

Calyceal rupture

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Section: Uroradiology & genital male imaging

Area of Interest: Kidney

Procedure: Imaging sequences

Procedure: Diagnostic procedure

Procedure: Pyelography

Procedure: Physiological studies

Imaging Technique: CT

Imaging Technique: Nuclear medicine conventional

Special Focus: Inflammation Haemodynamics / Flow dynamics Obstruction / Occlusion Case Type: Anatomy and Functional Imaging

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Patient: 47 years, female

Clinical History:

A 47-year-old female patient presented with a four-day history of left lower back pain radiating to the left flank, left upper quadrant, and left lower quadrant; nausea; vomiting; and lightheadedness. Laboratory results revealed a normal white blood cell count and negative urinalysis.

Imaging Findings:

Non-contrast CT demonstrated mild left hydronephrosis and proximal hydroureter with perinephric and periureteral inflammatory changes, but there was no urolithiasis or other identifiable source of obstruction (Fig. 1, 2).

Nuclear medicine MAG3 renal scan revealed timely left renal uptake, but there was delayed renal clearance with more than 50% residual radiotracer (Fig. 3, 4). Progressive radiotracer accumulation was noted with the mildly prominent left intrarenal collecting system and renal pelvis. Following the administration of Lasix, some of the retained radiotracer cleared via the left ureter, but there was visualization of extraluminal radiotracer in the infrarenal space indicating calyceal rupture (Fig. 3).

Discussion:

Background: Rupture of the renal collecting system is a rare finding that is usually due to an obstructive ureteral or staghorn calculus but may be secondary to trauma, neoplasm, or iatrogenic causes [1, 2]. Iatrogenic rupture was a common complication of retrograde pyelogram precipitating pyelosinus backflow and calyceal rupture resulting in urinoma formation. Forniceal rupture likely occurs because the larger calyces at the renal poles form a more acutely angled fornix which withstands less hydrostatic pressure leading to rupture [7, 8].

Clinical Perspective: The symptoms associated with renal calyceal/forniceal rupture are acute flank/abdominal pain with nausea and vomiting [3, 4, 5]. Leukocytosis and fever may be present [2, 6].

Imaging Perspective: Calyceal rupture is usually diagnosed via contrasted CT and traditionally confirmed with

retrograde pyelogram. In this case, the calyceal rupture was diagnosed via MAG3 renogram. Additionally, this case is unusual as the source of the hydroureteronephrosis and subsequent calyceal rupture was not identified on non-contrasted CT, and the patient denied recent stone passage.

Outcome: The left calyceal rupture was treated with placement of a 6 French Double J ureteral stent, and the patient was discharged home with prescriptions for oxybutynin and tamsulosin. Placement of a percutaneous nephrostomy tube is also a possible treatment choice, and small urinomas usually resolve spontaneously [5, 9].

Take Home Message: If there is a contraindication to administering iodinated contrast, a nuclear medicine renogram is a practical alternative to diagnose suspected calyceal rupture.

Differential Diagnosis List: Left renal calyceal rupture., Urolithiasis, Urothelial carcinoma, Extrinsic compression of the renal pelvis or ureter

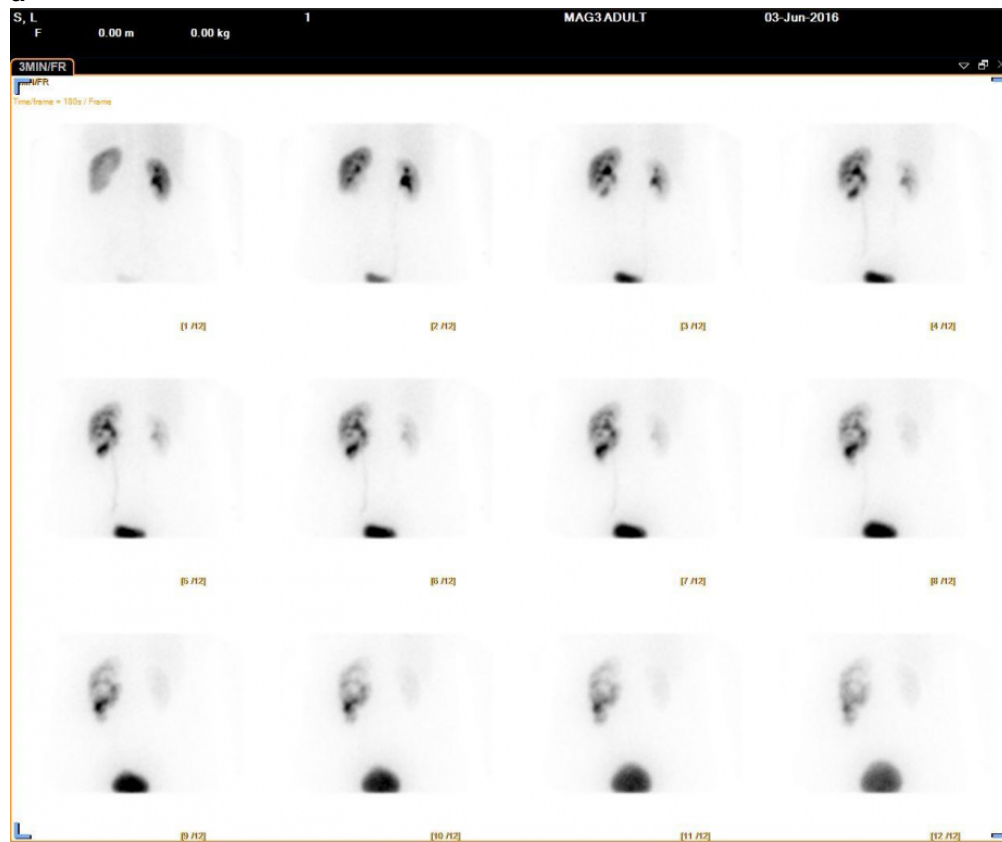
Final Diagnosis: Left renal calyceal rupture.

References:

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Figure 1

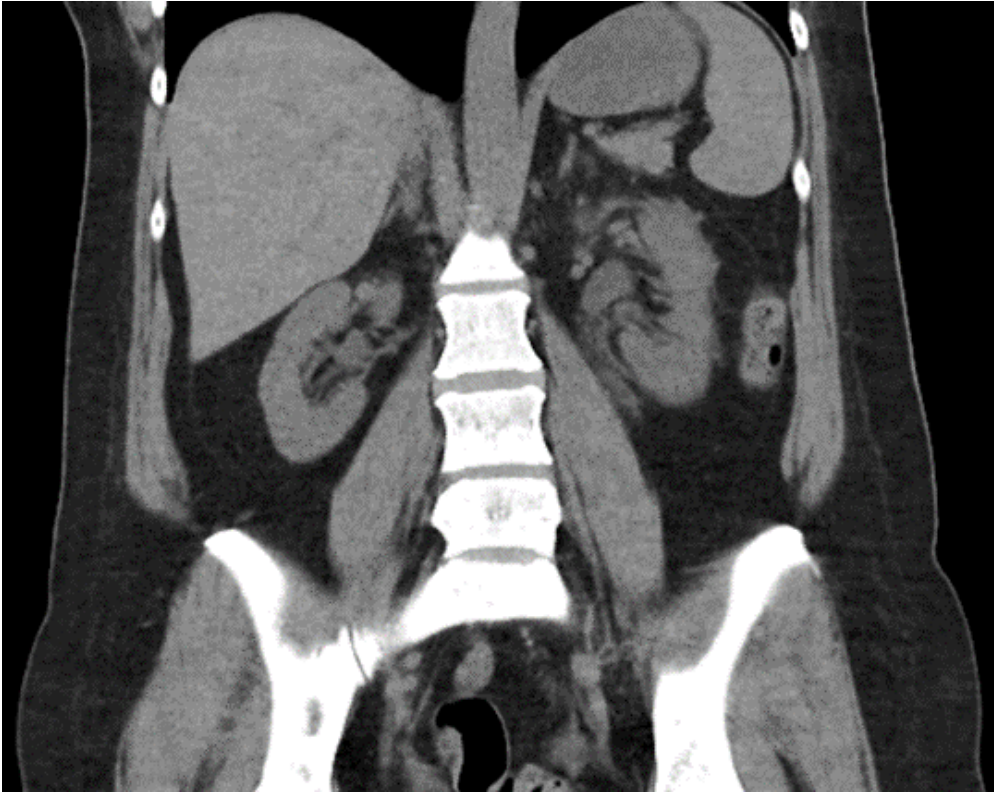
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Description: Nuclear medicine MAG3 renal scan demonstrating radiotracer accumulation within the mildly prominent renal collecting system and extraluminal radiotracer in infrarenal space consistent with calyceal rupture. **Origin:** Dept Radiology, Augusta University, Augusta, Georgia, USA

Figure 2

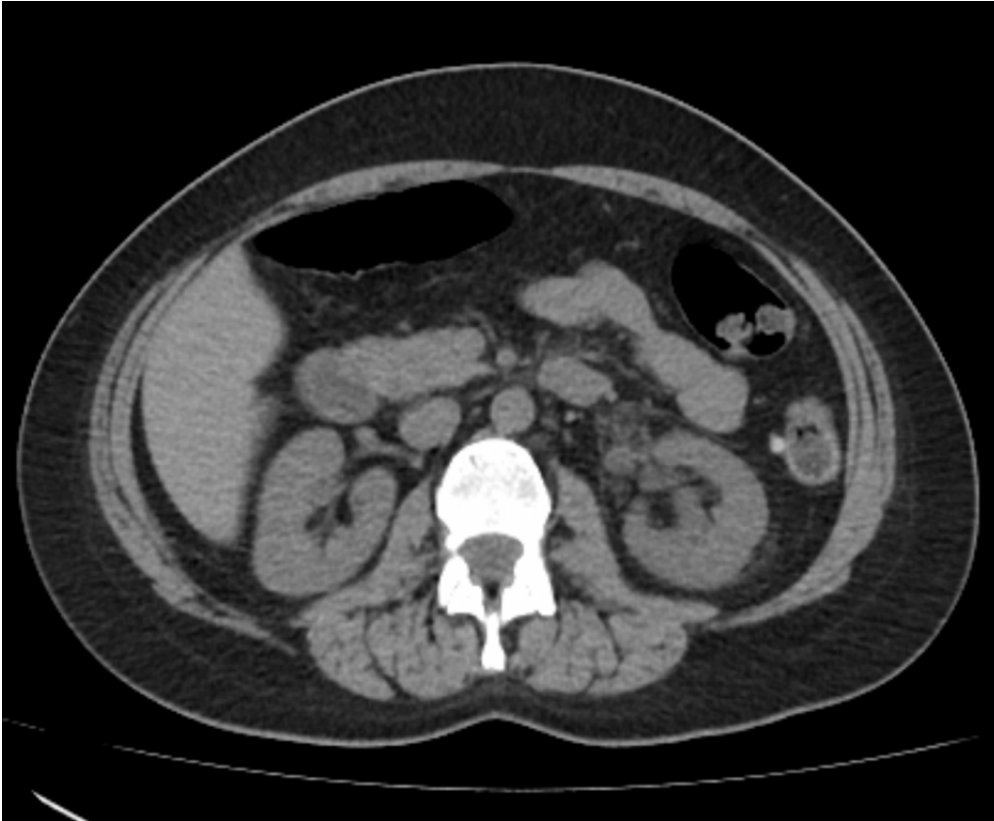
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Description: Coronal non-contrast CT demonstrating mild left hydronephrosis with perinephric and periureteral inflammatory changes. **Origin:** Dr K Klein, Dept Radiology, Augusta University, Augusta, Georgia, USA

Figure 3

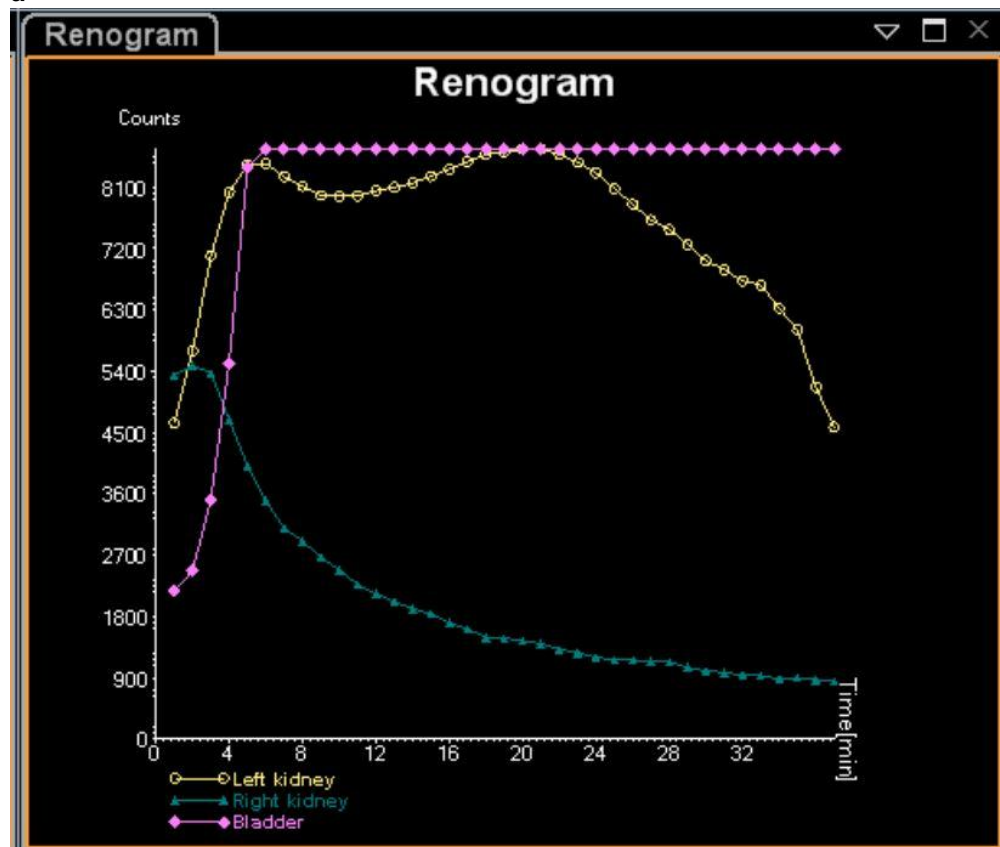
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Description: Axial non-contrast CT showing mild left hydroureter with periureteral inflammatory changes. **Origin:** Dr Kandy Klein, Dept Radiology, Augusta University, Augusta, Georgia, USA

Figure 4

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Description: Nuclear medicine MAG3 renal scan revealing delayed left renal clearance with more than 50% residual radiotracer. **Origin:** Dr. Darko Pucar, Department of Radiology, Augusta University, Augusta, Georgia, USA