AMSER Rad Path
Case of the Month:

Bilateral pelvic masses in 73 y.o. F

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Patient Presentation

Clinical history:

- 73-year-old post-menopausal female with medical history significant for T2DM, stage 3 CKD, HTN, hyperlipidemia, CHF and uterine prolapse s/p hysterectomy at age 32.

- Presented as a transfer for an incidental ovarian mass finding in the setting of acute, nonlocalized abdominal pain, diarrhea, nausea, vomiting and weight loss over the past 5 days.

Pertinent social history:

- Former cigarette smoker (20 pack-year)

- No alcohol use

Pertinent physical exam findings:

- Bimanual exam elicited tenderness and fullness in left adnexa

What imaging should we order?

Variant 1: Acute nonlocalized abdominal pain and fever. No recent surgery. Initial imaging.

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

ED Workup included ordering a CT AP w/o contrast

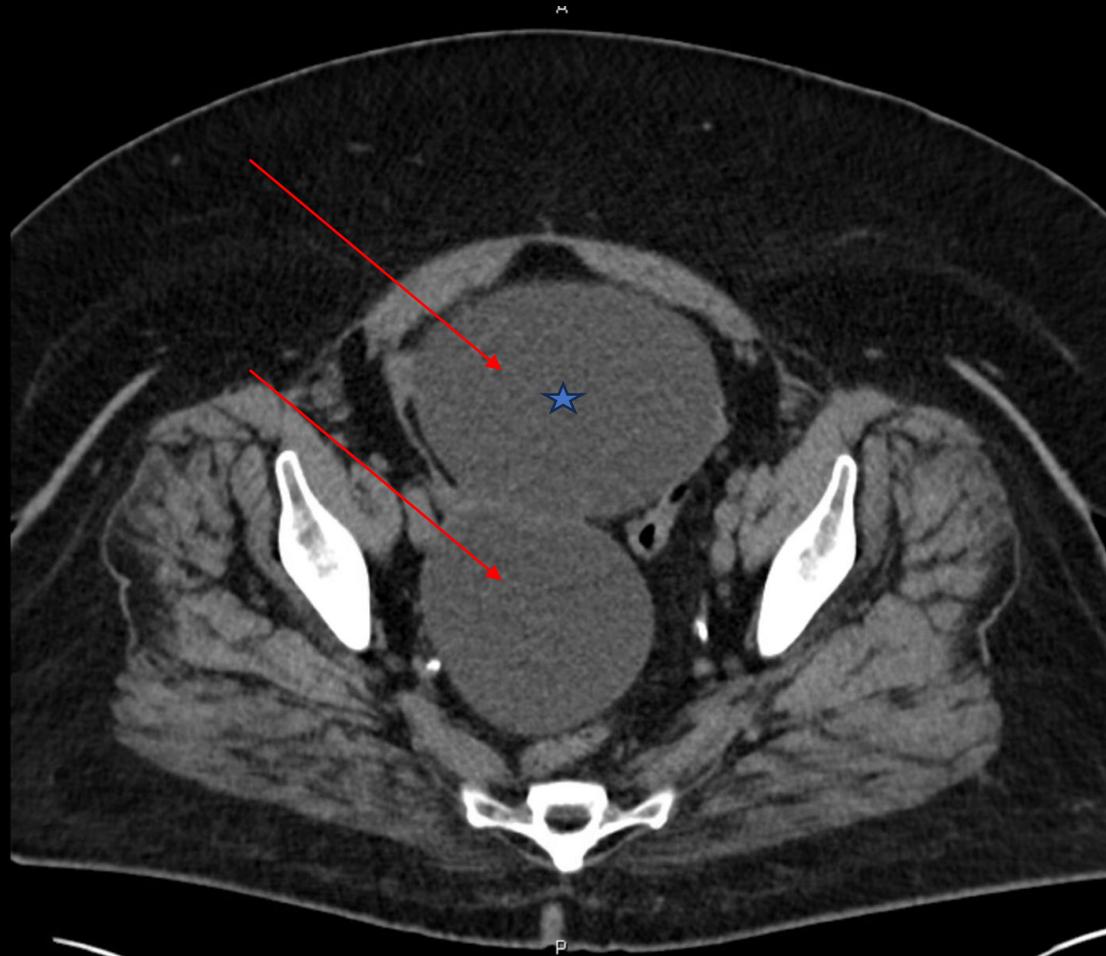CT Abdomen Pelvis w/o Contrast, Axial (unlabeled)
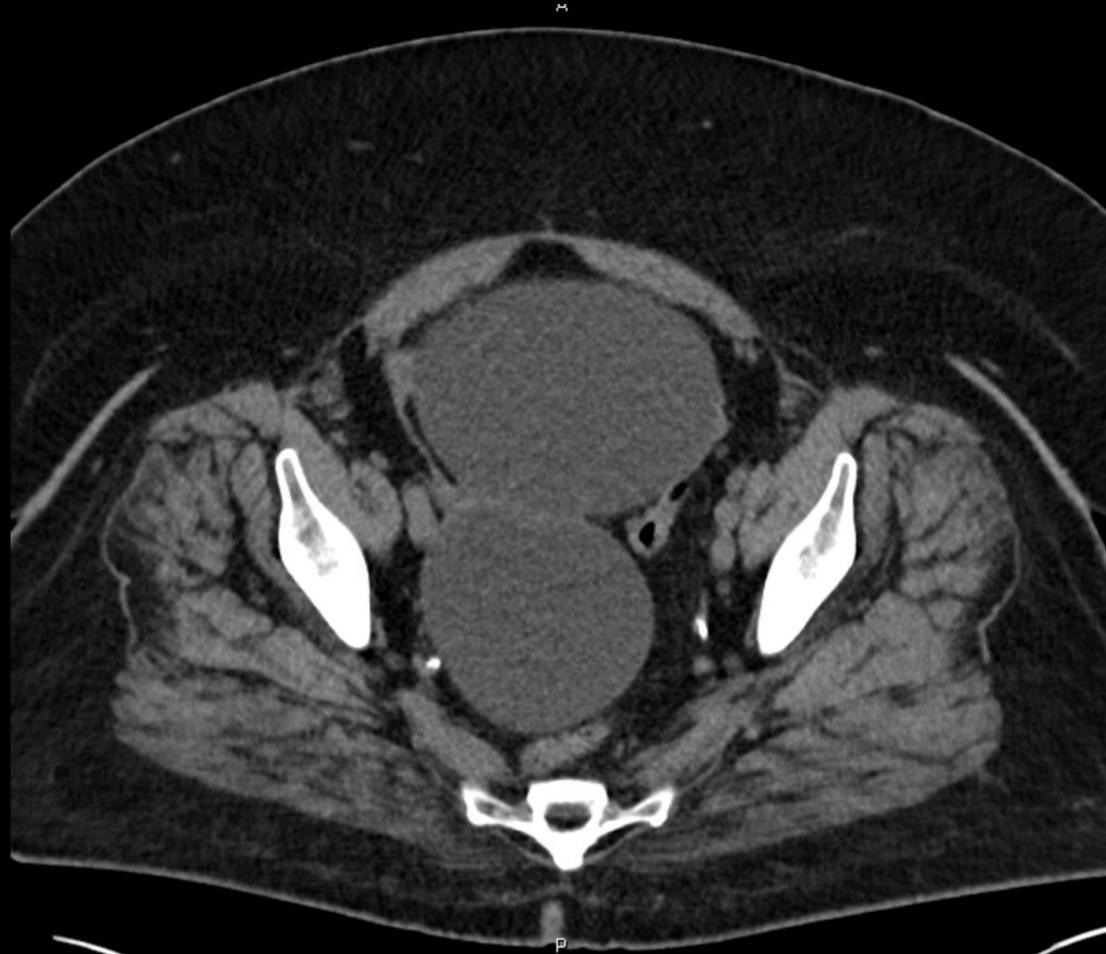
CT Abdomen Pelvis w/o Contrast, Sagittal (unlabeled)

CT Abdomen Pelvis w/o Contrast, Axial (labeled)

Red arrows indicate 2 cystic pelvic lesions. The anterior lesion (blue star) measuring up to 13.4 cm and the posterior lesion measuring up to 9.7 cm.
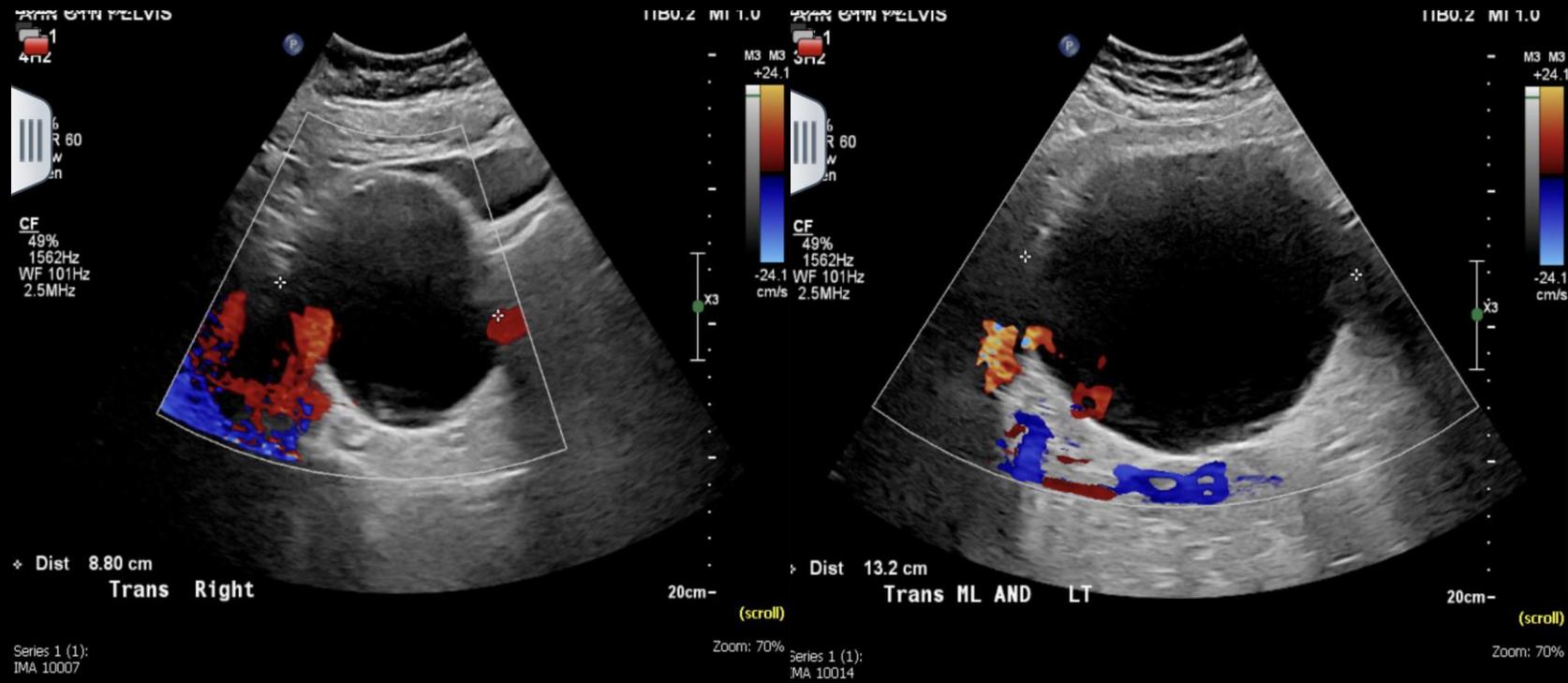
CT Abdomen Pelvis w/o Contrast, Sagittal (labeled)

Red arrows indicate 2 cystic pelvic lesions. The cephalic lesion (blue star) measuring up to 13.4 cm and the caudal lesion measuring up to 9.7 cm.
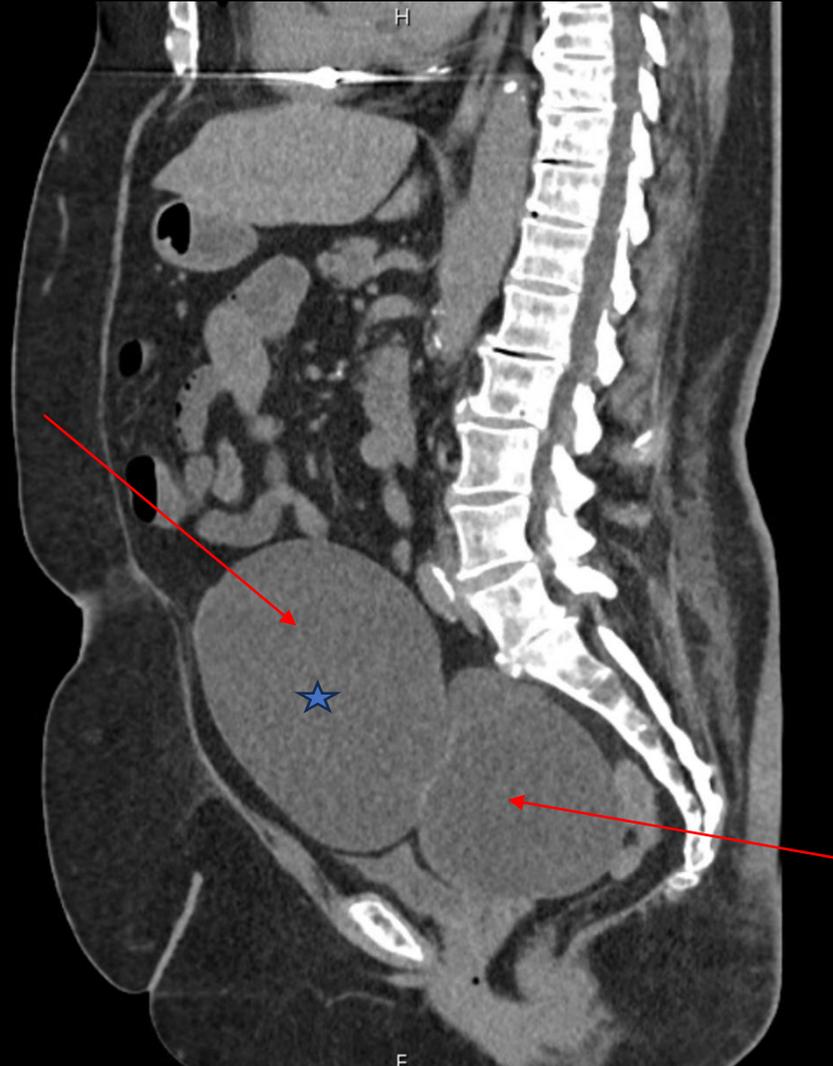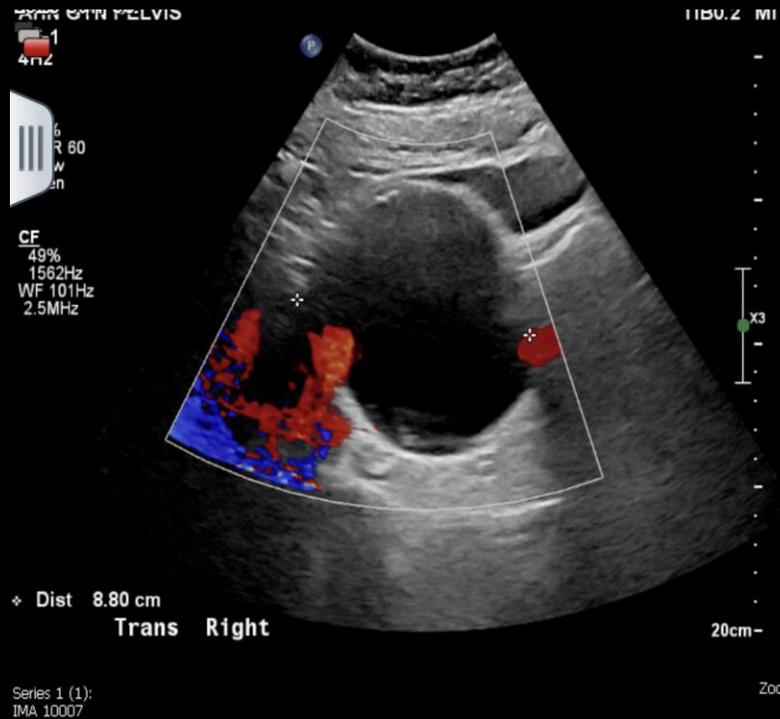
What imaging should we order next to characterize these lesions?

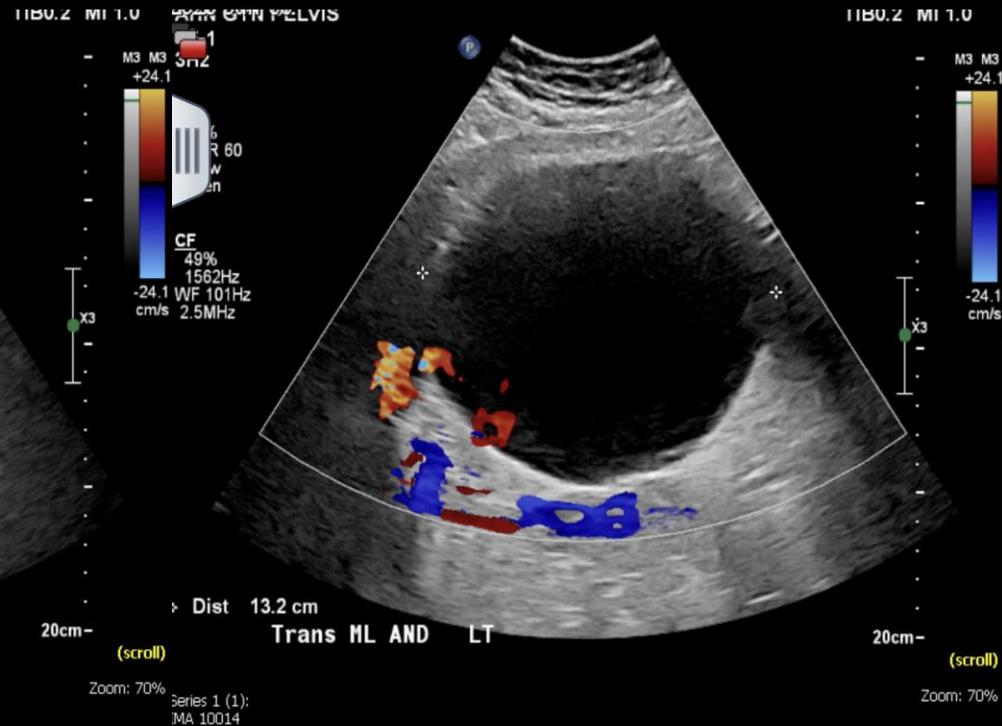# Transvaginal US w/ Doppler (unlabeled)

Transvaginal US w/ Doppler (labeled)

Normal arterial inflow bilaterally

Right ovary: midline cystic lesion measuring approx. 11.6 x 8.7 cm
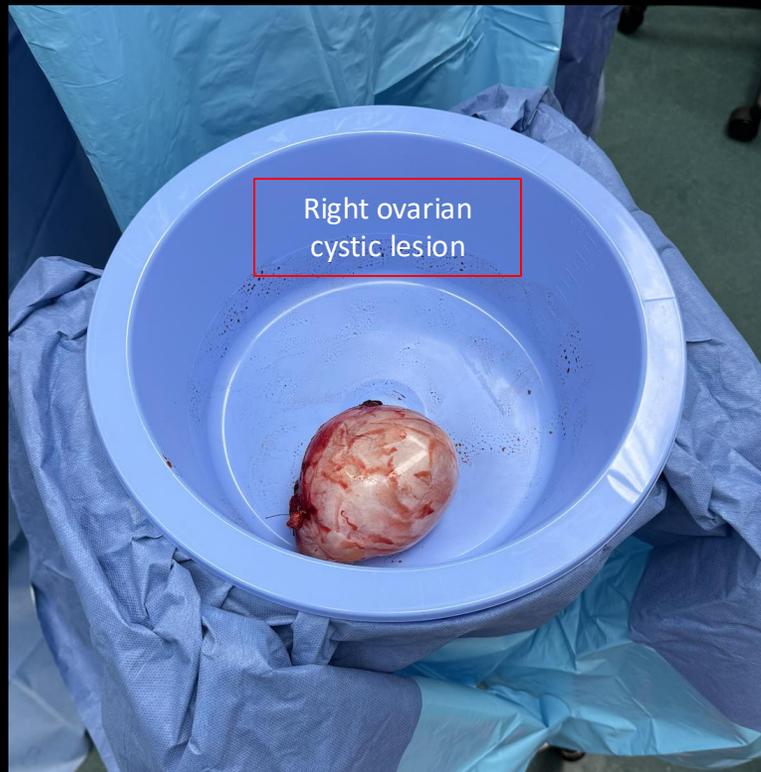
Left ovary: midline/left-sided cystic lesion measuring 12.9 x 10.1 cm

DDX (based on imaging)

- Simple follicular cysts

- Benign mucinous cystadenoma

- Benign serous cystadenoma

- Dermoid cysts

- Ovarian adenocarcinoma

*Patient was scheduled for an exploratory laparotomy

Gross Path (labeled)

Micro Path (labeled)
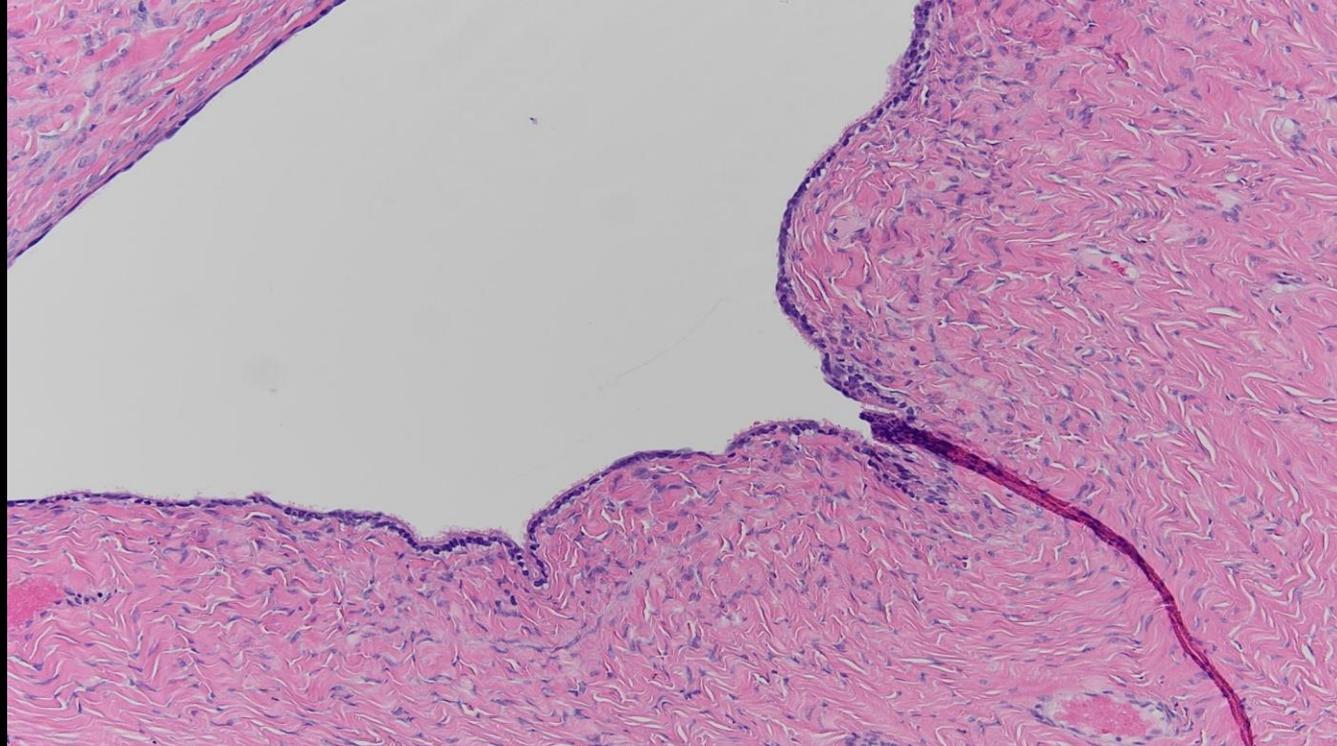
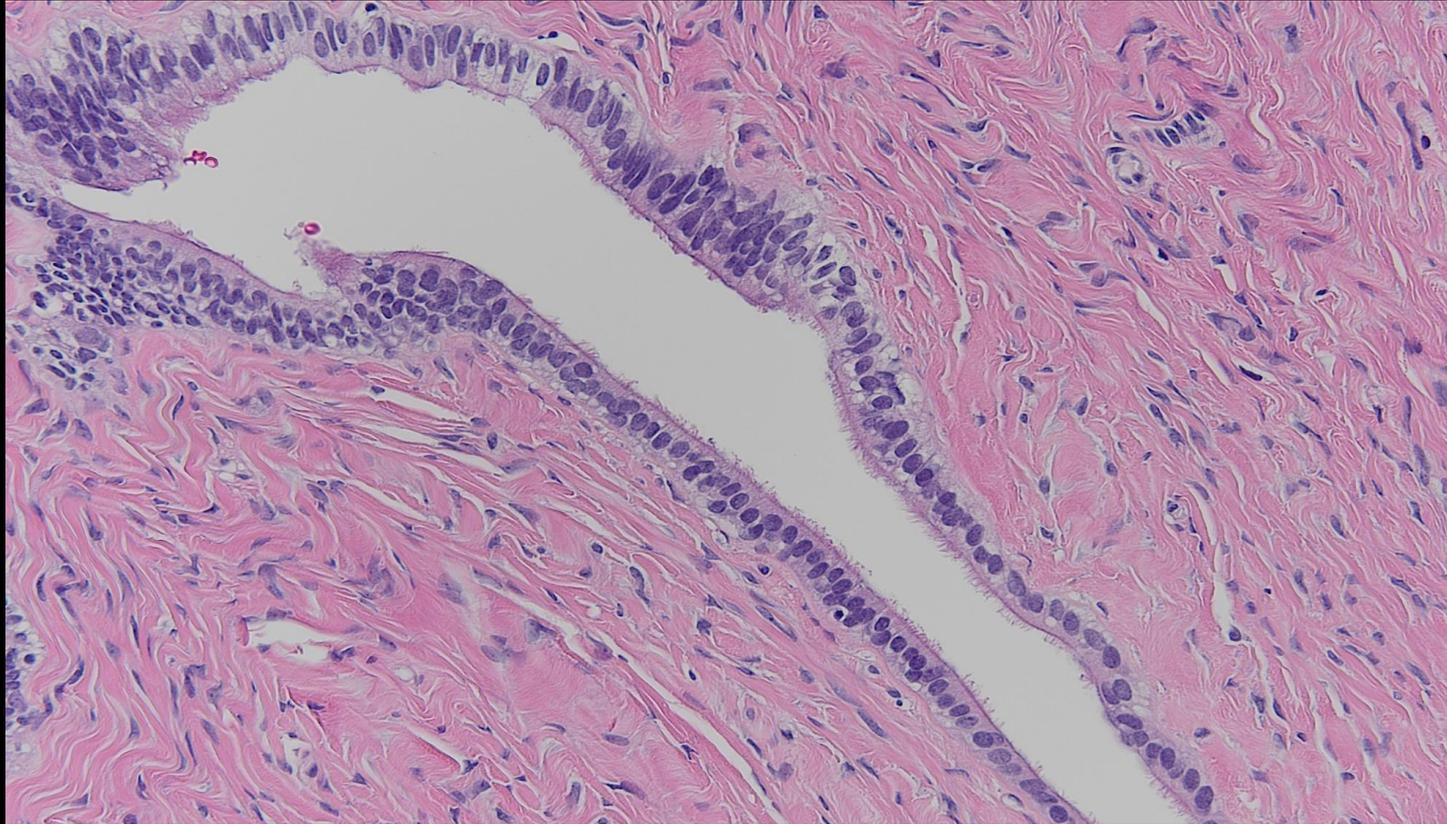**H&E: On intermediate power, the mass displays cysts lined by a single layer of tall, columnar, ciliated cells resembling normal tubal epithelium. The bland, fibrous stroma contains spindle-shaped fibroblasts.**

Micro Path (labeled)

H&E: On high power, the mass displays a focal area of epithelial proliferation but no cytologic atypia or mitotic figures.

Final Dx:

Benign Ovarian Serous Cystadenomas

Case Discussion

- Ovarian epithelial cell neoplasms can be characterized as benign, borderline and malignant based on the following histopathological findings:
    - Epithelial cell proliferation, degree of nuclear atypia and stromal invasion
- Ovarian Epithelial cell neoplasms usually occur in older women (age >40).
    - Other risk factors include obesity, late menopause, hormone therapy, and family history
- These neoplasms are further categorized as serous (most common), mucinous, endometrioid, clear cell, seromucinous, and undifferentiated subtypes.

Case Discussion

- Benign epithelial cell neoplasms: Usually cysts lined by a single layer of benign epithelium; homogenous in appearance
  a. Serous Cystadenoma (most common overall ovarian neoplasm)
  b. Mucinous cystadenoma

- Borderline epithelial cell neoplasms: atypical cell proliferation without stromal invasion
  a. Serous Borderline Cystadenoma
  b. Mucinous Borderline Cystadenoma

- Malignant epithelial cell neoplasms: Stromal invasion
  a. Low- and High-grade Serous cystadenocarcinoma
  b. Mucinous Cystadenocarcinoma
  c. Endometrioid Carcinoma
  d. Clear Cell Carcinoma

Case Discussion

Distinguishing Mucinous vs. Serous Cystadenomas

Cystadenoma Type	Serous	Mucinous
Prevalence	Most common	Less common
Age onset	40-60	30-50
Size	Smaller	Larger
Laterality	Bilateral	Unilateral
Calcifications	Psammomatous calcifications on histology	Intramural calcifications on CT
Papillary projections	Yes	No
Appearance on US	Simple, unilocular cysts	Multilocular cystic mass with varying echogenicity
Gene mutations	None	KRAS

Note: both borderline and malignant neoplasms are more heterogenous in appearance due to the presence of solid components and are usually multilocular with thick septa.

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Case Discussion

- 1st-line imaging modality for adnexal masses is US.

- Indeterminate US findings must be followed up with MRI.

- O-RADS for both US and MRI provides risk stratification and management protocol which helps reduce aggressive intervention.
  - Pre-menopausal and post-menopausal guidelines vary
  - O-RADS score and PPV for malignancy
    - O-RADS 0: Incomplete
    - O-RADS 1: Normal ovary
    - O-RADS 2: Almost certainly benign (<1% US, <0.5% MRI)
    - O-RADS 3: Low risk (1-10% US, ~5% MRI)
    - O-RADS 4: Intermediate risk (10-50% US, ~50% MRI)
    - O-RADS 5: High risk (Greater than or equal to 50% US, ~90% MRI)

References:

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- Taylor, E. C., Irshaid, L., & Mathur, M. (2021). Multimodality Imaging Approach to Ovarian Neoplasms with Pathologic Correlation. Radiographics : a review publication of the Radiological Society of North America, Inc, 41(1), 289–315. https://doi.org/10.1148/rg.2021200086