AMSER Rad Path Case of the Month:

58 y.o. female with fullness and discomfort in the lower abdomen

Osmaan Shahid, MS4 – Drexel University College of Medicine

Christopher Morse, MD – Gynecologic Oncology, Allegheny Health Network

Whitney Stolnicki, MD – Pathology, Allegheny Health Network

Harmeet Kharoud, MD – Pathology, Allegheny Health Network

Angela Sanguino, MD – Pathology, Allegheny Health Network

Matthew Hartman, MD – Radiology, Allegheny Health Network

DREXEL UNIVERSITY College of Medicine

Allegheny Health Network

AMSER

Patient Presentation

- 58yo F presented to the ED with nausea and vomiting after recent epidural steroid injection. She also mentioned some fullness and discomfort in her lower abdomen of unknown chronicity.
- Endorsed difficulty emptying bladder. Denies any constipation or diarrhea; ovulatory changes; vaginal bleeding or discharge.
- PMH: HTN, HLD, T2DM; s/p two prior C-sections and laparoscopic lysis of adhesions
- Physical exam showed tenderness with palpable soft tissue mass in suprapubic region

Pertinent Labs

- CA-125 is elevated at 41.5 (normal = 0 – 35)
- CEA is within normal limits.
- CA 19-9 is within normal limits.

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

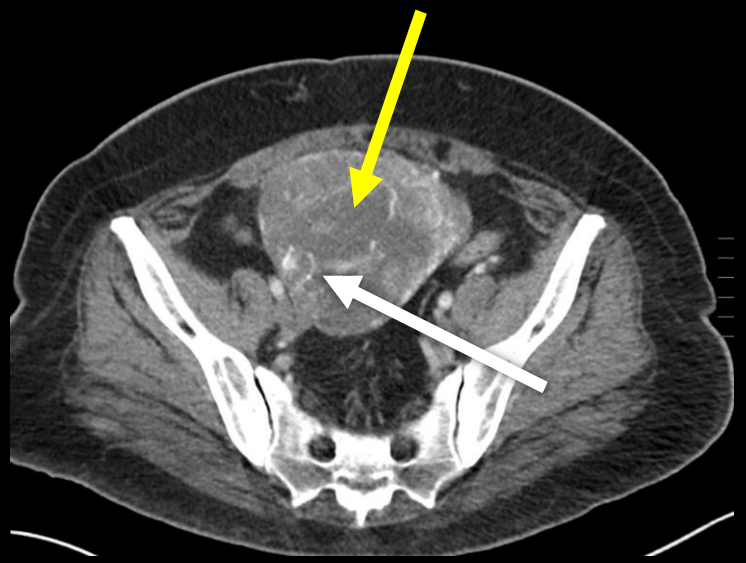
Variant 1: **Palpable abdominal mass. Suspected intra-abdominal neoplasm. Initial imaging.**

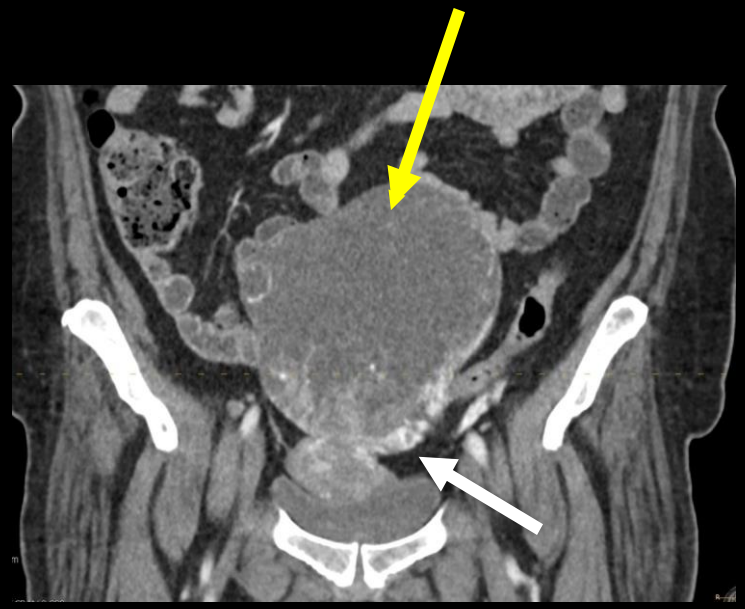
Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen with IV contrast	Usually Appropriate	☢☢☢
US abdomen	Usually Appropriate	O
MRI abdomen without and with IV contrast	May Be Appropriate	O
CT abdomen without IV contrast	May Be Appropriate	☢☢☢
MRI abdomen without IV contrast	May Be Appropriate	O
CT abdomen without and with IV contrast	Usually Not Appropriate	☢☢☢☢
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☢☢☢☢
Radiography abdomen	Usually Not Appropriate	☢☢
Fluoroscopy contrast enema	Usually Not Appropriate	☢☢☢
Fluoroscopy upper GI series	Usually Not Appropriate	☢☢☢
Fluoroscopy upper GI series with small bowel follow-through	Usually Not Appropriate	☢☢☢

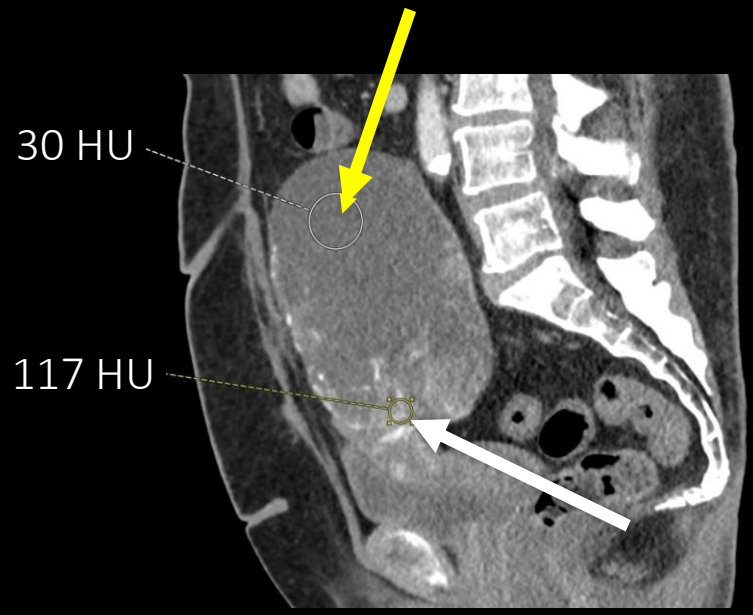
This imaging modality was ordered by the ER physician

CT Abdomen and Pelvis with contrast

CT Abdomen and Pelvis with contrast





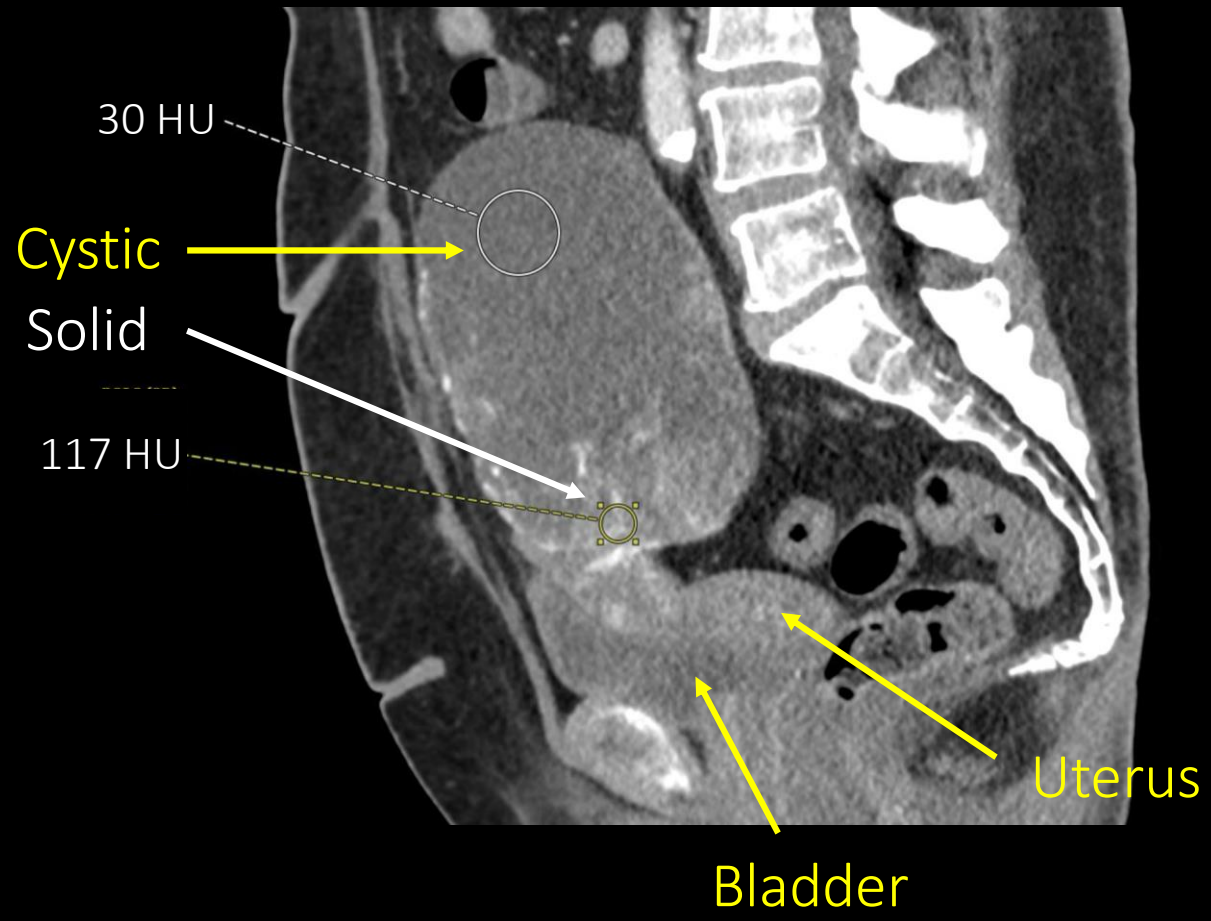


Cystic component

Solid component

Left ovary showed mixed cystic and solid mass measuring 13.4 x 9.2 x 13.8 cm.

CT Abdomen and Pelvis with contrast



Left ovary showed mixed cystic and solid mass measuring 13.4 x 9.2 x 13.8 cm.

Differential Diagnosis

Ovarian mass with solid and cystic components

Epithelial Tumors

- Cystadenocarcinoma
- Endometrioid carcinoma
- Clear cell carcinoma

Germ Cell Tumors

- Dermoid cyst
- Dysgerminoma
- Yolk sac tumor

Sex-Cord Stromal Tumors

- Granulosa cell tumor
- Thecoma

Metastatic Tumors

- Krukenberg tumor
- Lymphoma

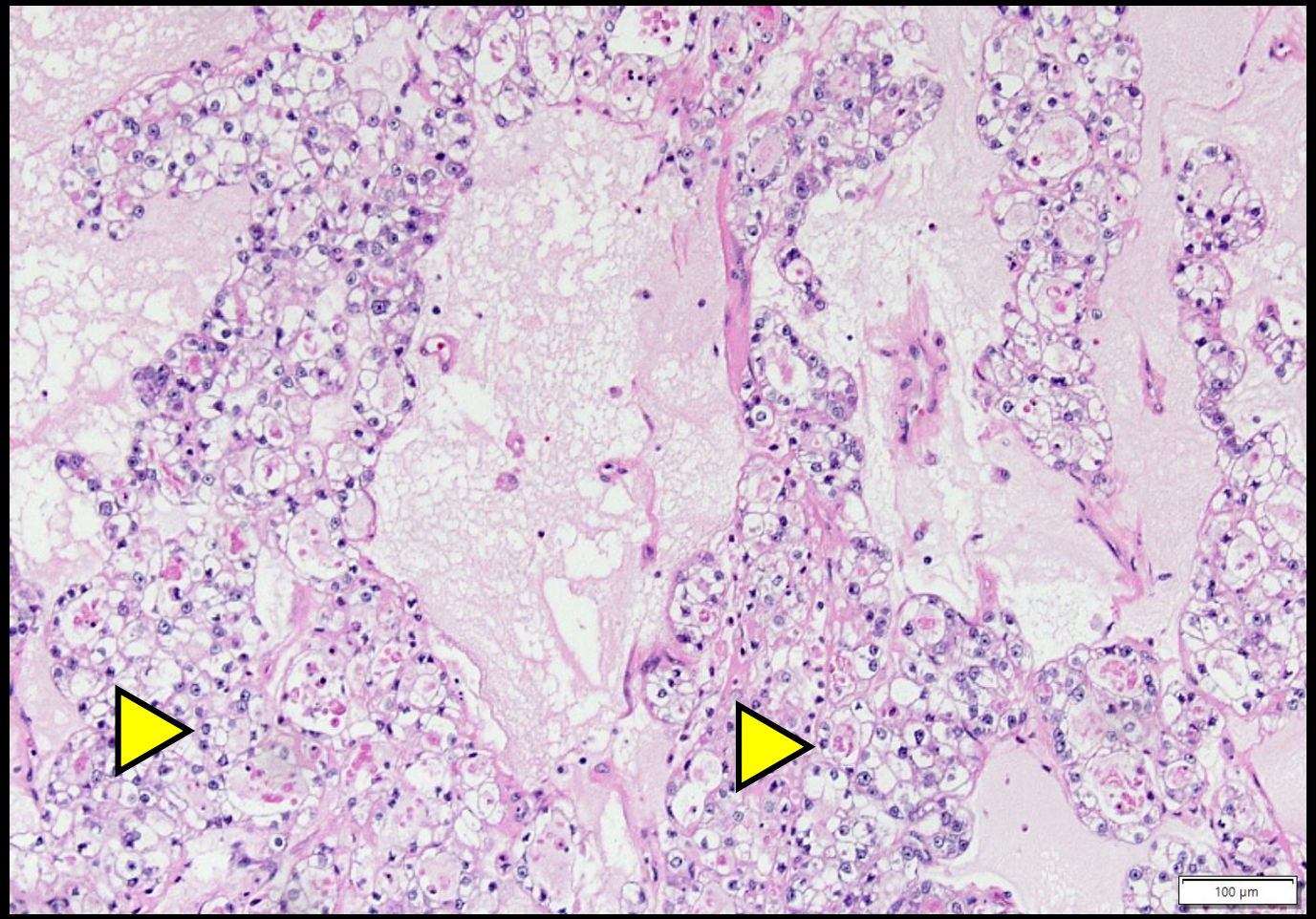
Other Conditions

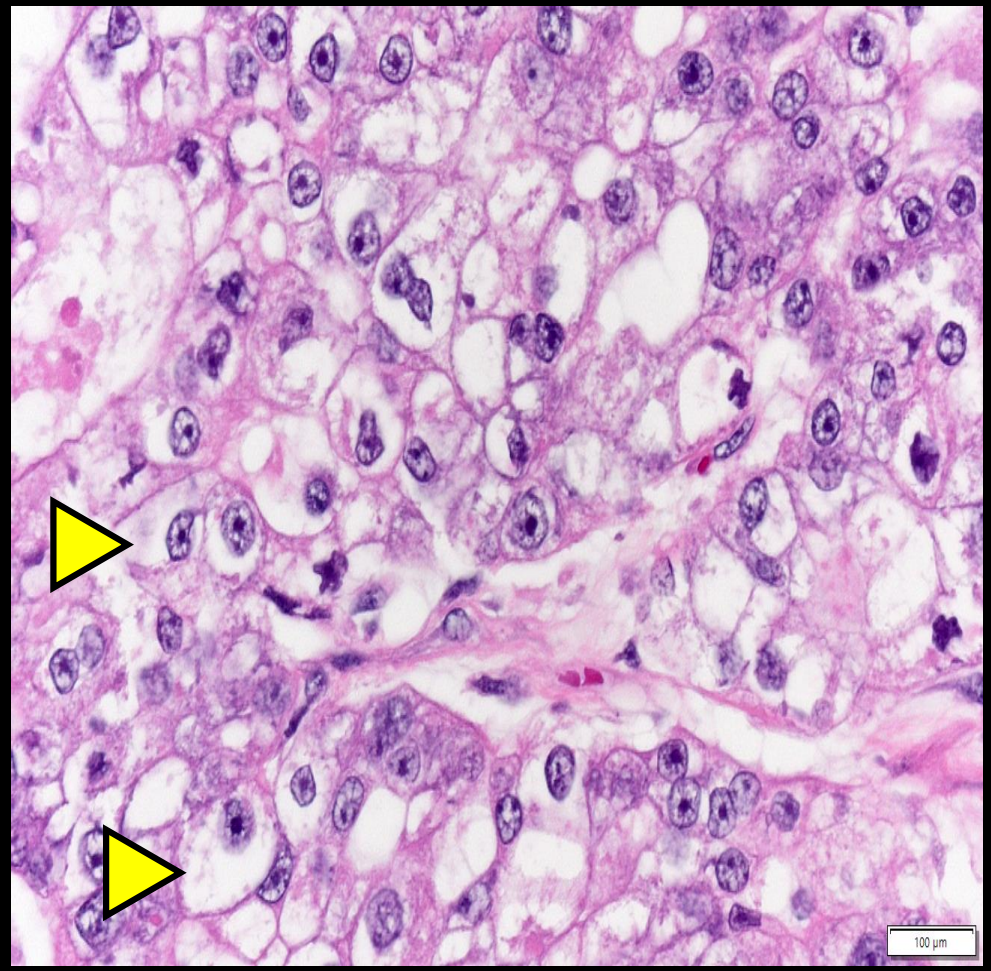
- Ovarian cystadenofibroma
- Peritoneal inclusion cyst

Gross Specimen

Left ovary was intact pink-tan mass that measured 17.1 x 14.2 x 10.0 cm. Mostly smooth surface with mild lobulations and adherent fatty tissues.

Histology

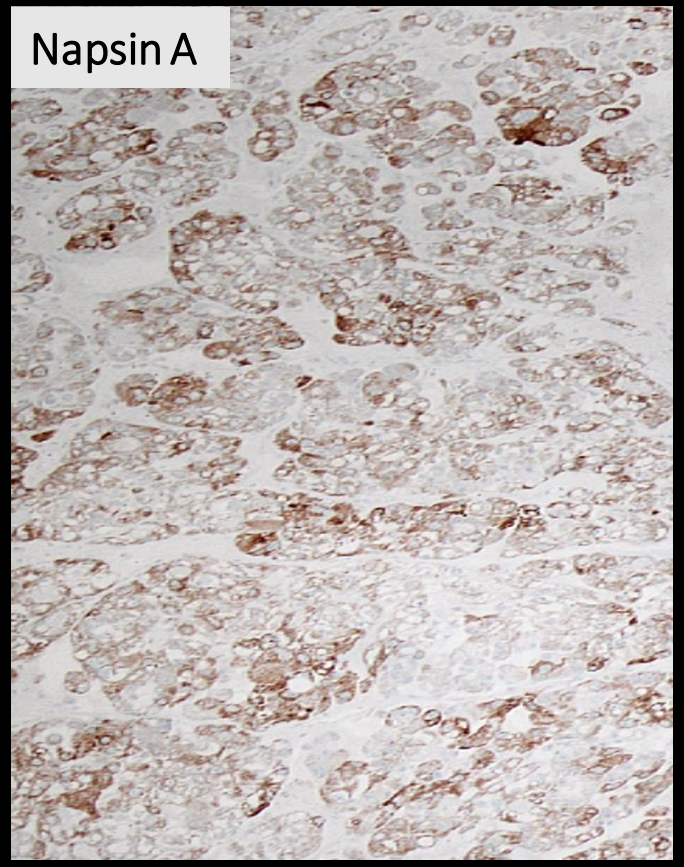


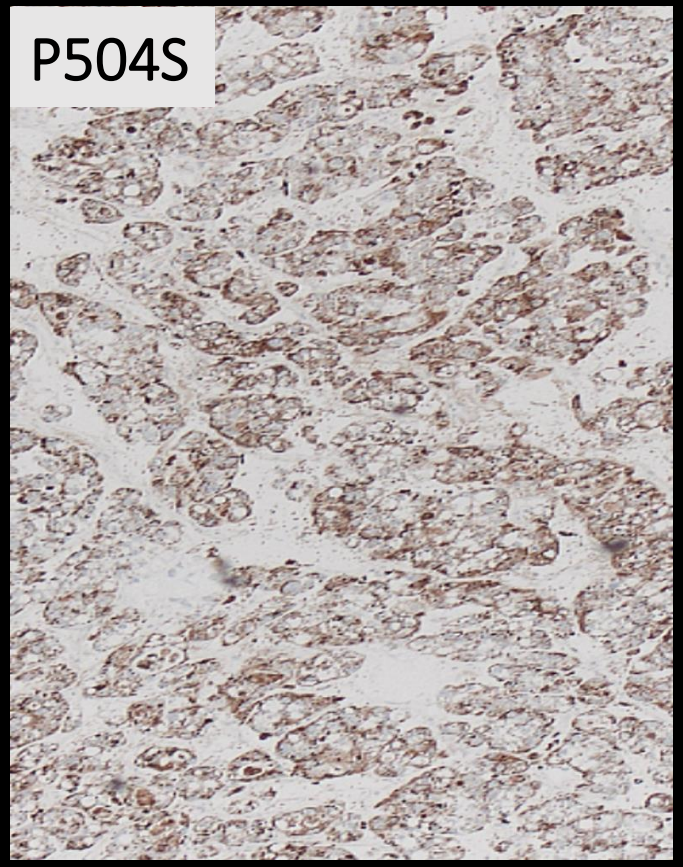


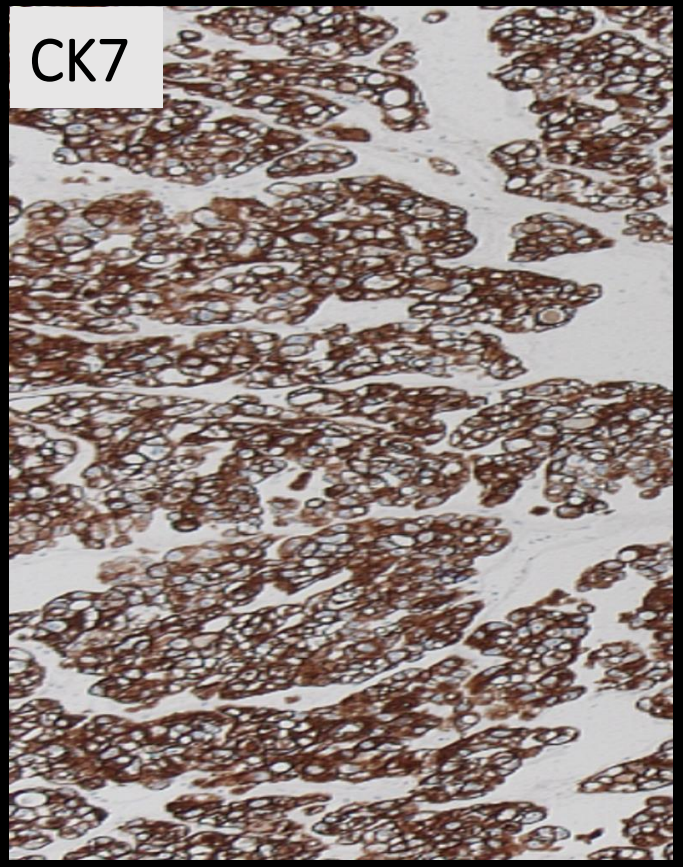
Cells with clear cytoplasm (arrowhead) lining tubulocystic architecture

Immunohistochemistry

Immunohistochemical panel relevant to the primary diagnosis.
The tumor is positive for Napsin A, P504S, and CK7.







Final Dx:

Ovarian Clear Cell Carcinoma, FIGO Stage IIIA1

Case Discussion

- Patient underwent total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, pelvic and para-aortic lymph node dissection staging biopsies
- Pathology showed FIGO Stage IIIA1 clear cell carcinoma of the left ovary with metastasis to the left para-aortic lymph node

Case Discussion

- Ovarian clear cell carcinoma is a sub-type of ovarian epithelial carcinoma
  - Comprises 5-10% of all epithelial carcinomas in North America
  - Higher prevalence in East Asia
  - Average age of onset is about 56 years old
  - Almost always invasive and malignant
  - Associated with thrombotic events, paraneoplastic hypercalcemia, and Lynch syndrome
- Risk factors:
  - Main risk factor is endometriosis; identified in over half of patients with this tumor
  - Early menarche, late menopause
  - Most common genetic mutations are associated with *ARID1A* and PIK3/mTOR pathways
- Diagnosis:
  - Microscopic examination
  - Associated with mild elevations of CA-125

Case Discussion

- Characteristic findings on imaging:
  - CT: Large, unilocular cystic mass with a solid portion protruding into cystic cavity
  - MRI: High intensity cystic mass and Intermediate intensity solid nodules on T2-weighted imaging
  - Ultrasound: Anechoic cystic mass with irregular hyperechoic solid nodules along the walls
  - Both CT and MRI are useful in identifying lymphadenopathy, which may suggest metastasis

- Treatment
  - Primary treatment involves surgical removal of the mass with platinum-based adjuvant therapy
  - Response rate to chemotherapy is often less than 50%

References:

- American College of Radiology. ACR Appropriateness Criteria. https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria
- Choi, Hyuck Jae, et al. “CT findings of clear cell carcinoma of the ovary.” *Journal of Computer Assisted Tomography*, vol. 30, no. 6, Nov. 2006, pp. 875–879, https://doi.org/10.1097/01.rct.0000220795.45782.1d.
- Gadducci, Angiolo, et al. “Clear cell carcinoma of the ovary: Epidemiology, pathological and biological features, treatment options and clinical outcomes.” *Gynecologic Oncology*, vol. 162, no. 3, 8 July 2021, pp. 741–750, https://doi.org/10.1016/j.ygyno.2021.06.033.
- Mabuchi, Seiji, et al. “Clear cell carcinoma of the ovary: Molecular insights and future therapeutic perspectives.” *Journal of Gynecologic Oncology*, vol. 27, no. 3, 19 Jan. 2016, https://doi.org/10.3802/jgo.2016.27.e31.
- Rodrigues, Susana, et al. “Clear cell carcinoma of the ovary: Clues for radiologists to perform a correct diagnosis.” *Current Problems in Diagnostic Radiology*, vol. 53, no. 2, Mar. 2024, pp. 271–279, https://doi.org/10.1067/j.cpradiol.2023.10.003.
- Tang, Haosha, et al. “Clear cell carcinoma of the ovary.” *Medicine*, vol. 97, no. 21, 25 May 2018, https://doi.org/10.1097/md.0000000000010881.
- Taylor, Erin C., et al. “Multimodality imaging approach to ovarian neoplasms with pathologic correlation.” *RadioGraphics*, vol. 41, no. 1, Jan. 2021, pp. 289–315, https://doi.org/10.1148/rg.2021200086.
- Zhu, Chenchen, et al. “Clinical characteristics and prognosis of ovarian clear cell carcinoma: A 10-year retrospective study.” *BMC Cancer*, vol. 21, no. 1, 25 Mar. 2021, https://doi.org/10.1186/s12885-021-08061-7.