AMSER Case of the Month October 2025

82-year-old female with indeterminate renal mass

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Patient Presentation

- 82-year-old female with PMH of recurrent cystitis and renal stones presents as follow-up for bilateral urolithiasis first diagnosed 7 months ago via non-contrast CT abdomen. Symptoms at that time included right flank pain and hematuria. Her current symptoms include urinary retention and urge incontinence.
- PMH: recurrent cystitis, bilateral urolithiasis
- SH: no significant surgical history
- ROS: negative other than stated in HPI
- PE: 100 mL orange cloudy urine draining via 14 French straight catheter, no suprapubic tenderness, otherwise non-contributory

Pertinent Labs

- Urinalysis
  - Blood 2+
- BMP
  - BUN: 31
  - Cr: 1.32
  - GFR: 40

Non-improving symptoms in a patient with known stone disease

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 2: **Acute onset flank pain in patient with known current stone disease, diagnosed on recent imaging. Recurrent symptoms of stone disease. Follow-up 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	O
Radiography abdomen and pelvis	May Be Appropriate	☢☢
CT abdomen and pelvis with IV contrast	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 without and with IV contrast	Usually Not Appropriate	☢☢☢☢
CTU without and with IV contrast	Usually Not Appropriate	☢☢☢☢

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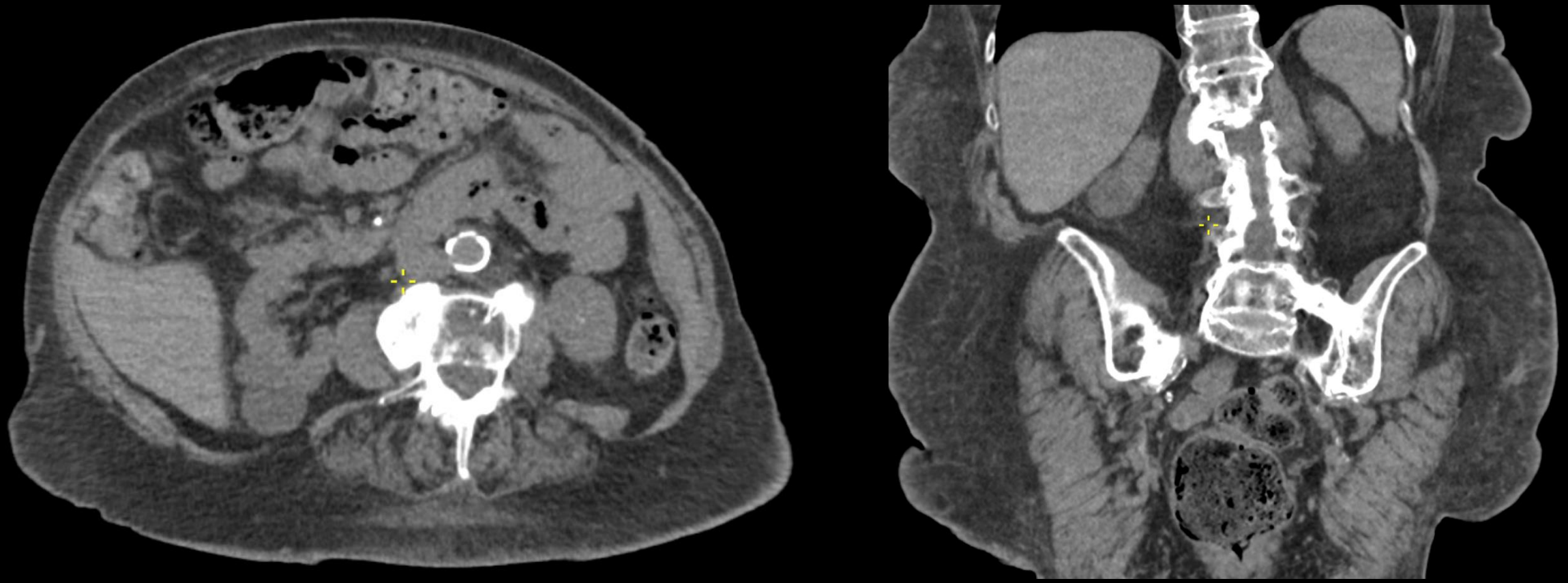
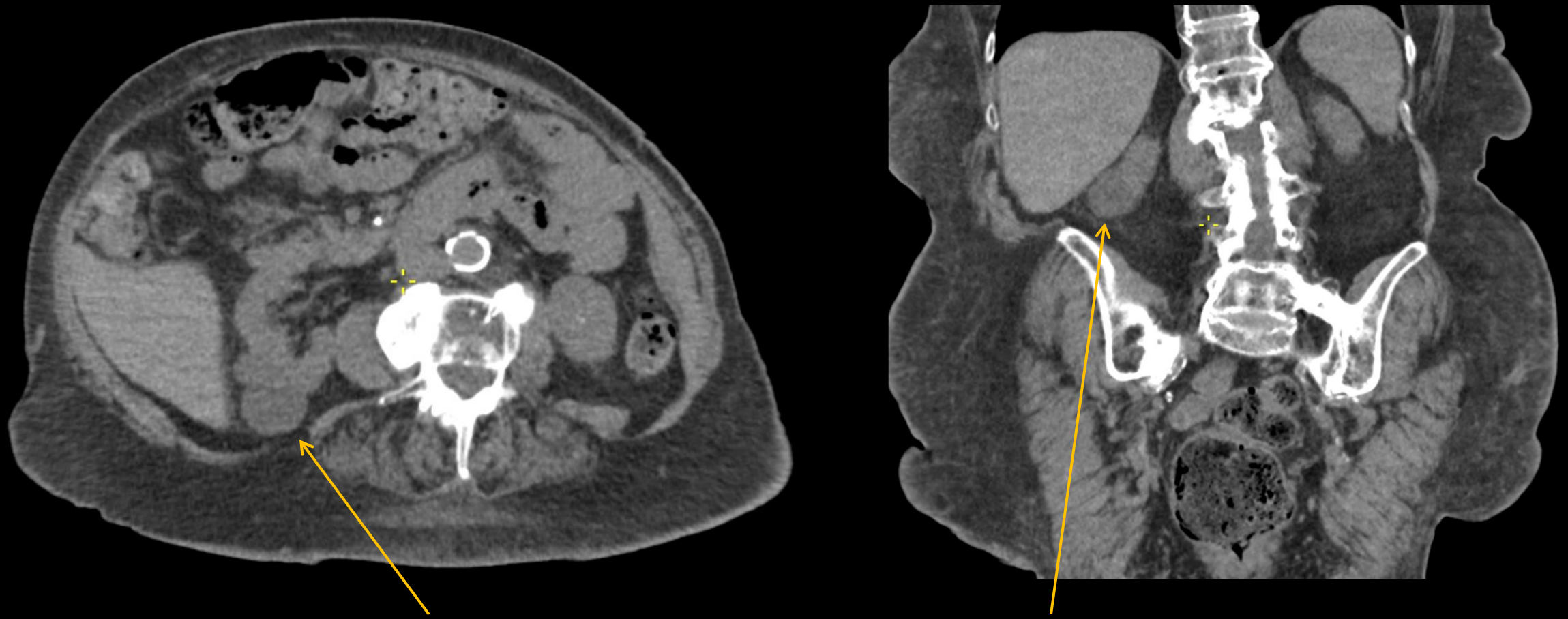
Findings (unlabeled)



CT abdomen without contrast axial (left) coronal (right)

Findings (labeled)



Hypodense exophytic lesion not measuring simple fluid of the inferior polar region measuring 3.2 cm

Indeterminate renal mass found incidentally. What Imaging Should We Order Next?

Select the applicable ACR Appropriateness Criteria

American College of Radiology
ACR Appropriateness Criteria®
Indeterminate Renal Mass

Variant 1: **Indeterminate renal mass. No contraindication to either iodinated CT contrast or gadolinium-based MR intravenous contrast. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
US abdomen with IV contrast	Usually Appropriate	O
MRI abdomen without and with IV contrast	Usually Appropriate	O
CT abdomen without and with IV contrast	Usually Appropriate	☢☢☢☢
US kidneys retroperitoneal	May Be Appropriate	O
MRI abdomen without IV contrast	May Be Appropriate	O
CT abdomen with IV contrast	May Be Appropriate	☢☢☢
CT abdomen without IV contrast	May Be Appropriate	☢☢☢
CTU without and with IV contrast	May Be Appropriate	☢☢☢☢
Arteriography kidney	Usually Not Appropriate	☢☢☢
Radiography intravenous urography	Usually Not Appropriate	☢☢☢
Image-guided biopsy adrenal gland	Usually Not Appropriate	Varies
MRU without and with IV contrast	Usually Not Appropriate	O

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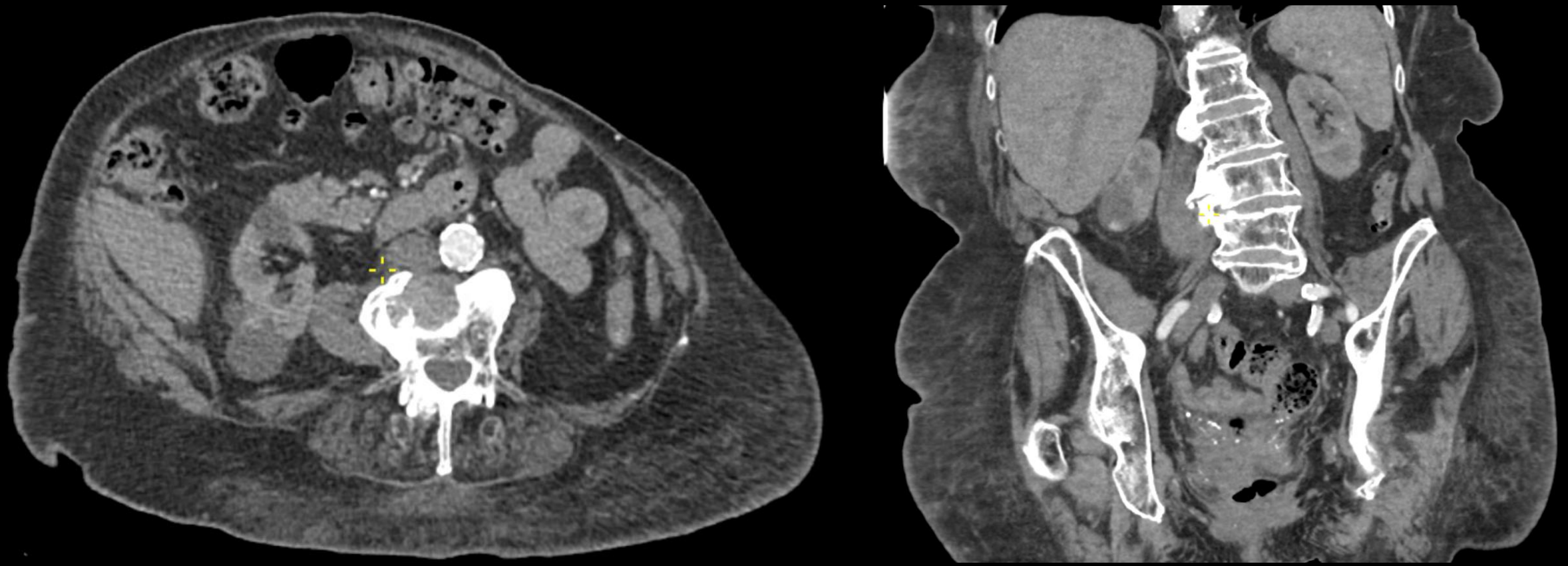
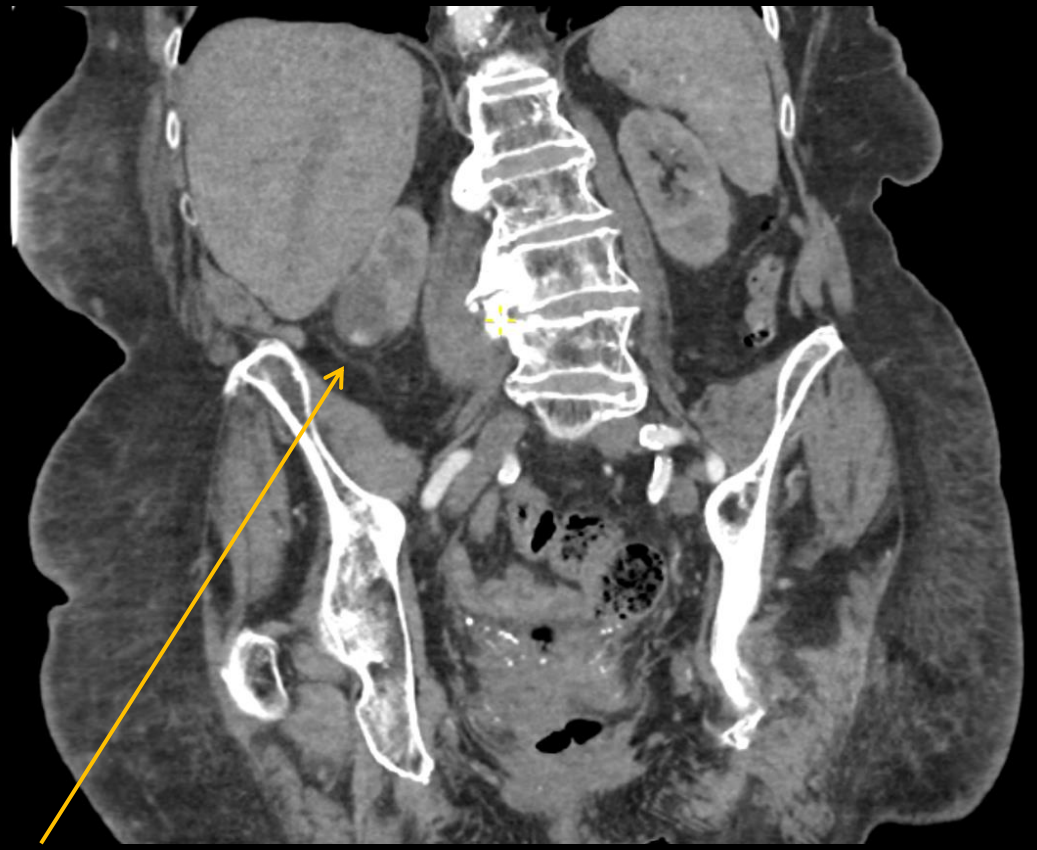
Findings (unlabeled)



CT Abdomen with contrast axial (left) coronal (right)

Findings (labeled)



Septated renal interpolar cystic lesion measuring 4.4 x 3.1 cm with nodular enhancement along inferior aspect measuring 0.9 cm

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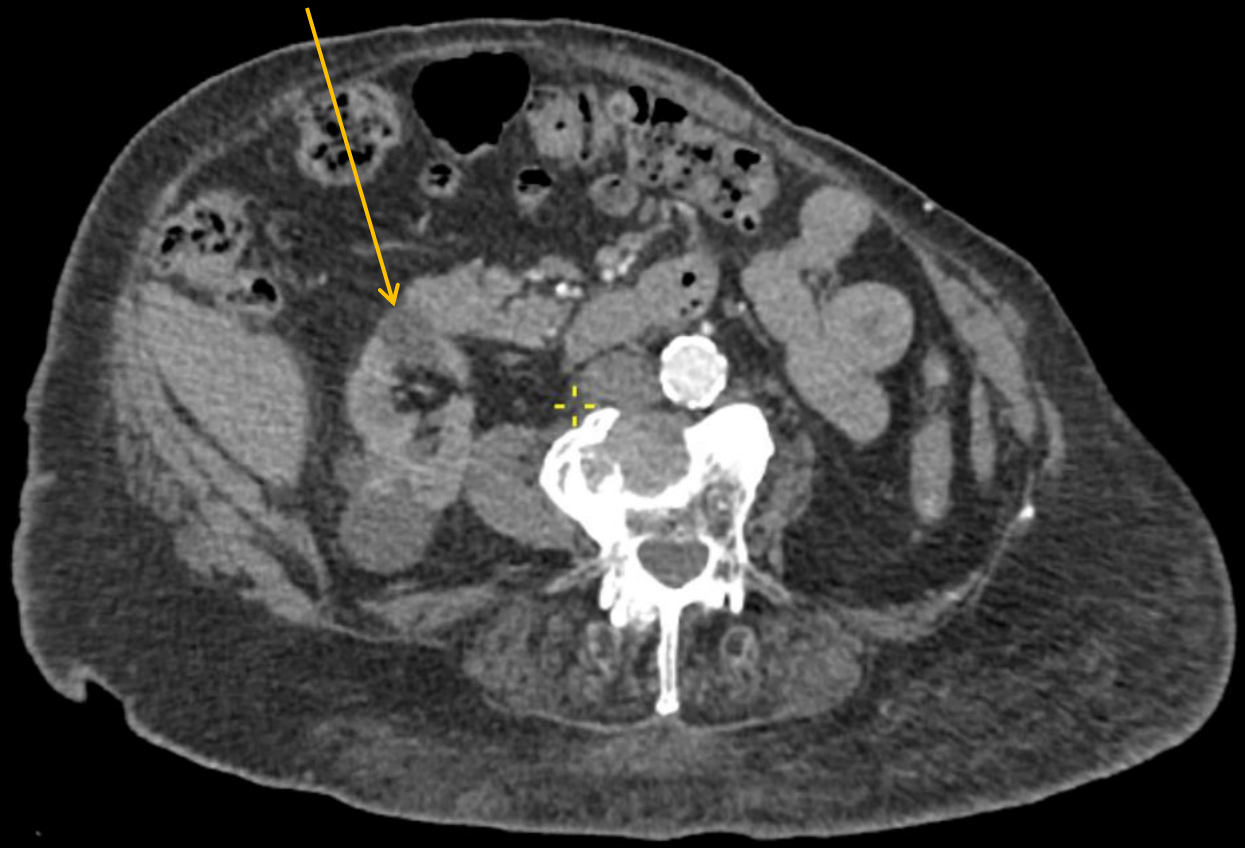
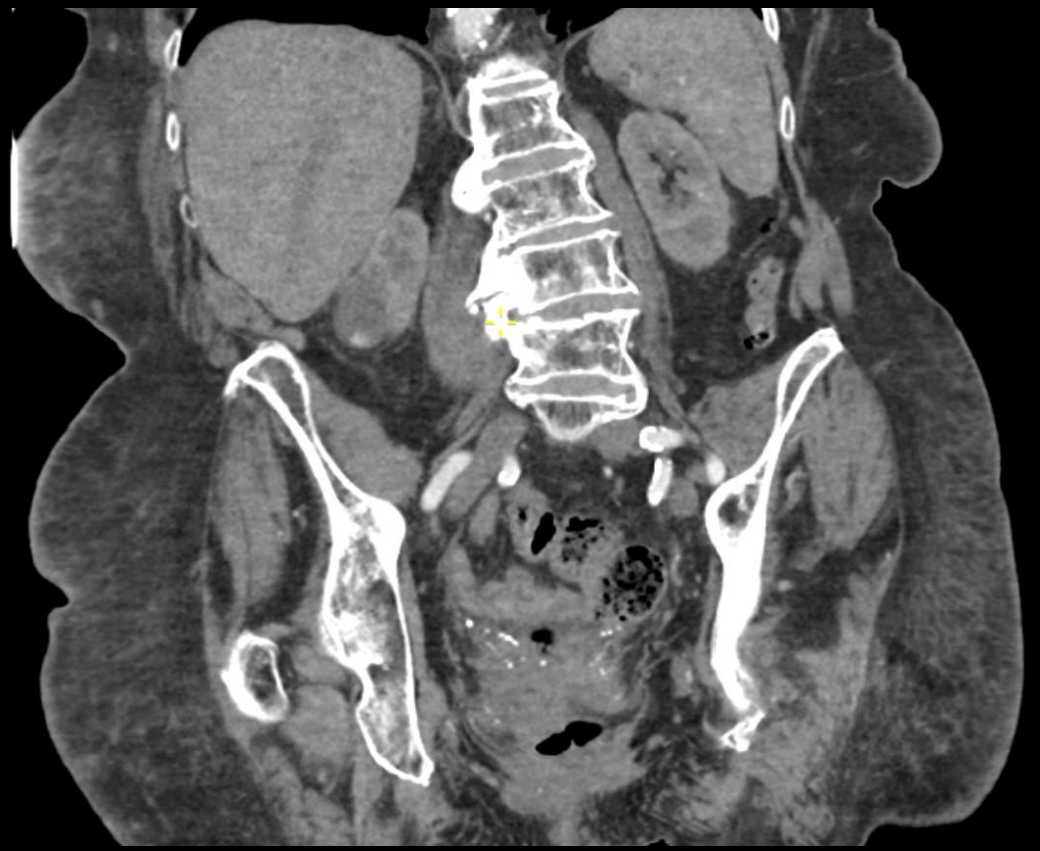
Findings (labeled)

Cyst in the anterior interpolar region measuring 1.9 cm





Final Dx:

Cystic Renal lesion with mural nodule, Bosniak IV

Case Discussion

What was performed:

- Biopsy and aspiration of the large septated lesion were attempted
  - Pathology and Cytology were unfortunately non-diagnostic
- Lesion was treated successfully with microwave ablation (MWA) under CT guidance

Case Discussion

Overview of Bosniak Classification

- Purpose: Used to classify renal cystic lesions on CT/MRI to estimate malignancy risk & guide management.
- Based on:
  - Septations
  - Calcifications
  - Wall thickness
  - Enhancement after contrast
  - Presence of nodules or solid components
- Categories: Bosniak I to IV (I & II = benign, IIF = follow-up, III & IV = often surgical)
- Risk of RCC increases progressively from I → IV
  - More information on next slide

Case Discussion

Classification:

- Bosniak (I to IV) classification: Imaging system for cystic renal masses based on septations, calcifications, and enhancement
  - I – Simple cyst, thin wall, no septa/calcification/solid → Benign (~0%)
  - II – Few thin septa or fine calcifications, hyperdense <3 cm → Benign (<1%)
  - IIF – More septa/minimal thickening, hyperdense >3 cm → Low risk (~5–10%), needs f/u
  - III – Thickened/irregular septa or wall with enhancement → Intermediate (~40–60%), often surgery
  - IV – Enhancing soft tissue component → High risk (~90%), malignant until proven otherwise
    - This case met criteria for Bosniak IV based on septations and enhancing nodular component

Case Discussion

Treatment:

- Partial nephrectomy – preferred if feasible (nephron-sparing)
- Radical nephrectomy – for large/complex lesions or poor surgical candidates for PN
- Ablation – option in select patients including those with small lesions and high surgical risk
  - Microwave Ablation/Radiofrequency/Cryoablation further described next slide

Case Discussion

Ablation options:

- RFA: uses heat via radiofrequency; effective but limited by heat sink effect
  - Preferred for small, exophytic lesions
- MWA: faster, higher temperatures, less affected by heat sink
  - Preferred for larger, exophytic lesions as was in this case
- Cryoablation: freezes tissue; better visualization of ablation zone, but longer procedure
  - Preferred for central, collecting-system-adjacent lesions

Case Discussion

- Outcomes: >90% local control in small lesions, preserves kidney function, low complication rates
- Follow-up: Contrast CT/MRI to confirm ablation and monitor recurrence.

References:

- Menezes MR, Viana PCC, Yamanari TR, et al. Safety and feasibility of radiofrequency ablation for treatment of Bosniak IV renal cysts. International Brazilian Journal of Urology. 2016;42(3):456-463. doi:10.1590/S1677-5538.IBJU.2015.0444
- Kim JH, Rhim H, et al. [Meta-analysis of the efficacy and safety of percutaneous image-guided microwave ablation for malignant renal tumors]. Korean Journal of Radiology. 2018;19(5):938-955. doi:10.3348/kjr.2018.19.5.938
- Silverman, S. G., et al. “Bosniak Classification of Cystic Renal Masses, Version 2019: An Update Proposal and Needs Assessment.” Radiology vol. 292, no. 2, 2019, pp. 475–488. doi:10.1148/radiol.2019