AMSER Rad Path Case of the Month:

54-year-old female with right adrenal mass

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Allegheny Health Network

Patient Presentation

Clinical history:

- 54-year-old female with a past medical history significant for renal cell carcinoma s/p nephrectomy. The patient underwent left radical nephrectomy in January 2022 with pathology demonstrating a clear cell tumor, 11 cm, grade 2. The patient was placed on immunotherapy which was stopped after she developed a severe rash likely secondary to treatment with systemic therapy. The patient subsequently developed a right adrenal lesion enlarging since her prior left nephrectomy.

Pertinent social history:

- Never smoker

Pertinent physical exam findings:

- GU: No CVA tenderness
- Abdomen: Soft, non-tender, not distended

Pertinent Labs

- Catecholamines, fractionated, urine, 24 hr: WNL
- Metanephrines, urine, 24 hr: WNL
- BUN: 33 (6-20 mg/dL)
- Creatinine: 1.31 (0.50-0.90 mg/dL)

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Variant 5: **Adrenal mass, less than 4 cm on initial imaging. No diagnostic benign imaging features. History of malignancy. Adrenal specific imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI abdomen without and with IV contrast	Usually Appropriate	O
CT abdomen without and with IV contrast	Usually Appropriate	☢☢☢☢
FDG-PET/CT skull base to mid-thigh	Usually Appropriate	☢☢☢☢
Image-guided biopsy adrenal gland	May Be Appropriate	Varies
MRI abdomen without IV contrast	May Be Appropriate	O
CT abdomen without IV contrast	May Be Appropriate	☢☢☢
CT abdomen with IV contrast	Usually Not Appropriate	☢☢☢

This imaging modality was ordered

Radiology Images (not labeled)

Coronal

Axial

Initial CT abdomen/pelvis w/ contrast

Radiology Images (not labeled)

Axial CT abdomen/pelvis w/o contrast 6 months status post left nephrectomy

Radiology Images (not labeled)

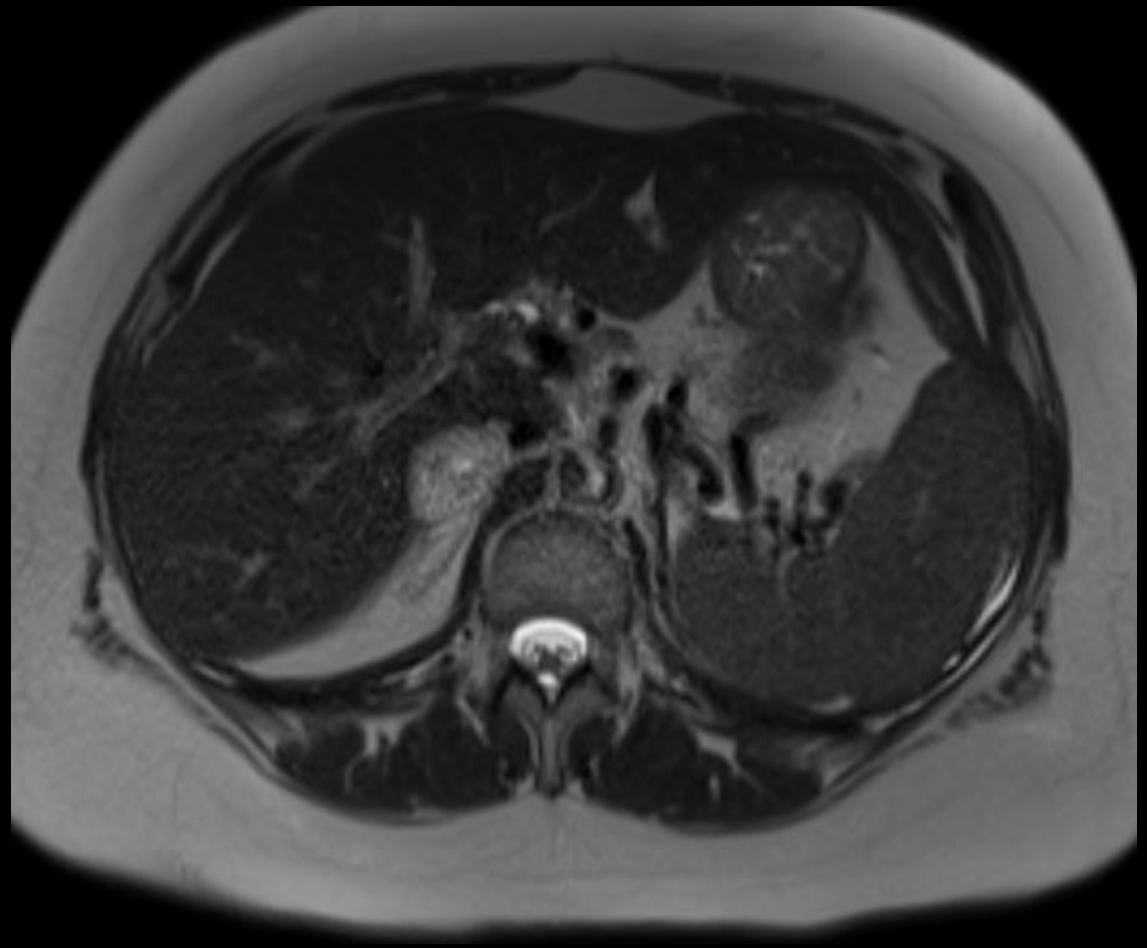
Axial T1 w/o contrast

Axial T1 w/ contrast

MRI 6 months status post left nephrectomy

Radiology Images (not labeled)

Axial T2

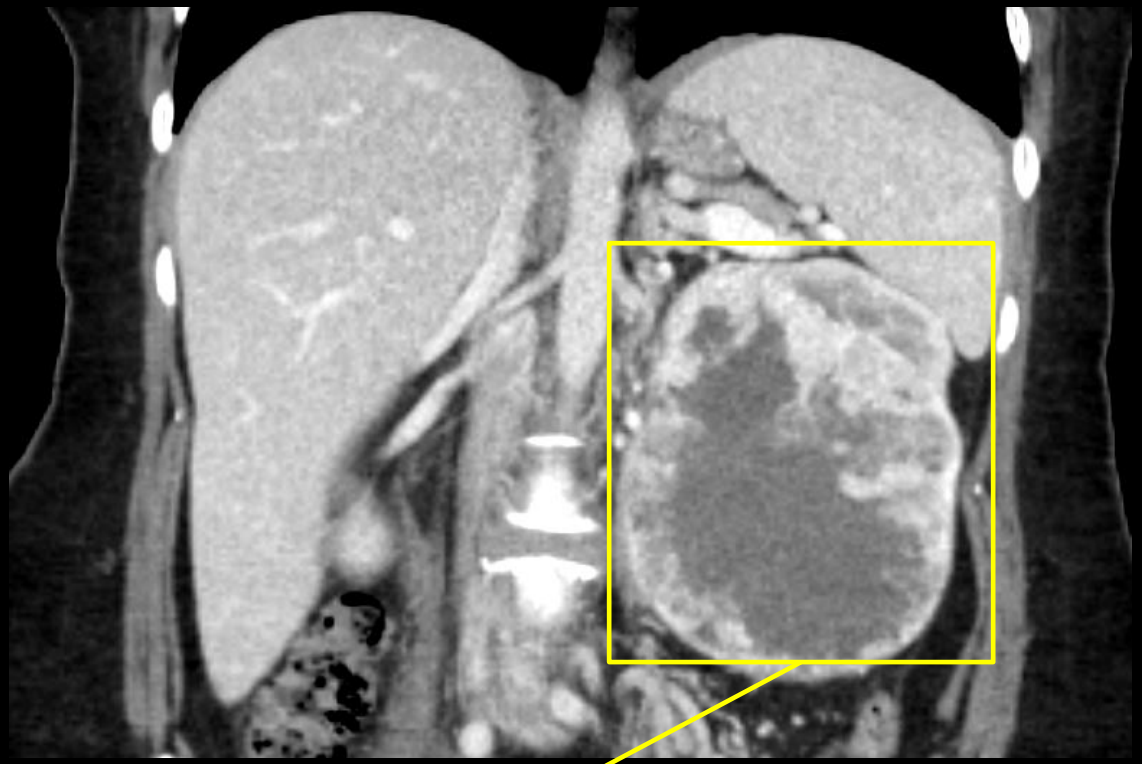


MRI 6 months status post nephrectomy

Radiology Images (labeled)

Initial CT abdomen/pelvis w/ contrast

Coronal



11.3 x 10.0 x 11.8 cm, centrally necrotic left renal mass, appearing to rise from the hilum

Axial

Normal right adrenal gland, measuring 1 cm

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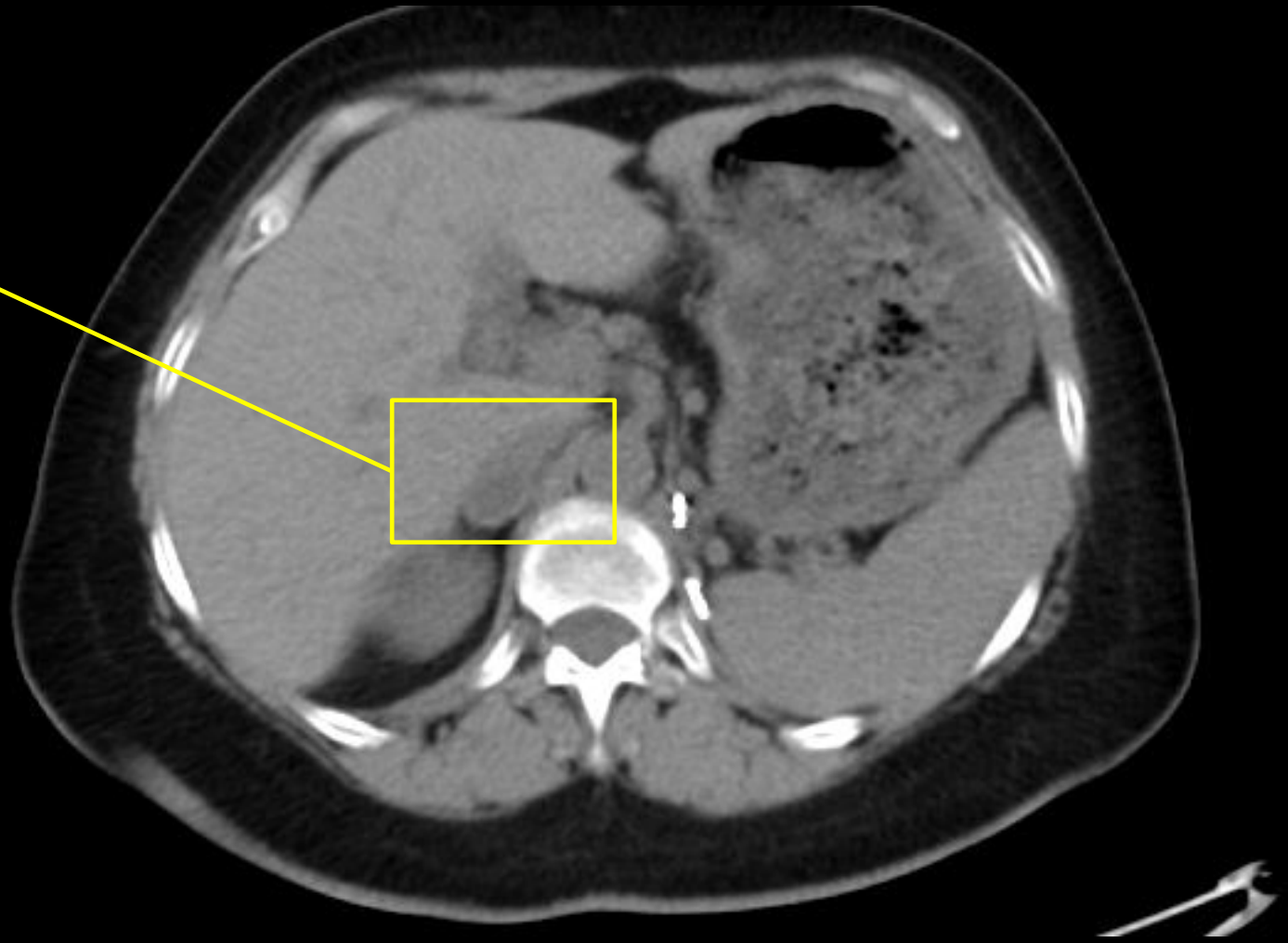
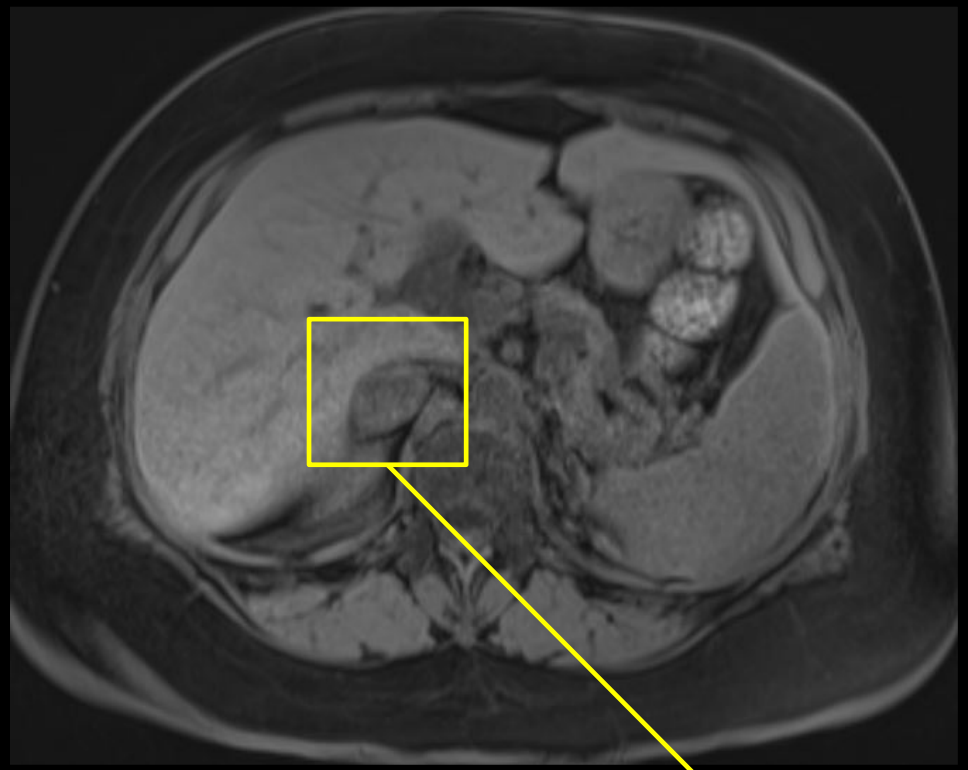
Radiology Images (labeled)



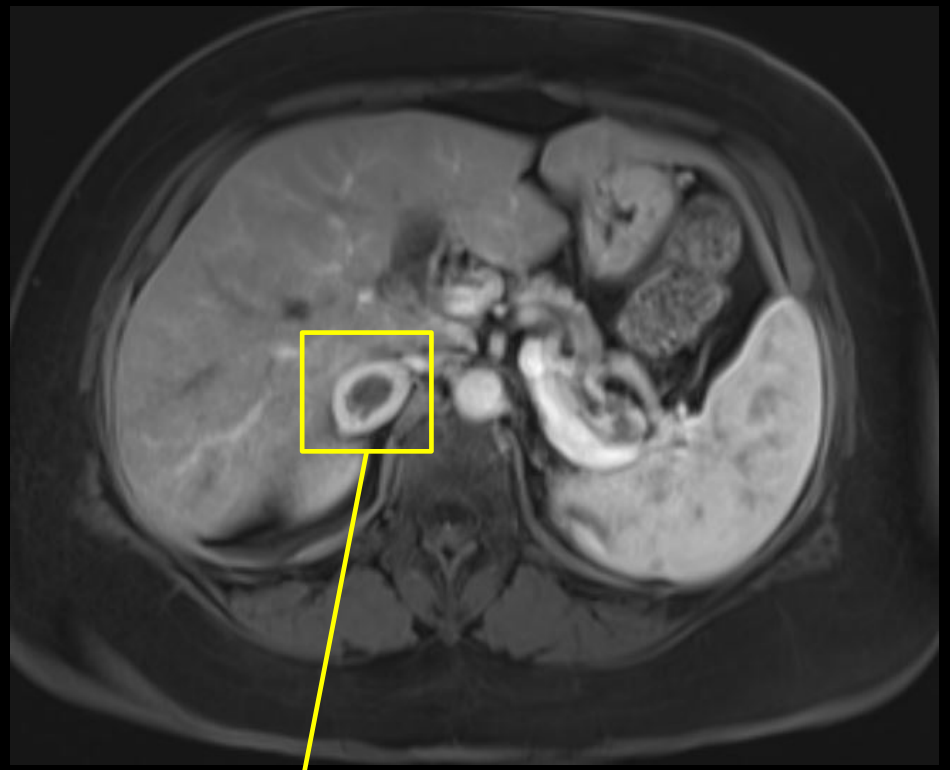
Axial CT abdomen/pelvis w/o contrast 6 months status post left nephrectomy

Radiology Images (labeled)

Axial T1 w/o contrast



Axial T1 w/ contrast



Interval enlargement of right adrenal lesion which is peripherally enhancing with central necrosis

MRI 6 months status post nephrectomy

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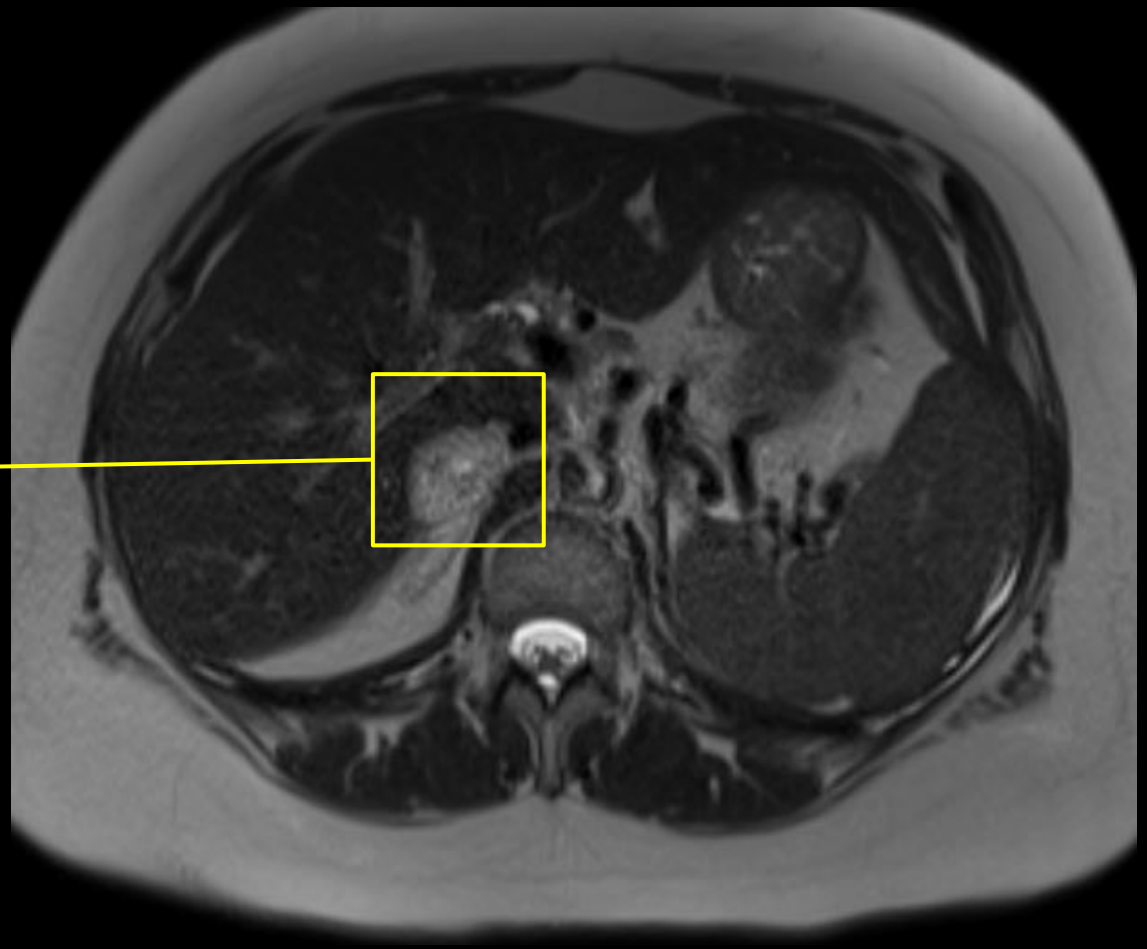
Radiology Images (labeled)

Axial T2



MRI 6 months status post nephrectomy

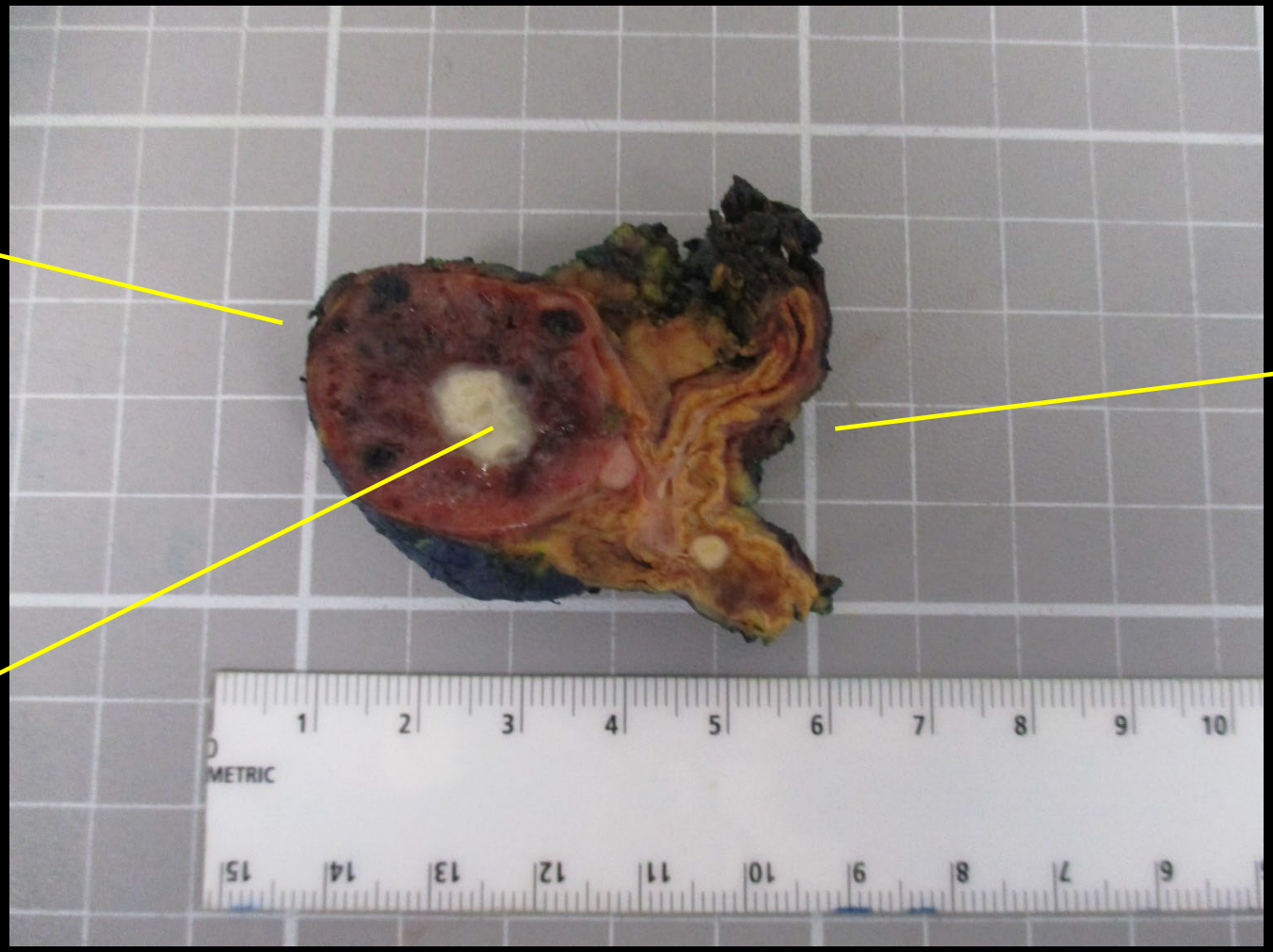
DDX (based on imaging)

- Adrenal metastasis
- Adrenal adenoma
- Adrenal lymphoma
- Pheochromocytoma

Gross Path (labeled)

Well circumscribed, hemorrhagic soft lesion, measuring 2.5 x 2.5 x 2.0 cm

Central yellow soft component, measuring 0.9 cm in diameter



Right adrenal gland, measuring 4.5 x 4 x 1.7 cm, disrupted at one end, surface inked blue

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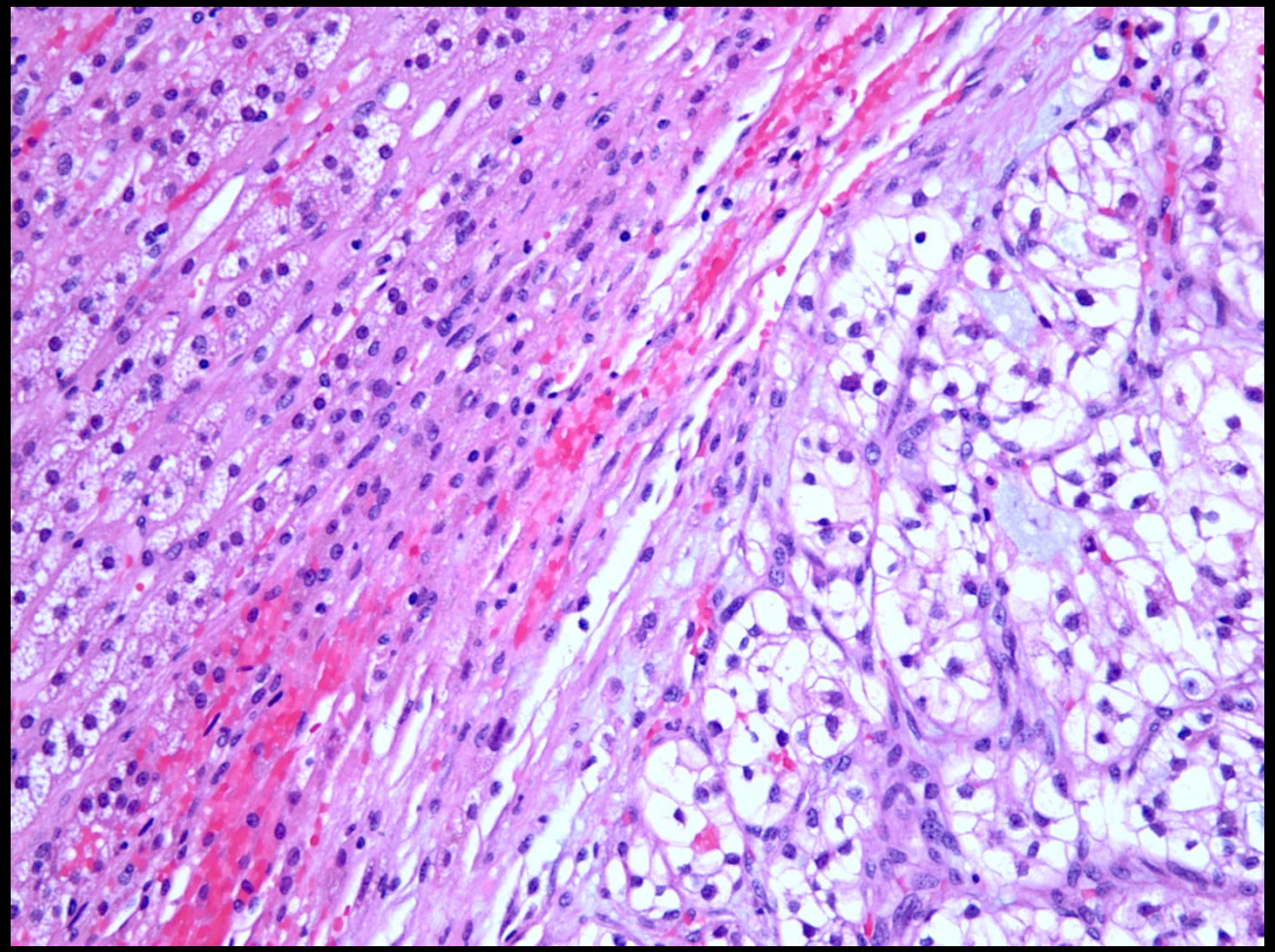
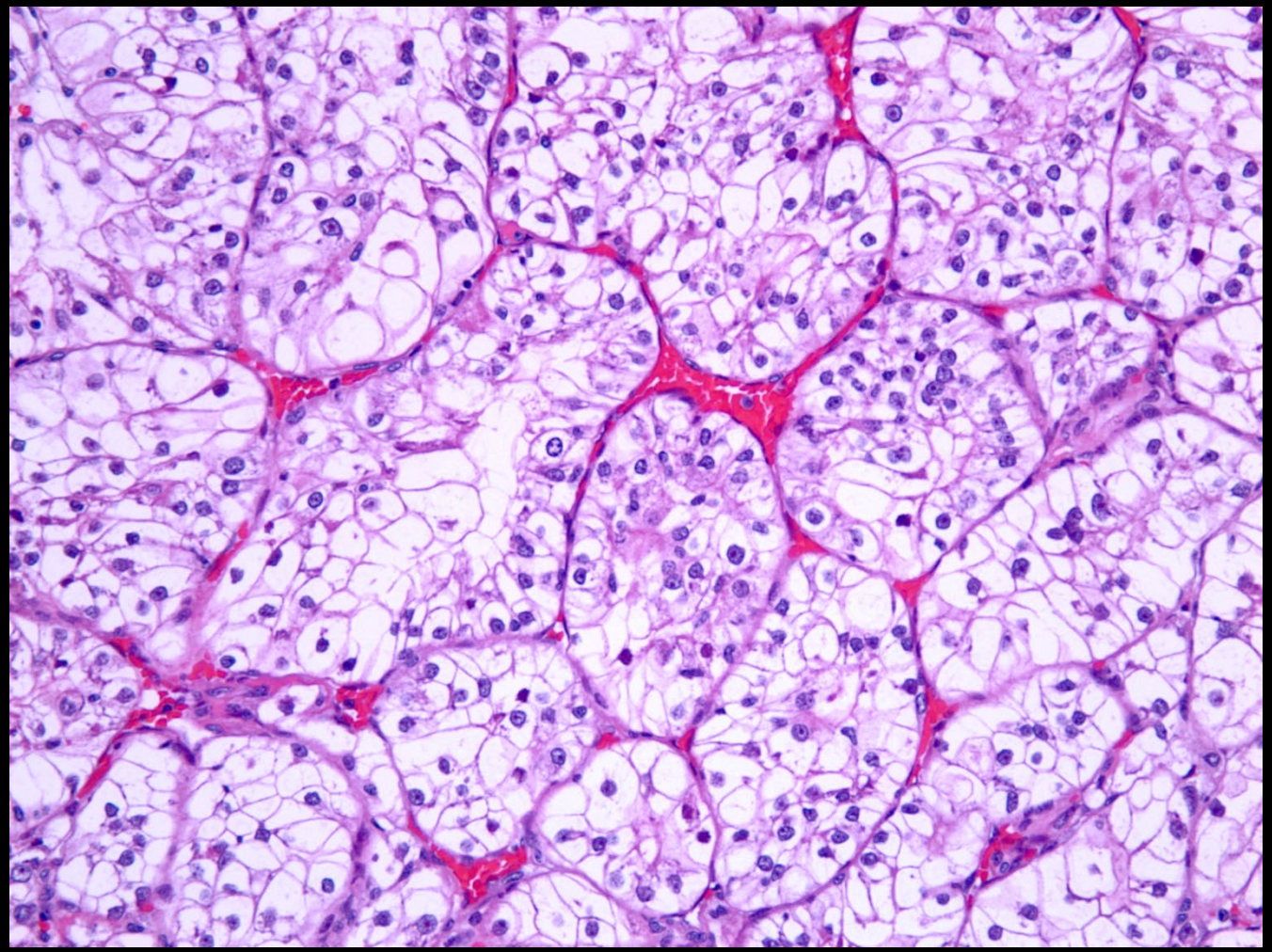
Micro Path (labeled)

Uninvolved adrenal tissue →



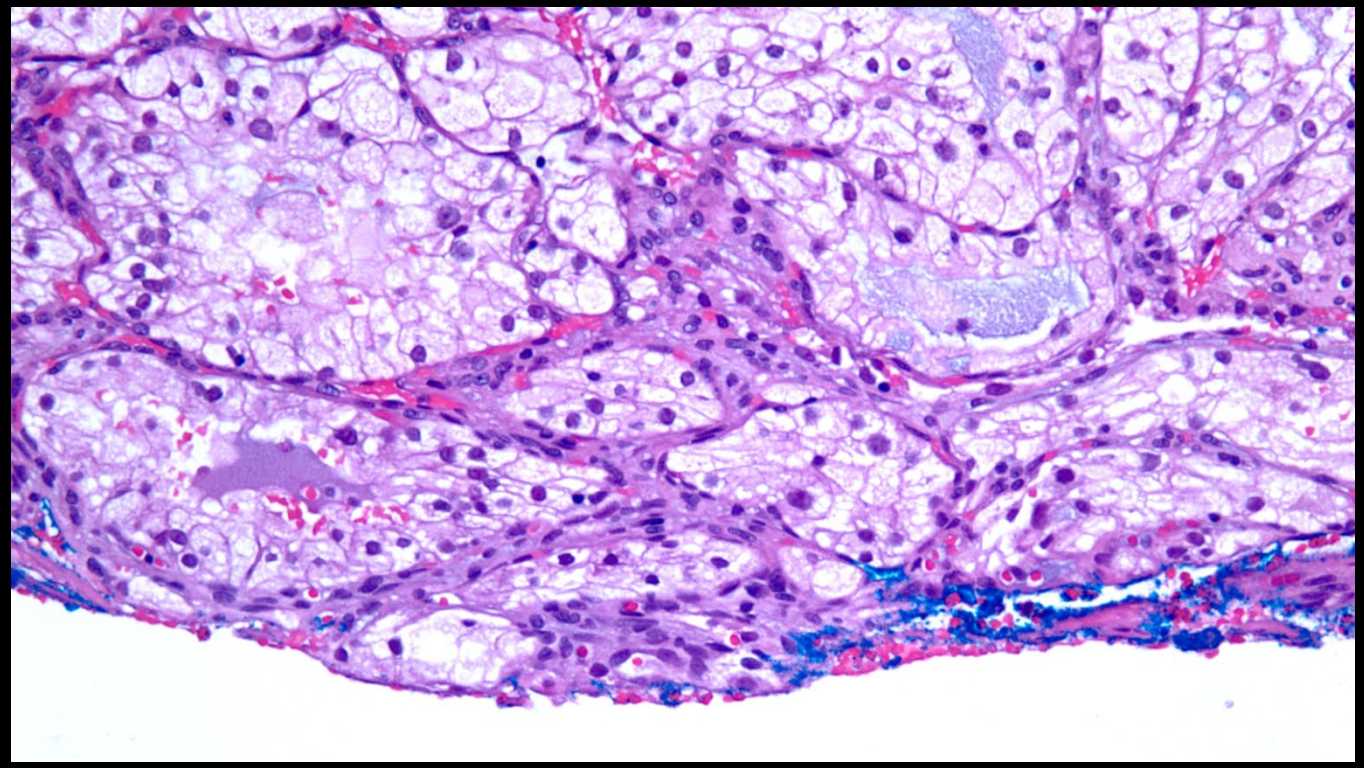
← Metastatic tumor

Micro Path (labeled)



High power view showing nests of clear cells with delicate interconnecting vascular network

Micro Path (labeled)



High power view showing tumor extending focally to the blue inked margin

Final Dx:

Metastatic clear cell renal cell carcinoma

Case Discussion: Background

- Clear cell RCC is the most common kidney malignancy
  - 80% of renal carcinomas are ccRCC
- Thought to arise from the epithelium of the PCT
- Can be sporadic or familial
  - >96% are sporadic
  - <4% familial – familial cases arise from inherited mutation in von Hippel-Lindau tumor suppressor gene located on chromosome 3p

Case Discussion: Clinical Presentation

- Range of symptoms can be present with RCC
  - At presentation ~25% of individuals either have metastases or advanced locoregional disease

- Classic triad of RCC (flank pain, hematuria, palpable abdominal mass)
  - Only present in at most 9% of patients
  - Hematuria only w/ tumor invasion of collecting system
  - Palpable flank mass associated with lower pole tumors and thin adults
    - Generally firm, non-tender, move with respiration

Case Discussion: Diagnosis

- CT or U/S
  - Thickened irregular walls or septa, and enhancement after contrast are suggestive of malignancy
- MRI
  - Particularly helpful in cases where neoplasm is diagnosed as it allows for evaluation of tumor growth into the collecting system and vessels.
  - Microscopic fat on MR is characterized by signal loss on opposed-phase images compared to in-phase dual-echo T1-weighted images
    - Can be found in RCC subtypes (most commonly clear cell RCC)

Case Discussion: Management of RCC

- Surgery is curative in majority of patients without metastases
  - Partial or radical nephrectomy depending on extent of disease, and patient comorbidities
- Treatment naïve patients with advanced metastatic disease not controlled by locoregional therapy receive systemic treatment
  - Immunotherapy (checkpoint inhibitors) and/or molecularly targeted therapy
- Greatest risk of recurrence is the first 3 years following resection

Case Discussion: Surveillance

- History and physical at months 6, 12, 24, and 36
- Abdominal imaging:
  - After partial nephrectomy – baseline abdominal CT/MRI at month 6, CT/MRI/US at 12, 24, 36 months
  - After radical nephrectomy – baseline abdominal CT at 6 months, then as clinically indicated
- Chest Imaging:
  - CXR or chest CT annually for 3 years

Case Discussion: Adrenal adenoma vs metastasis

- Imaging features of adrenal metastases are nonspecific
- Adrenal metastases may be bilateral or unilateral
- Metastases generally have slower washout than adrenal adenomas
  - Hypervascular metastases (RCC/HCC) may have similar washout to adrenal adenomas
- Highly suspicious imaging features for adrenal metastasis include large size (>4 cm) or interval growth between imaging studies

References:

Abou Elkassem AM, Lo SS, Gunn AJ, Shuch BM, Dewitt-Foy ME, Abouassaly R, Vaidya SS, Clark JI, Louie AV, Siva S, Grosu AL, Smith AD. Role of Imaging in Renal Cell Carcinoma: A Multidisciplinary Perspective. *Radiographics*. 2021 Sep-Oct;41(5):1387-1407.

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Shuch, B, Pantuck A, & Faiena I (2022). Surveillance for metastatic disease after definitive treatment for renal cell carcinoma. *UpToDate*. Retrieved October 14, 2022.

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