

AMSER Rad Path Case of the Month:

45-year-old female with incidental left adrenal lesion.

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Patient Presentation

- Presented to the emergency department (ED) with bilateral groin pain radiating into the thighs.
- Patient had noted high blood pressure, headache, flushing of the face and intermittent palpitations.
- Vital signs and abdominal exam were unremarkable.

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

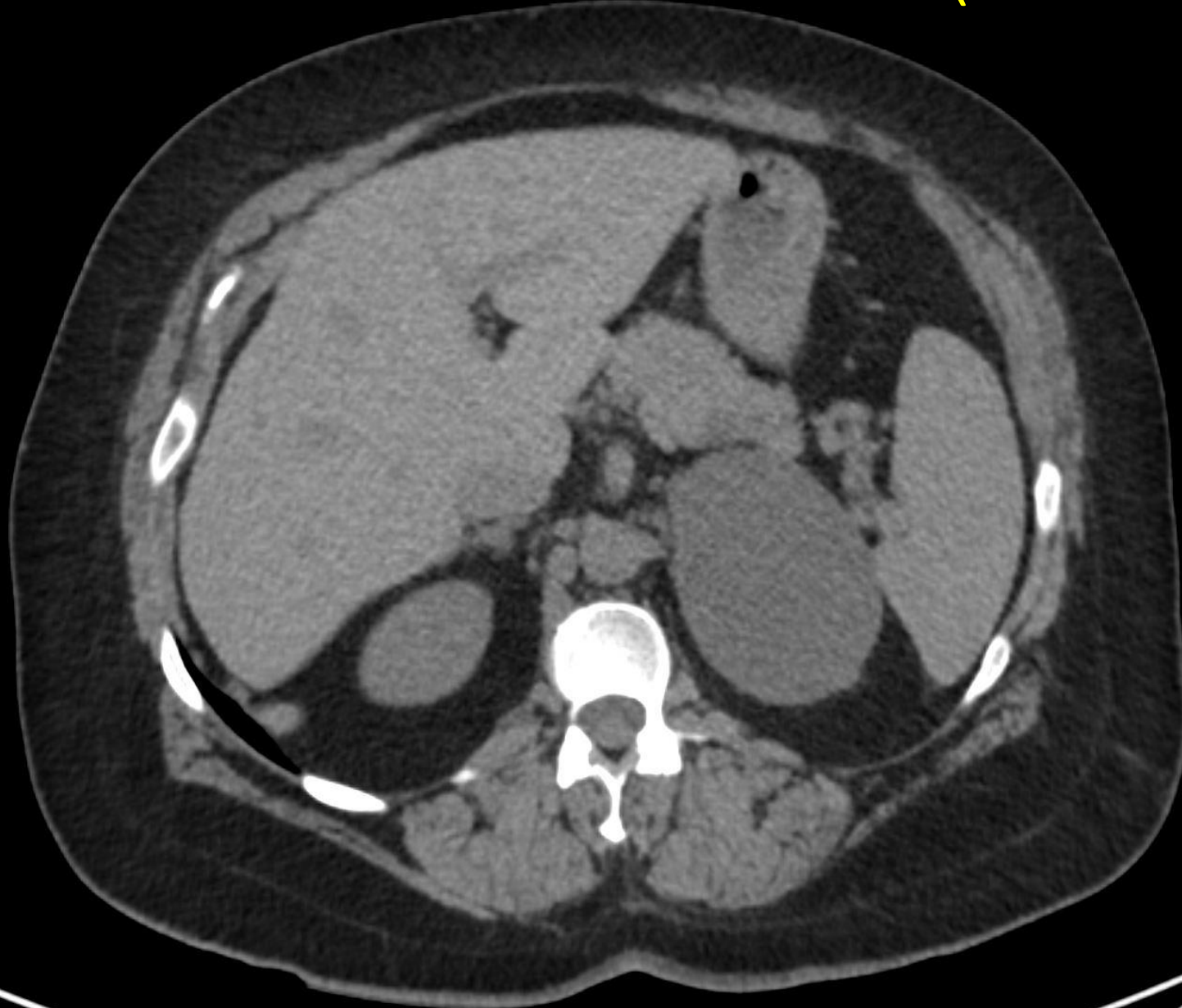
Variant 1:

Acute onset flank pain. Suspicion of stone disease. No history or remote history of stone disease. Initial imaging.

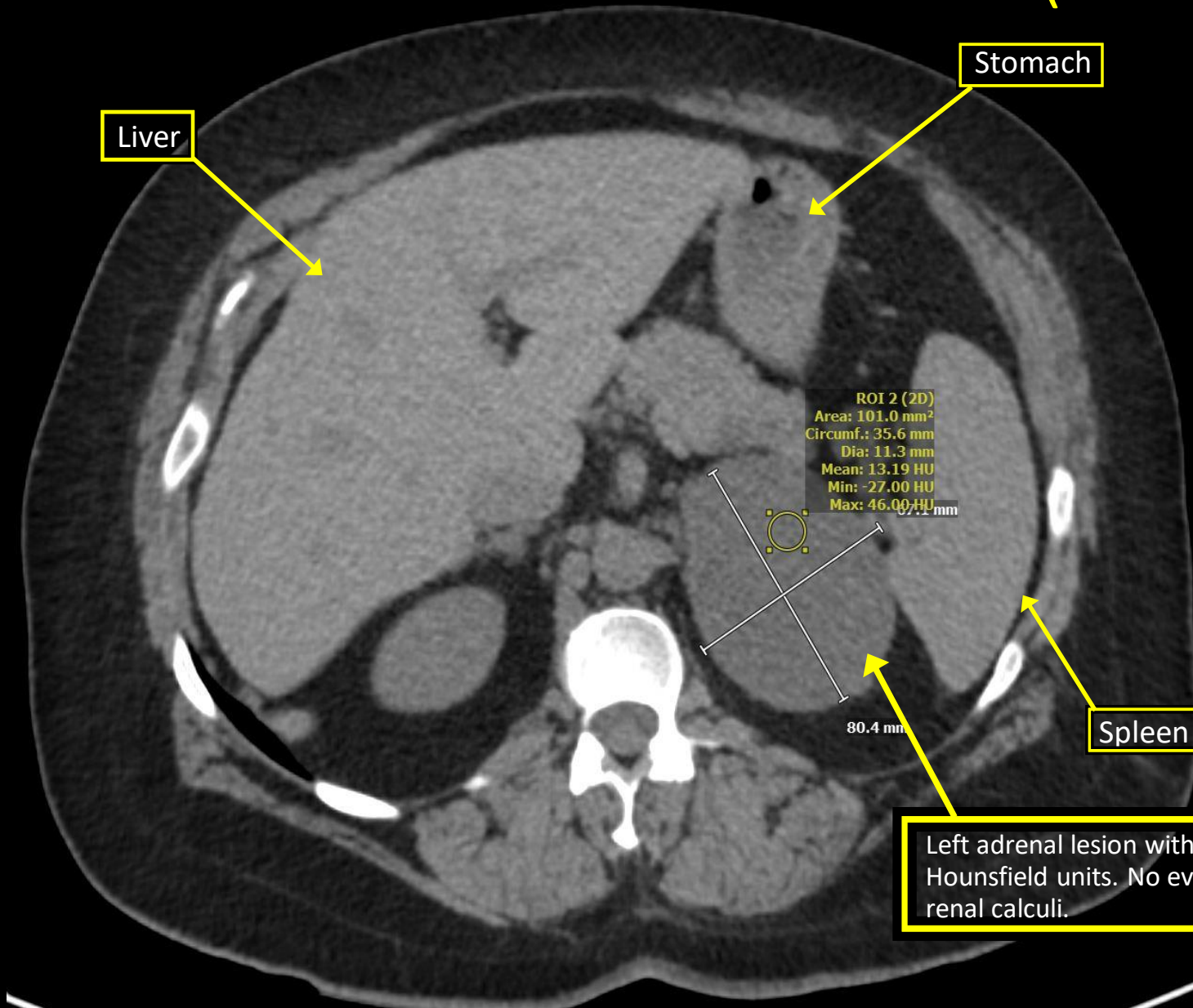
Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis without IV contrast	Usually Appropriate	☢☢☢
US color Doppler kidneys and bladder retroperitoneal	May Be Appropriate (Disagreement)	○
US kidneys and bladder retroperitoneal	May Be Appropriate (Disagreement)	○
Radiography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

CT Adrenal Without Contrast (not labeled)



CT Adrenal Without Contrast (labeled)



Left adrenal lesion with noncontrast CT density of 13 Hounsfield units. No evidence of hydronephrosis or renal calculi.

Pertinent Labs

Biochemical workup for pheochromocytoma and hyperaldosteronism was within normal limits

- Cortisol, serum
 - 8AM: 5.2 mcg/dL
 - 2PM: 4.8 mcg/dL
- ACTH: 9 pg/mL
- Renin Activity, plasma: 1.048 ng/mL/hr
- Aldosterone: 16.3 ng/dL
- Catecholamines
 - Epinephrine 27 pg/mL
 - Norepinephrine 410 pg/mL
 - Dopamine <30 pg/mL
- Metanephrine
 - Plasma: <25 pg/mL
 - Urine, 24hr: 95 µg/24 hrs

Differential Diagnosis (DDx) based on initial CT without contrast

- Adrenal Lesion:
 - Adrenal adenoma (lipid poor)
 - Adrenal cyst
 - Adrenal myelolipoma (lipid poor)
 - Adrenal cortical carcinoma
 - Pheochromocytoma
 - Metastasis
 - Lymphoma
- Nephrolithiasis ruled out based on initial CT without contrast

What Imaging Should We Order?

- Additional imaging is warranted to further delineate the characteristics of the adrenal lesion.

Select the applicable ACR Appropriateness Criteria

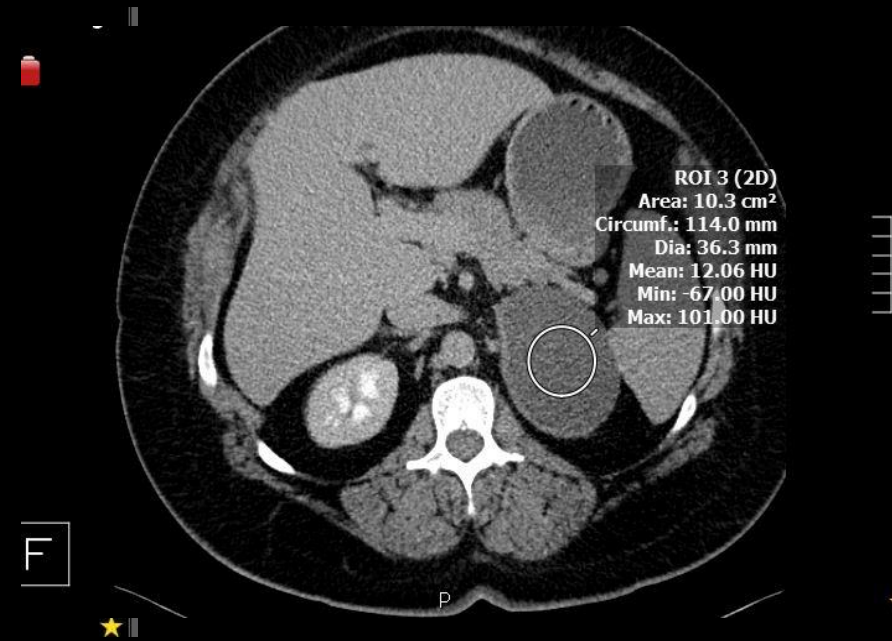
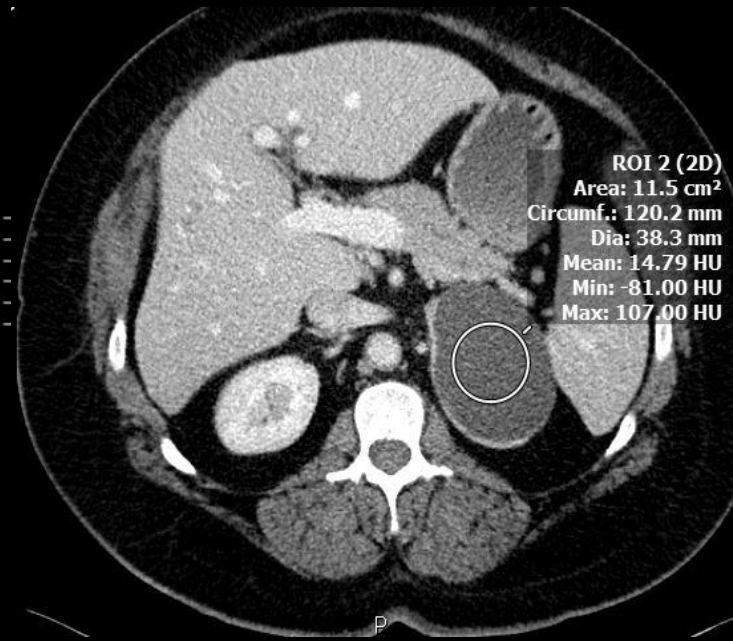
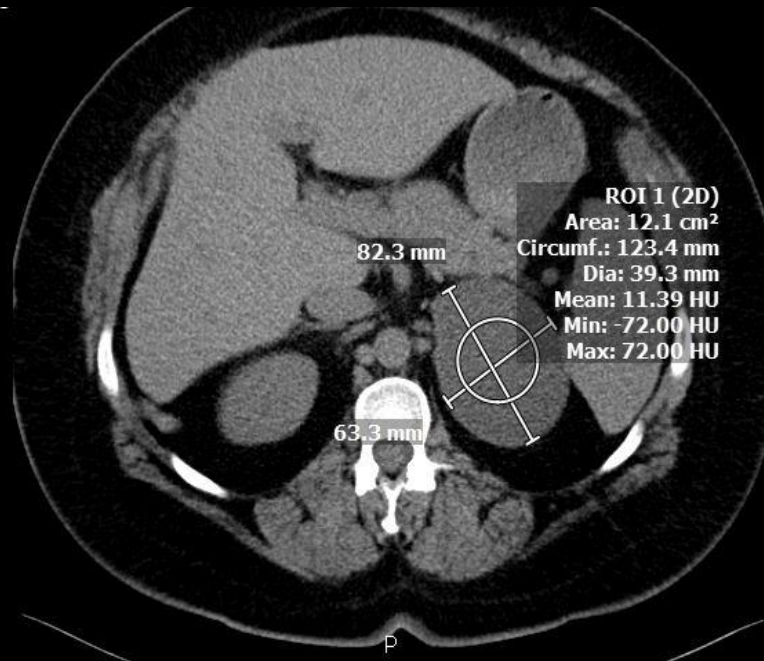
Variant 4:

Indeterminate adrenal mass, greater than or equal to 4 cm on initial imaging. No diagnostic benign imaging features. No history of malignancy. Adrenal specific imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Image-guided biopsy adrenal gland	Usually Not Appropriate	Varies
MRI abdomen without and with IV contrast	Usually Not Appropriate	0
MRI abdomen without IV contrast	Usually Not Appropriate	0
CT abdomen with IV contrast	Usually Not Appropriate	⚠⚠⚠
CT abdomen without IV contrast	Usually Not Appropriate	⚠⚠⚠
CT abdomen without and with IV contrast	Usually Not Appropriate	⚠⚠⚠⚠
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	⚠⚠⚠⚠

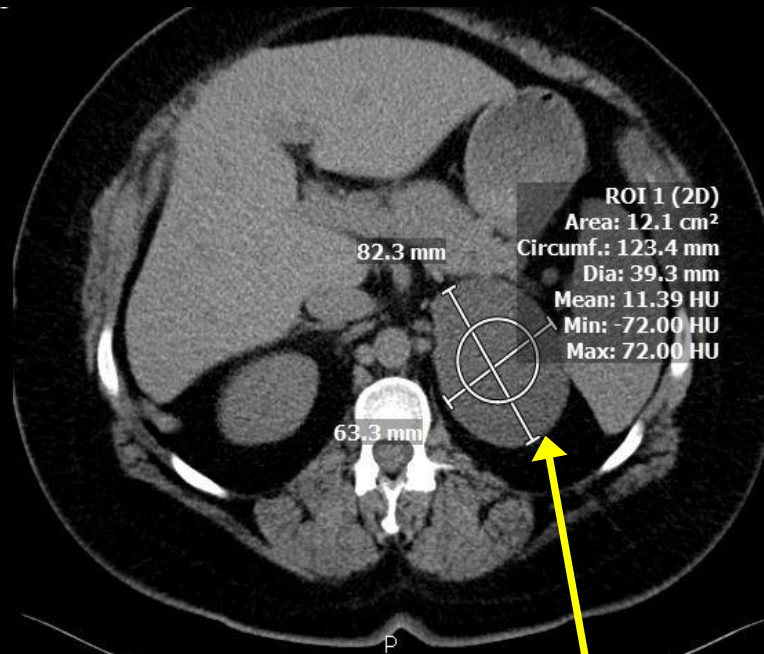
This imaging modality was ordered by the ED physicians

CT Adrenal Contrast Phases (not labeled)

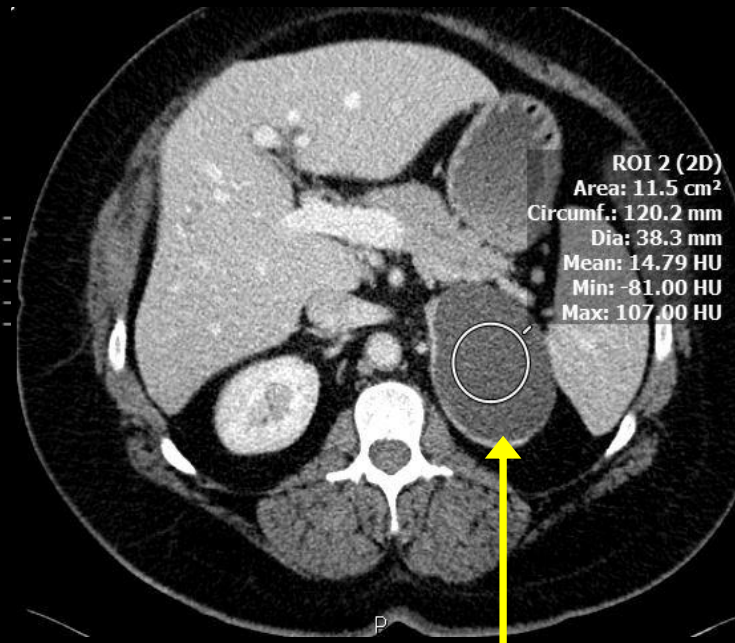


CT Adrenal Contrast Phases (labeled)

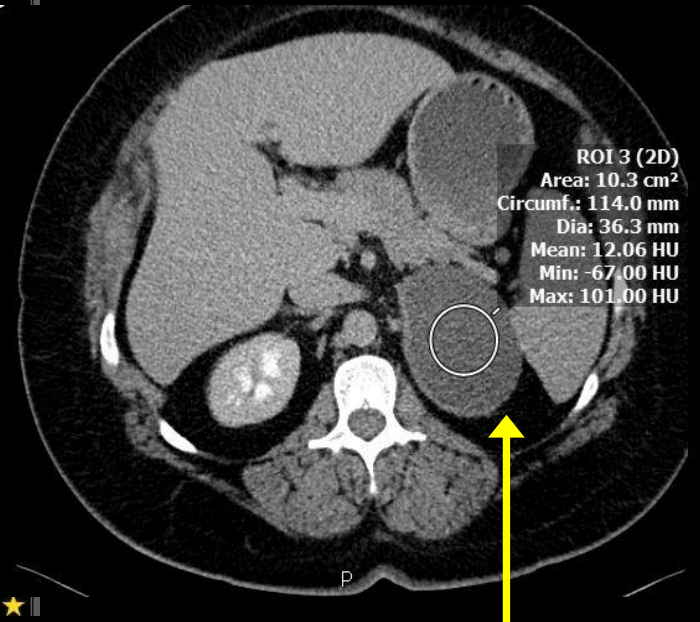
Non contrast



PV

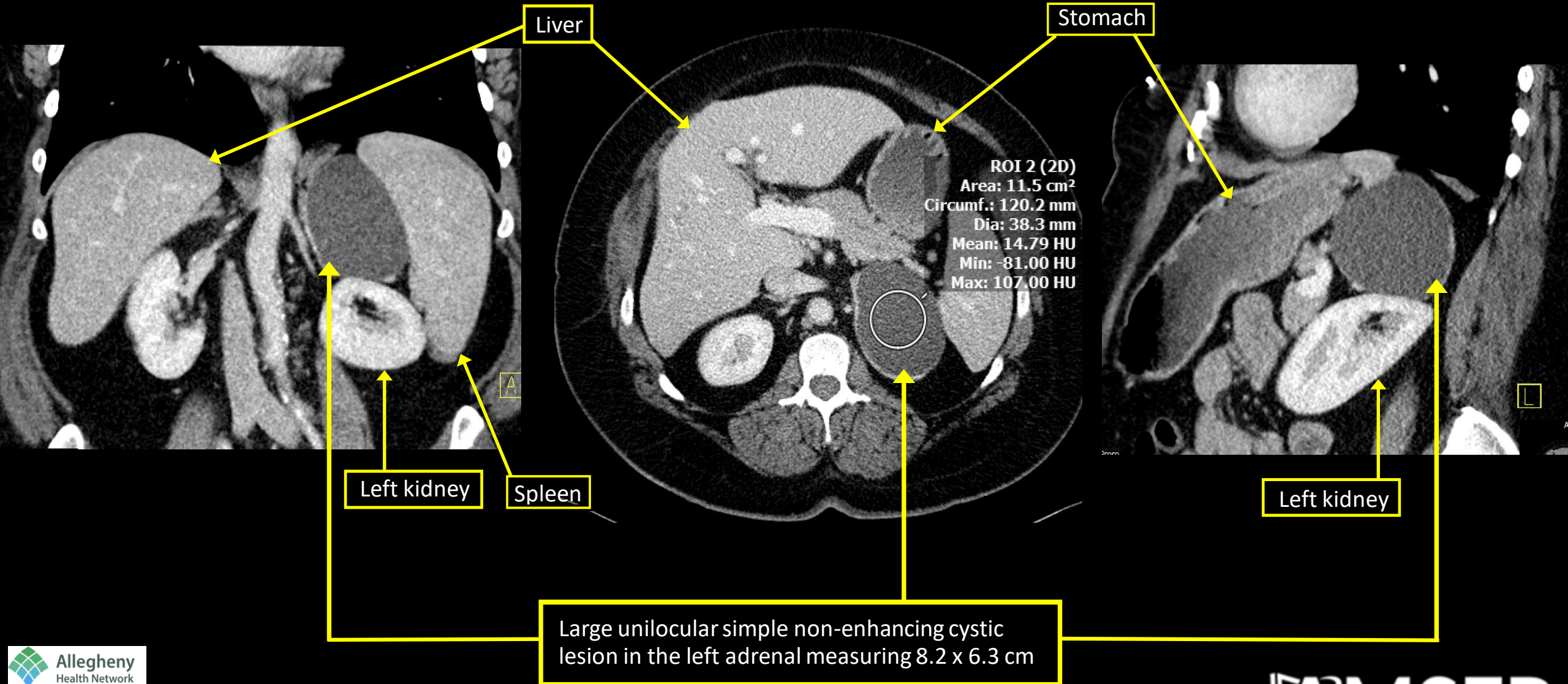


Delayed



Large unilocular simple cystic lesion in the left adrenal measuring 8.2 x 6.3 cm. With noncontrast CT density of 11 Hounsfield units, enhanced density of 15 Hounsfield units, and delayed density of 12 Hounsfield units, **there is no internal enhancement**. No internal septation or nodularity is identified within cystic lesion.

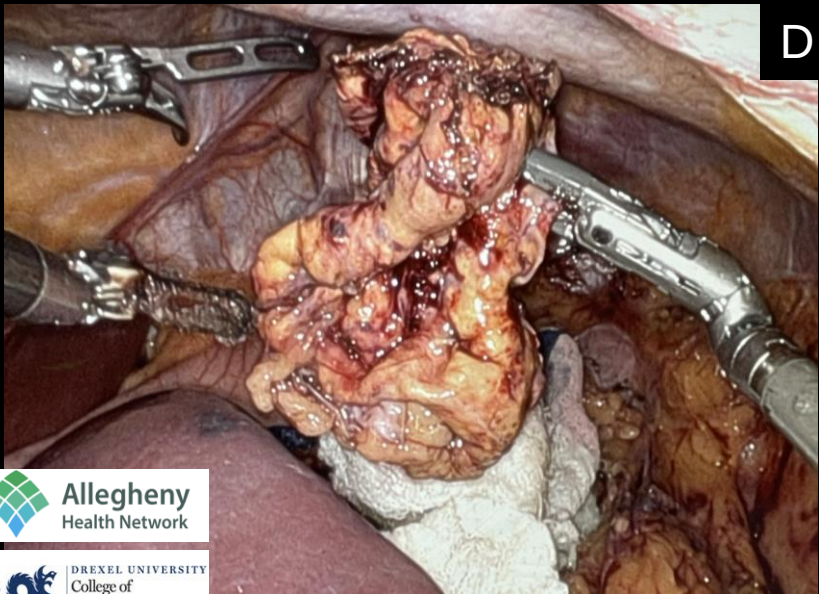
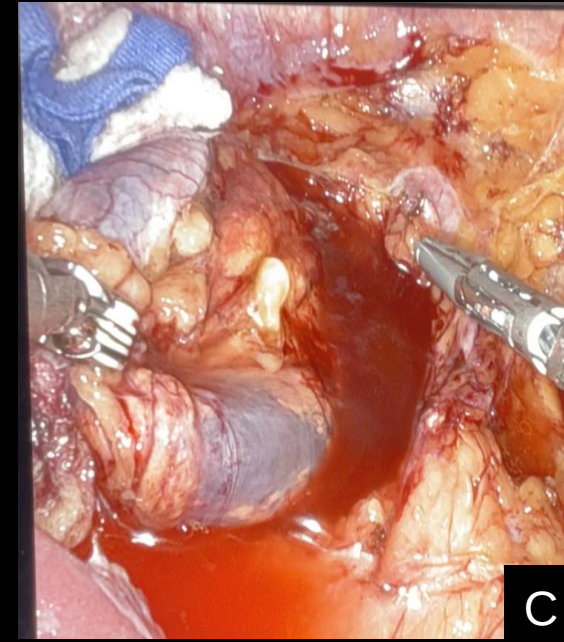
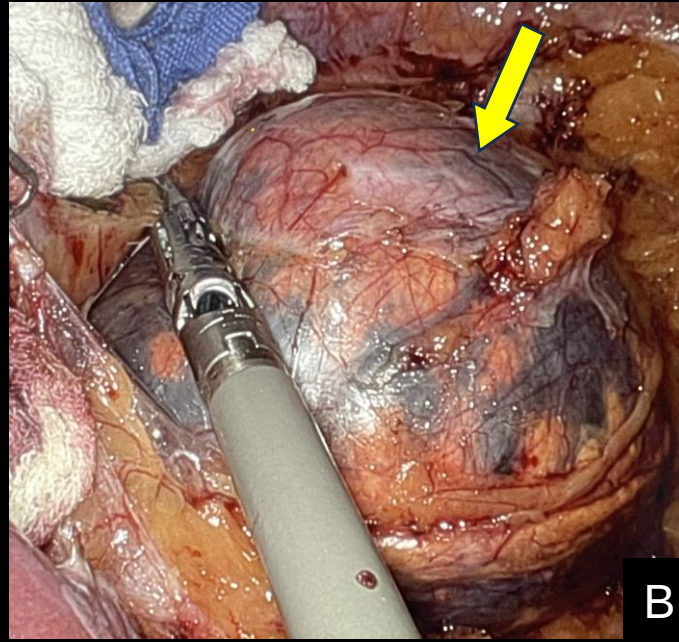
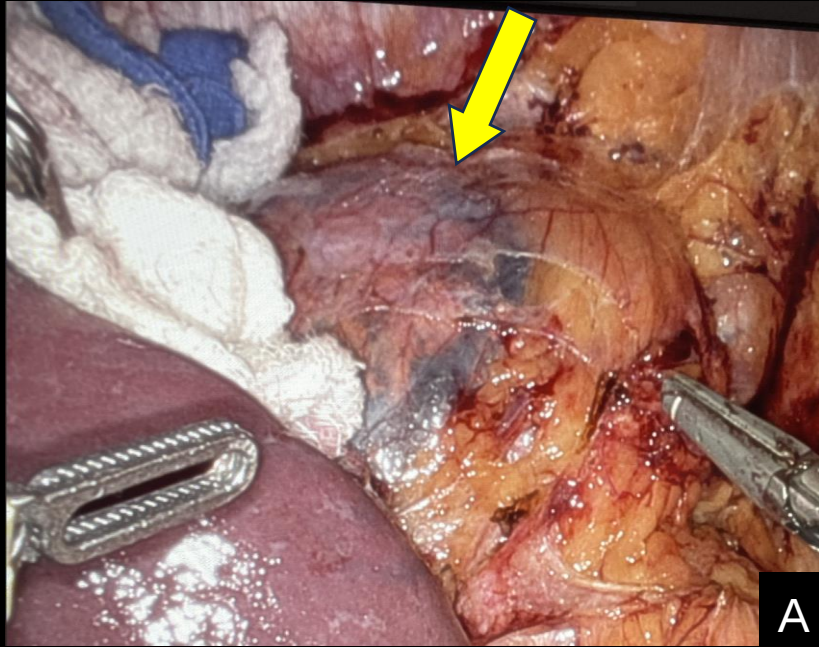
CT Adrenal PV Contrast Phase (labeled)



DDx based CT with contrast

- Adrenal Cystic Lesion:
 - Adrenal cyst
 - Adrenal cortical carcinoma

Gross Images

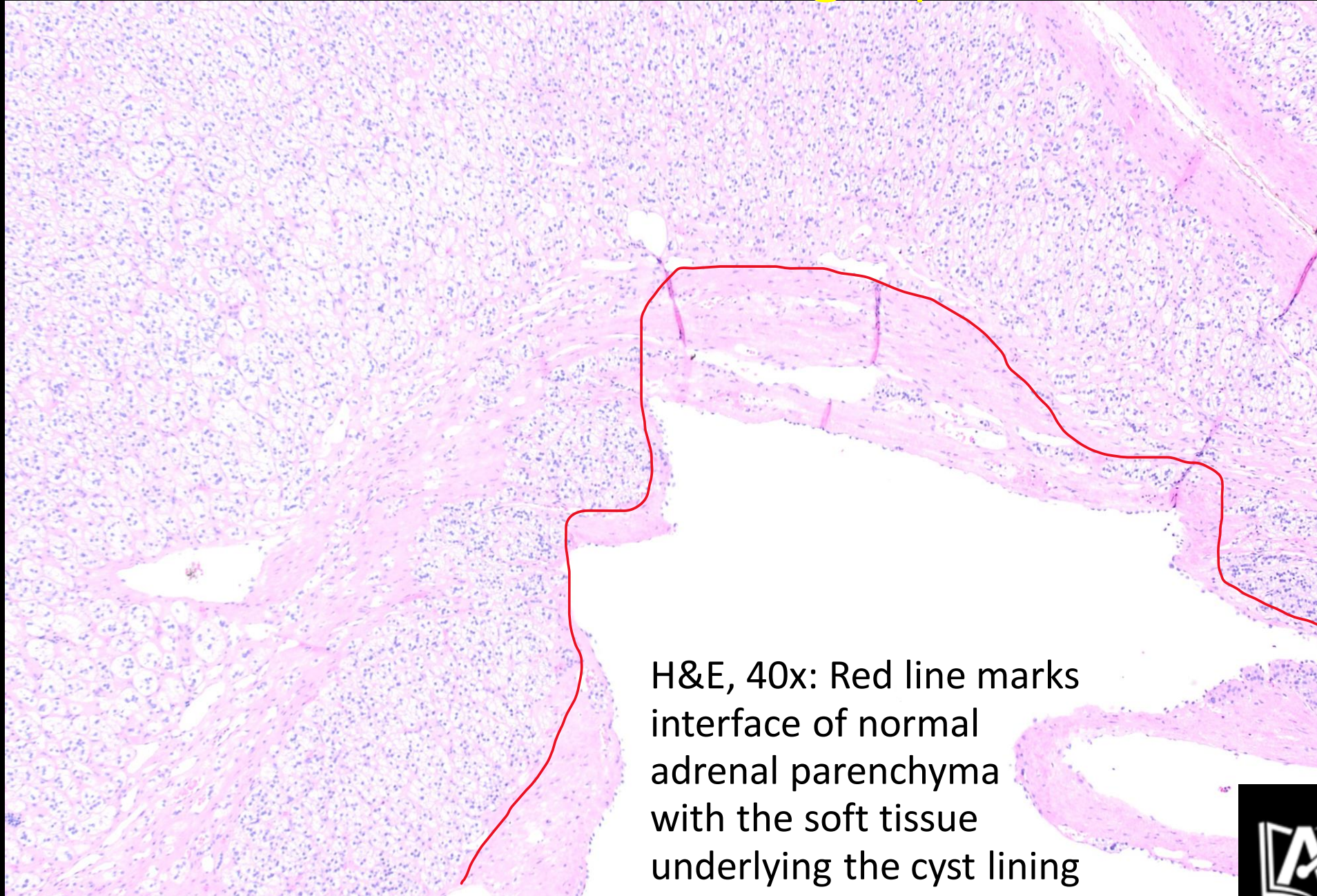


A & B: Intra-op images of left adrenal cyst.

C: Gush of clear fluid was observed upon the rupture of the cyst.

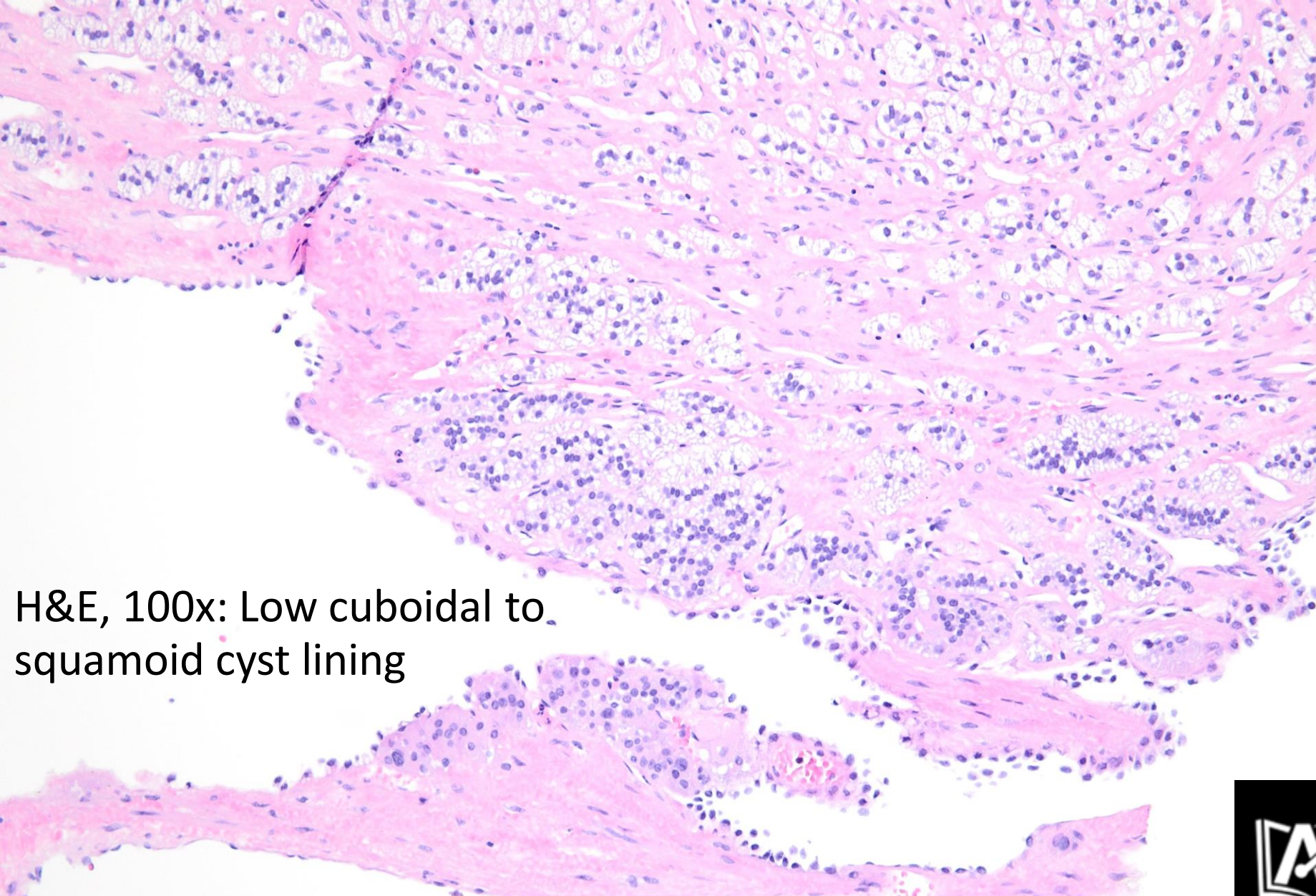
D & E: Resected left adrenal gland.

Photomicrograph



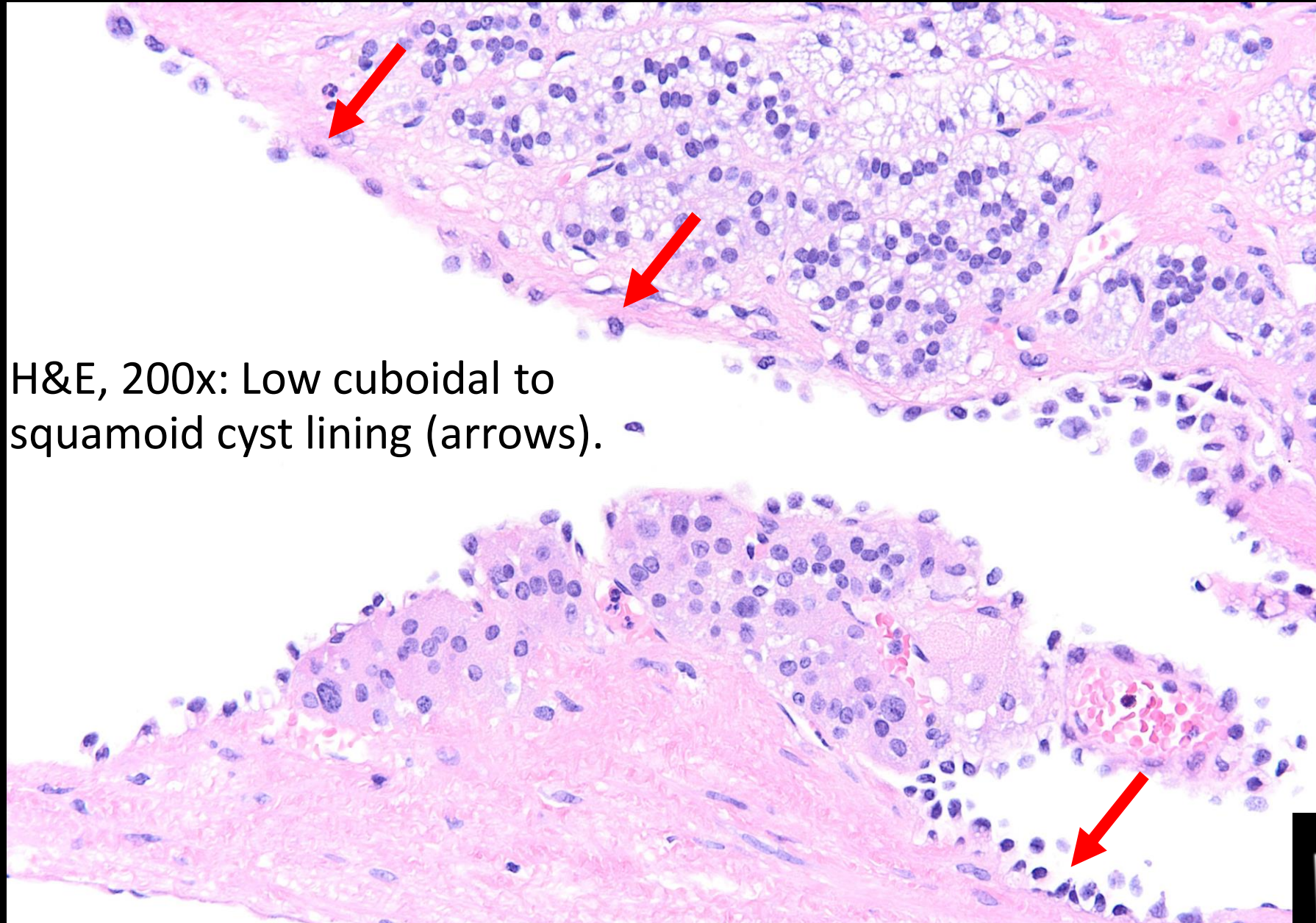
H&E, 40x: Red line marks interface of normal adrenal parenchyma with the soft tissue underlying the cyst lining

Photomicrograph

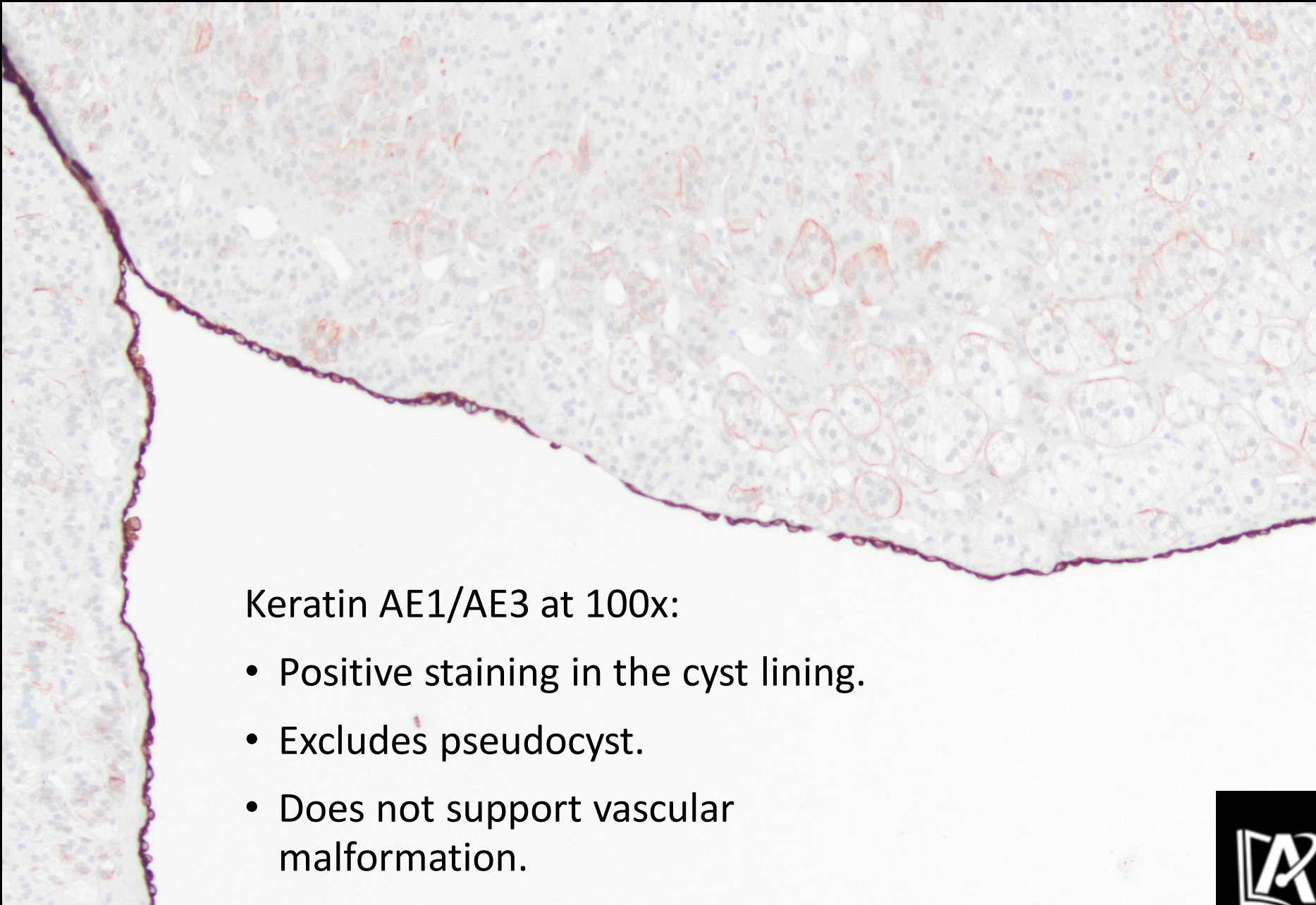


H&E, 100x: Low cuboidal to
squamoid cyst lining

Photomicrograph



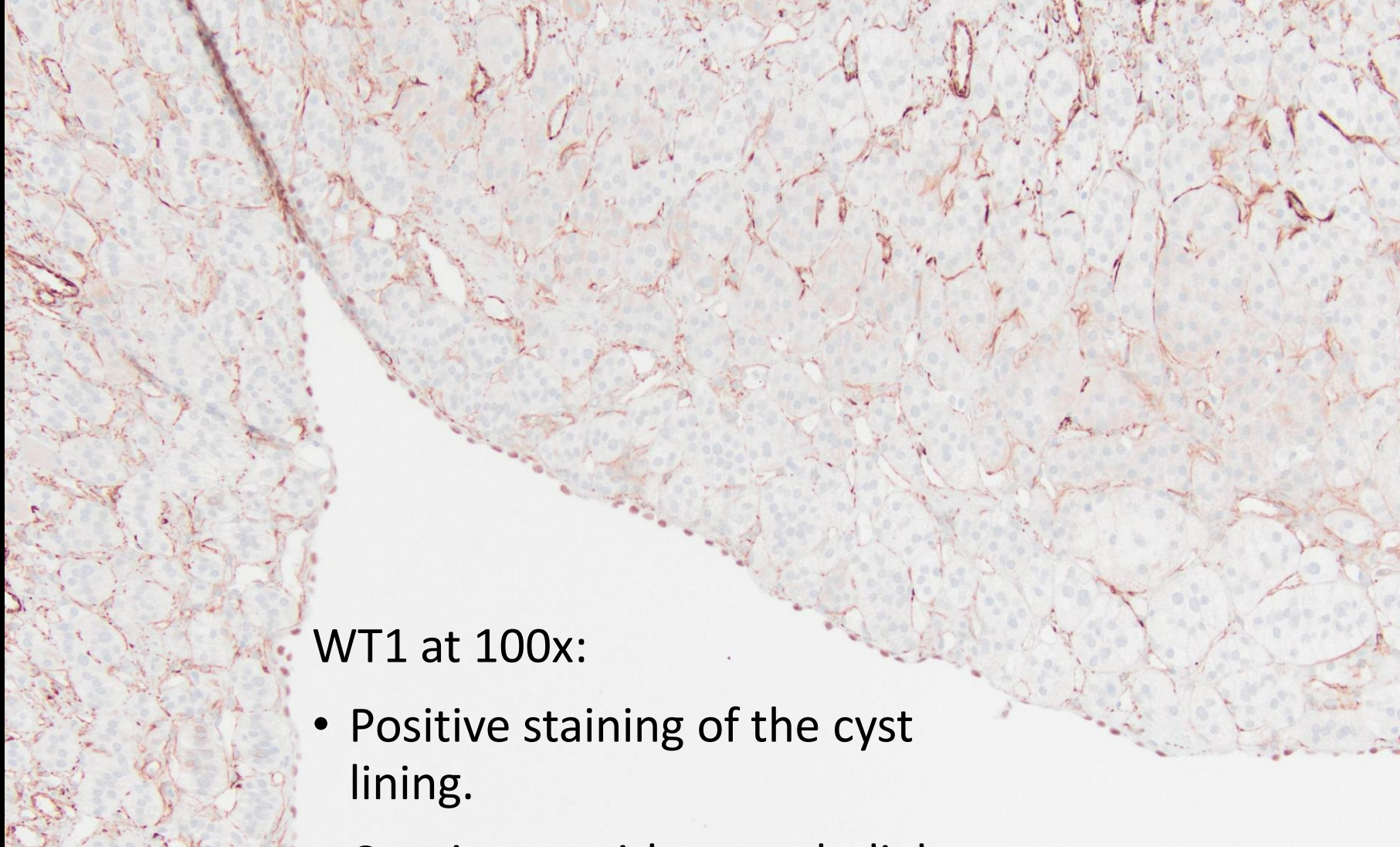
Immunohistochemistry



Keratin AE1/AE3 at 100x:

- Positive staining in the cyst lining.
- Excludes pseudocyst.
- Does not support vascular malformation.

Immunohistochemistry



WT1 at 100x:

- Positive staining of the cyst lining.
- Consistent with mesothelial cell differentiation.

Final Diagnosis:

Benign Adrenal Epithelial Cyst

Case Discussion

- **Epidemiology:**

- Adrenal cysts are a rare condition (1% of all adrenal incidentalomas).
- Most prevalent in 40 to 70-year-old patients with slight female predominance.

- **Pathology:**

- Adrenal cyst is a descriptive term that may encompass pseudocysts, endothelial cysts, epithelial cysts, and parasitic cysts.
- Endothelial cysts and pseudocysts are most common.

- **Risk Factors:**

- Several potential risk factors have been suggested, but not well-characterize due to rarity.
- Possible risk factors include trauma/hemorrhage, infection, congenital (Beckwith-Wiedeman syndrome), vascular malformations and neoplasms.

Case Discussion

- **Presentation:**

- Usually asymptomatic and discovered incidentally.
- Some present with palpable flank mass, GI symptoms, mass effect with abdominal, flank or groin pain.

- **Imaging:** CT with and without contrast.

- **Management:**

- There is no specific guidelines for managing adrenal cysts due to relatively low incidence.
 - Consensus is that cysts >5 cm should be resected to exclude malignancy.
 - Studies suggest that adrenal lesions should be surgically removed if it is symptomatic, functional, >5 cm, suggestive of malignancy or suggestive of parasitic cyst
 - Malignancy and functional cystic adrenal lesions should be ruled out.
- Patient had symptomatic and >5 cm cyst which favored excision.

References:

- Bozic Antic I, Djurisic I, Nikolic S. Adrenal Cysts: To Operate or Not to Operate?. *J Clin Med*. 2024;13(3):846. Published 2024 Feb 1. doi:10.3390/jcm13030846
- Calissendorff, J., Juhlin, C.C., Sundin, A. *et al*. Adrenal cysts: an emerging condition. *Nat Rev Endocrinol* **19**, 398–406 (2023). <https://doi.org/10.1038/s41574-023-00835-2>
- Knipe H, Bell D, Niknejad M, et al. Adrenal cyst. Reference article, Radiopaedia.org (Accessed on 08 Oct 2024) <https://doi.org/10.53347/rID-52050>
- Solanki S, Badwal S, Nundy S, Mehta NN. Cystic lesions of the adrenal gland. *BMJ Case Rep*. 2023;16(5):e254535. Published 2023 May 4. doi:10.1136/bcr-2022-254535