR 1.4
- WBC 11
- H&H 9.2 & 28.7



## 7/10 CT abd/pelvis



**Collapsed bowel loop with  
extensive fat stranding**

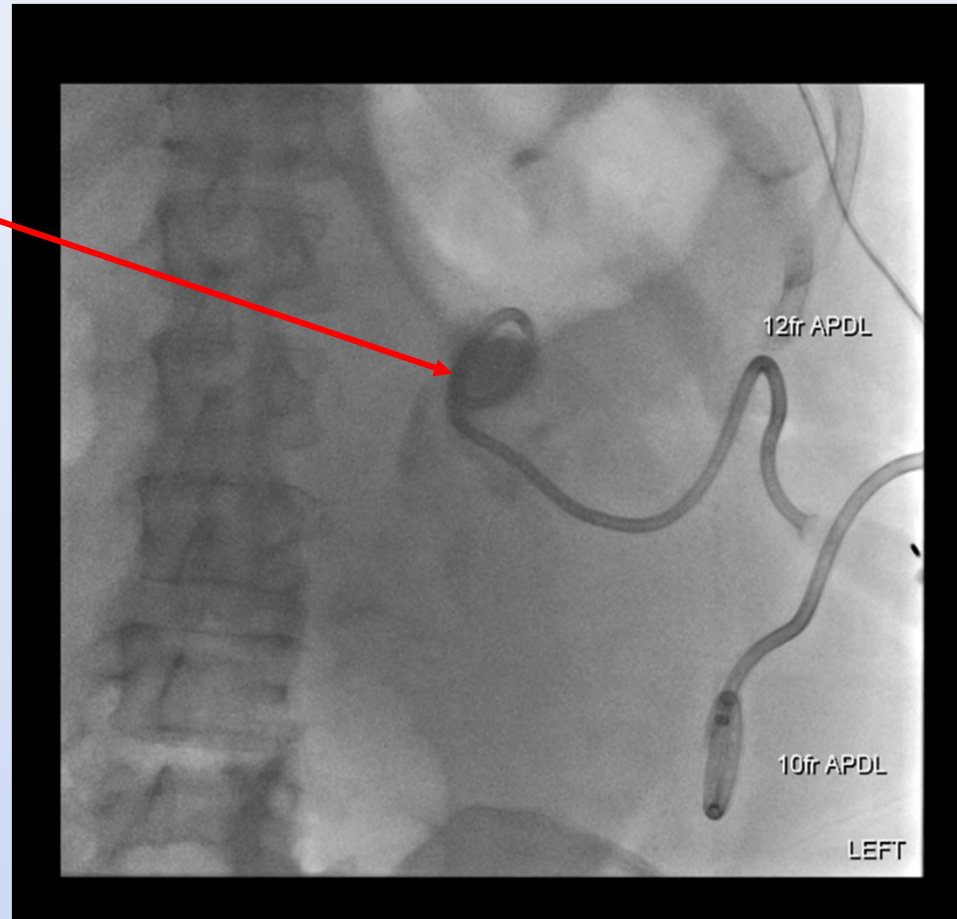
**Fluid collection**

**Large stone**

Redemonstration of lobulated kidney, large stone, collapsed bowel loop, with extensive fat stranding; may represent ileus due to adjacent inflammation. There is a newly developed, complex fluid collection concerning for abscess.

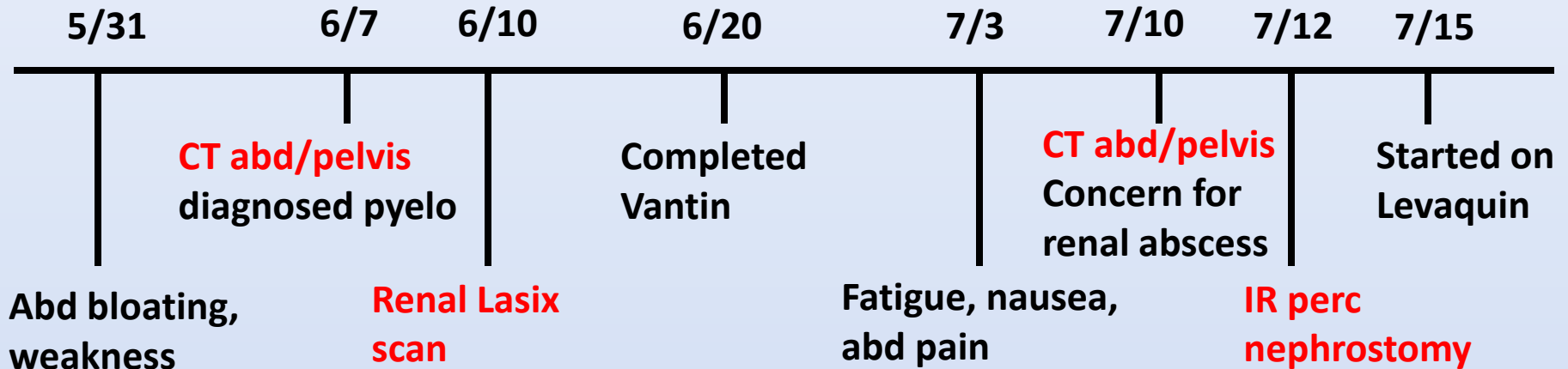
# 7/12 L percutaneous nephrostomy

12-French  
Mac-loc  
catheter



A needle was advanced into a left perinephric abscess under ultrasound guidance. A wire was advanced, the tract was serially dilated and a drainage catheter was placed. Contrast injection was not performed.

# Patient Timeline



Patient's abscess culture grew *Citrobacter freundii* complex, Group f streptococcus, and *Klebsiella oxytoca*. She was started on Levaquin with plan to d/c with follow-up urology appt to schedule nephrectomy. In this patient's case, nephrectomy is necessary due to a non-functional left kidney secondary to an underlying, destructive disease process.

# ACR Appropriateness Criteria & Imaging Cost

## Variant 1:

**Acute pyelonephritis. Uncomplicated patient (eg, no history of diabetes or immune compromise or history of stones or obstruction or prior renal surgery or lack of response to therapy). Initial imaging.**

| Procedure  | Appropriateness Category | Relative Radiation Level |
|--|--------------------------|--------------------------|
| Radiography intravenous urography                    | Usually Not Appropriate  | ☹☹☹                      |
| Fluoroscopy voiding cystourethrography               | Usually Not Appropriate  | ☹☹                       |
| Radiography abdomen and pelvis (KUB)                 | Usually Not Appropriate  | ☹☹                       |
| Fluoroscopy antegrade pyelography                    | Usually Not Appropriate  | ☹☹☹                      |
| US color Doppler kidneys and bladder retroperitoneal | Usually Not Appropriate  | 0                        |
| MRI abdomen without and with IV contrast             | Usually Not Appropriate  | 0                        |
| MRI abdomen without IV contrast                      | Usually Not Appropriate  | 0                        |
| MRI abdomen and pelvis without and with IV contrast  | Usually Not Appropriate  | 0                        |
| MRI abdomen and pelvis without IV contrast           | Usually Not Appropriate  | 0                        |
| CT abdomen and pelvis without and with IV contrast   | Usually Not Appropriate  | ☹☹☹☹                     |
| CT abdomen and pelvis with IV contrast               | Usually Not Appropriate  | ☹☹☹                      |
| CT abdomen and pelvis without IV contrast            | Usually Not Appropriate  | ☹☹☹                      |
| Tc-99m DMSA scan kidney                              | Usually Not Appropriate  | ☹☹☹                      |

**CT abd/pelvis with contrast:  
\$1,160 x 2 = \$2, 320**

**Renal Lasix Scan:  
\$1, 498**

**Percutaneous nephrostomy:  
\$2,350**

Sources: Honor Health, MDSave, and Journal of Urology

## Variant 4:

**Acute nonlocalized abdominal pain. Not otherwise specified. Initial imaging.**

| Procedure   | Appropriateness Category | Relative Radiation Level |
|---|--------------------------|--------------------------|
| CT abdomen and pelvis with IV contrast              | Usually Appropriate      | ☹☹☹                      |
| CT abdomen and pelvis without IV contrast           | Usually Appropriate      | ☹☹☹                      |
| MRI abdomen and pelvis without and with IV contrast | Usually Appropriate      | 0                        |

# Take home points

- Xanthogranulomatous pyelonephritis is a form of chronic pyelonephritis characterized by “bear’s paw” sign on CT.
- The Bosniak Classification System can be used to differentiate a simple cyst from a tumor on CT.
- A renal Lasix scan can be performed to help determine kidney function.
- CT abd/pelvis with IV contrast is usually appropriate as initial imaging to assess acute, non-localized abdominal pain.

# References

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