MASS CONFUSION: DECODING ADNEXAL LESIONS IN PREGNANCY

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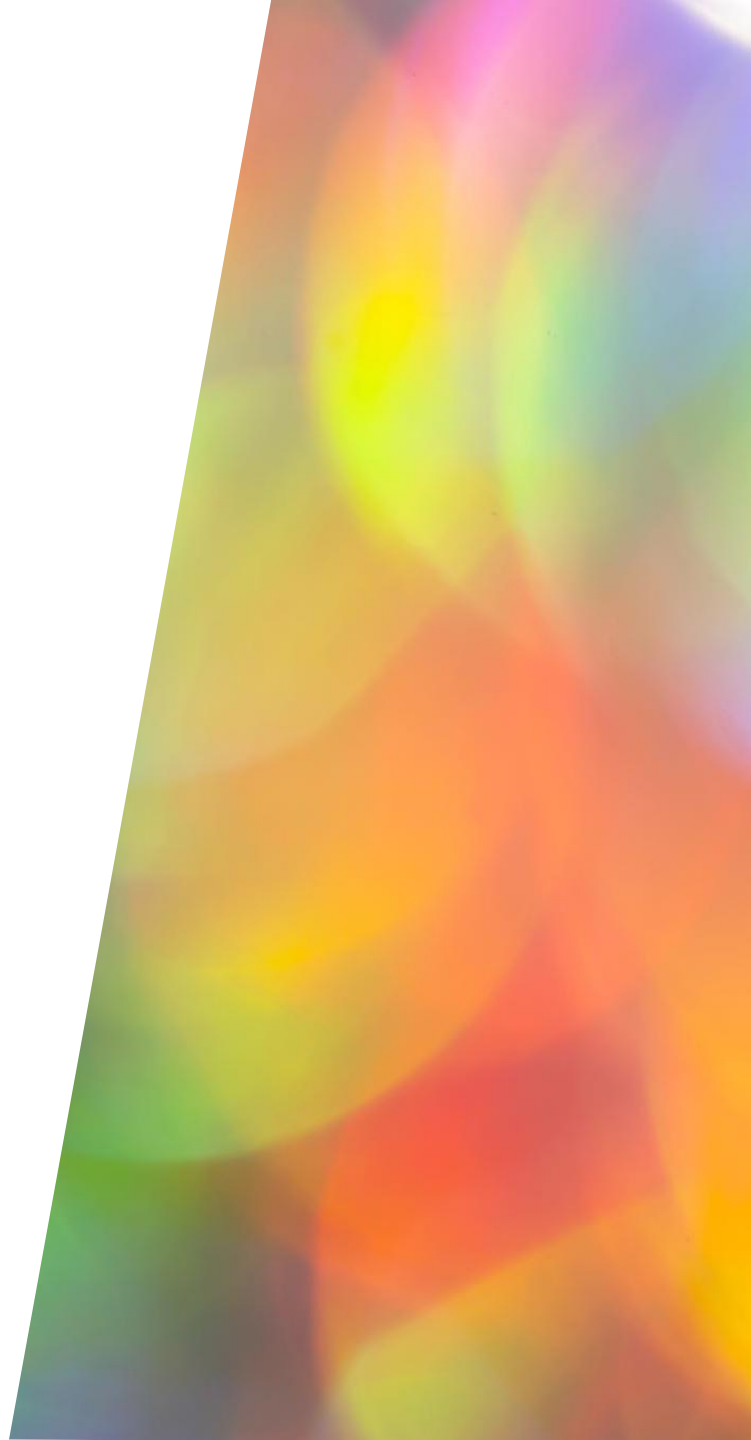


LEARNING OBJECTIVES

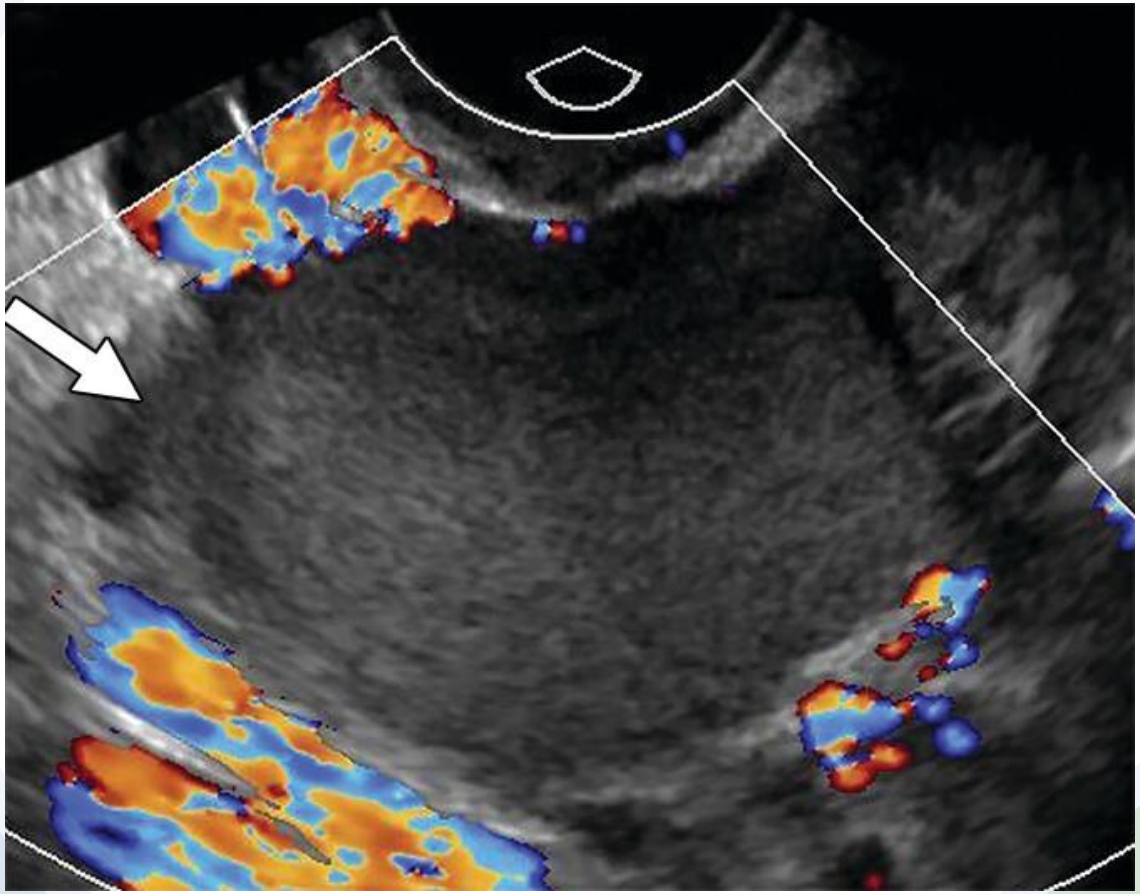
- ✓ How to optimize imaging of the adnexae during pregnancy
- ✓ How to identify and risk-stratify common adnexal lesions
- ✓ How to develop follow-up plans for pregnant patients with adnexal masses

STARTING WITH A CASE

A 33 y/o healthy G1P0 presents for her 20 week anatomy scan. Pregnancy uncomplicated to date.

STARTING WITH A CASE

Left adnexa



3.8x3.2x4.0cm

Describe your findings. How would you counsel her?

EPIDEMIOLOGY

- Identified in 2% of pregnant patients
  - At least 10x more frequent than in age-matched non-pregnant population, due to advent of routine obstetric ultrasonography
- 4% of these patients have bilateral masses
- Approximately 2% of masses are malignant
- Ovarian cancer is 5th most common malignancy diagnosed during pregnancy

PRESENTATION

Typically asymptomatic, or otherwise:

- Abdominal pain or pressure
- Bladder or bowel symptoms
- Palpable mass
- Acute torsion
  - Occurs with 5% of adnexal masses in pregnancy
- Elevated serum markers
  - e.g. AFP, inhibin A

TYPES OF LESIONS

Approximately in order of frequency*:

- Physiologic cysts
- Dermoids
- Paratubal and paraovarian cysts
- Serous and mucinous cystadenomas
- Endometriomas
- Fibroids
- Theca lutein cysts

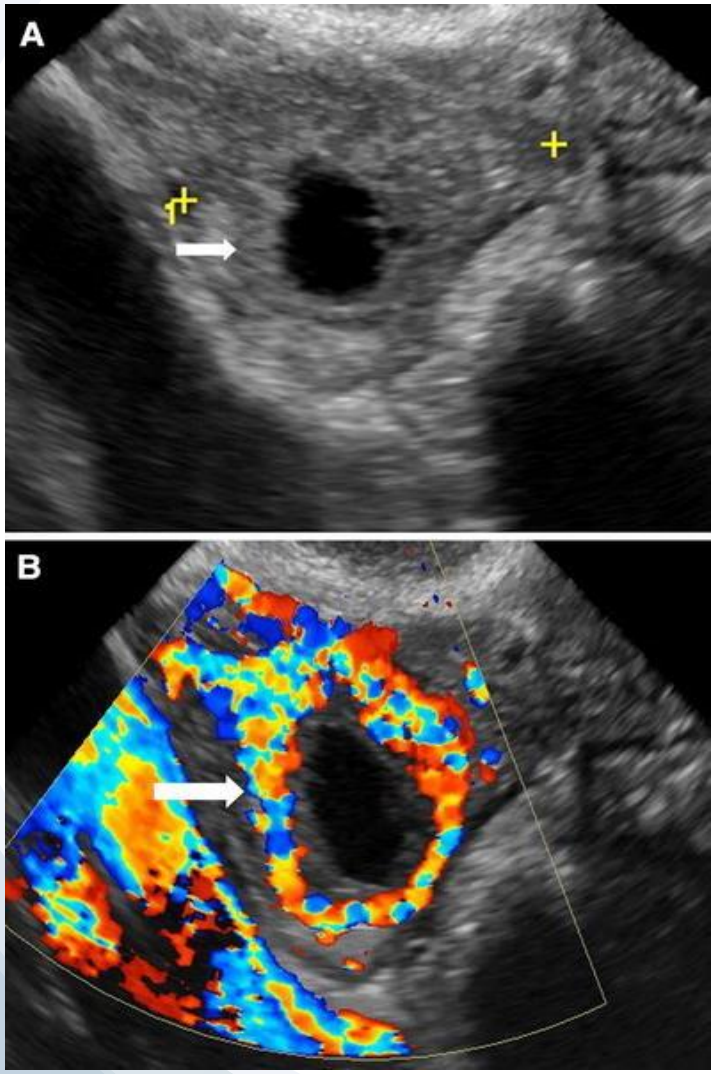
Benign

- Malignant and borderline tumors

PHYSIOLOGIC CYSTS

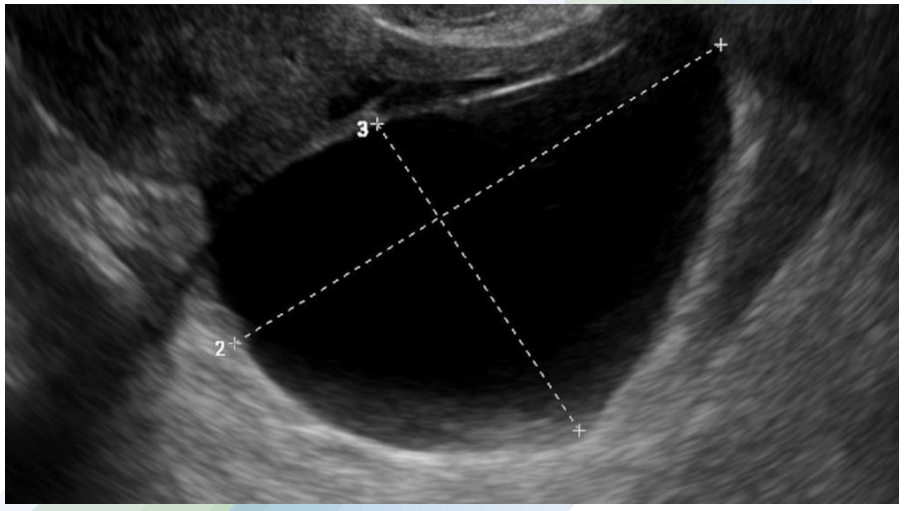
Corpus luteum:

- Simple
- Thick-walled
- "Ring of fire"
- Up to 6cm
- Resolve by 10 weeks



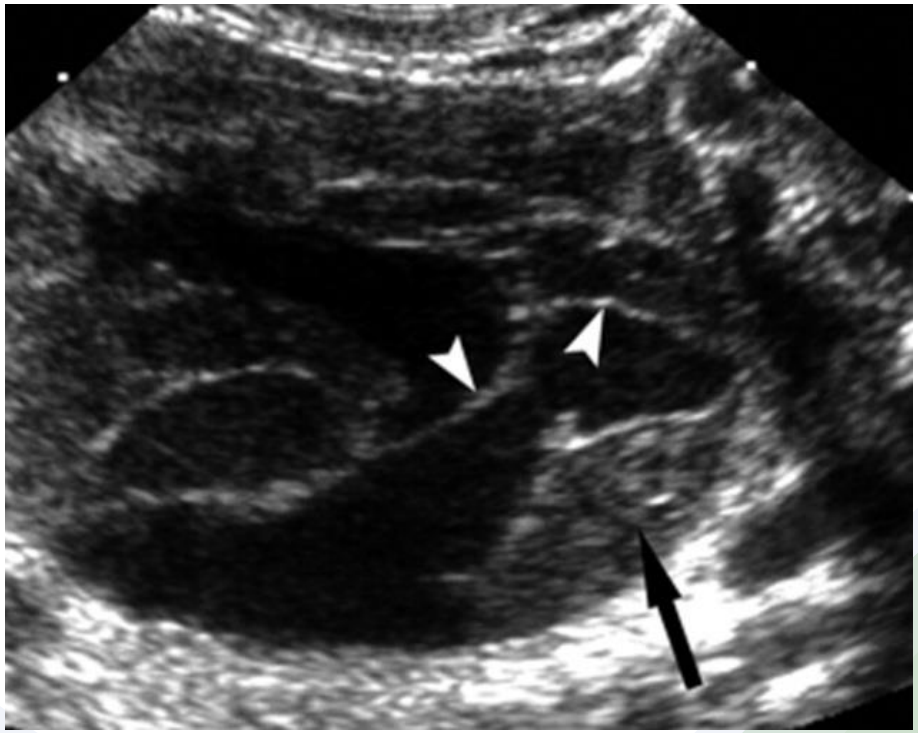
Follicular cyst:

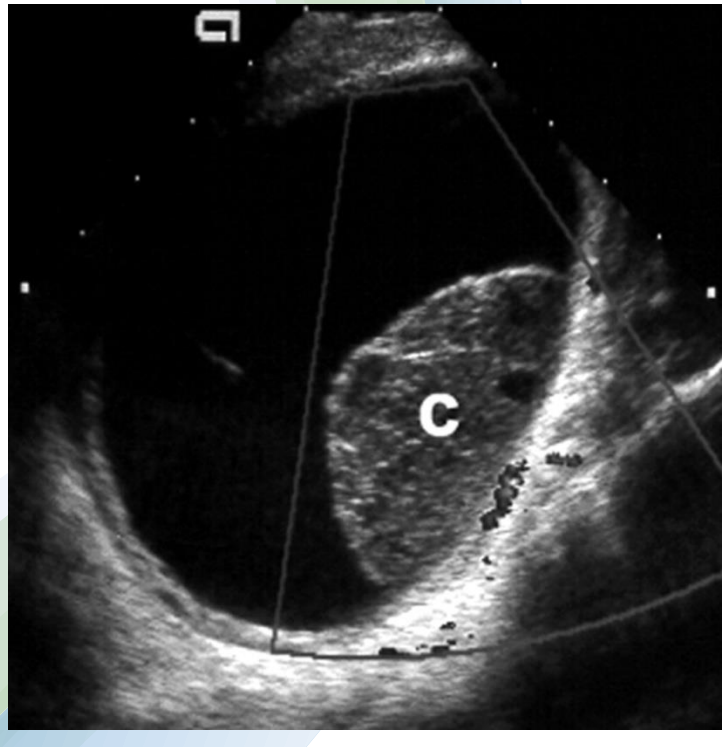
- Simple
- Thin-walled
- Up to 8cm
- Typically resolve by 20 weeks



HEMORRHAGIC CYSTS

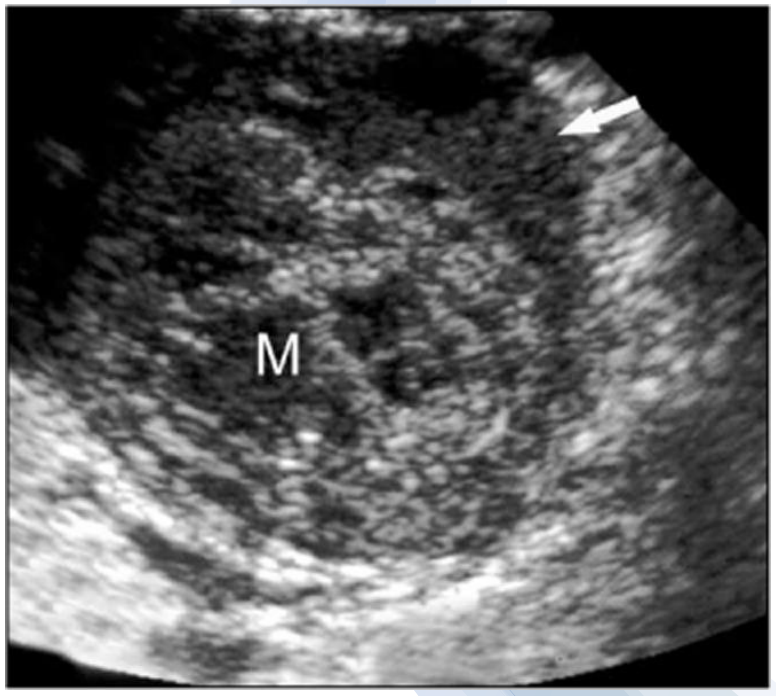
Evolving from a functional cyst to contain a reticular echogenic pattern of “fishnet weave” or over time, a retracting clot



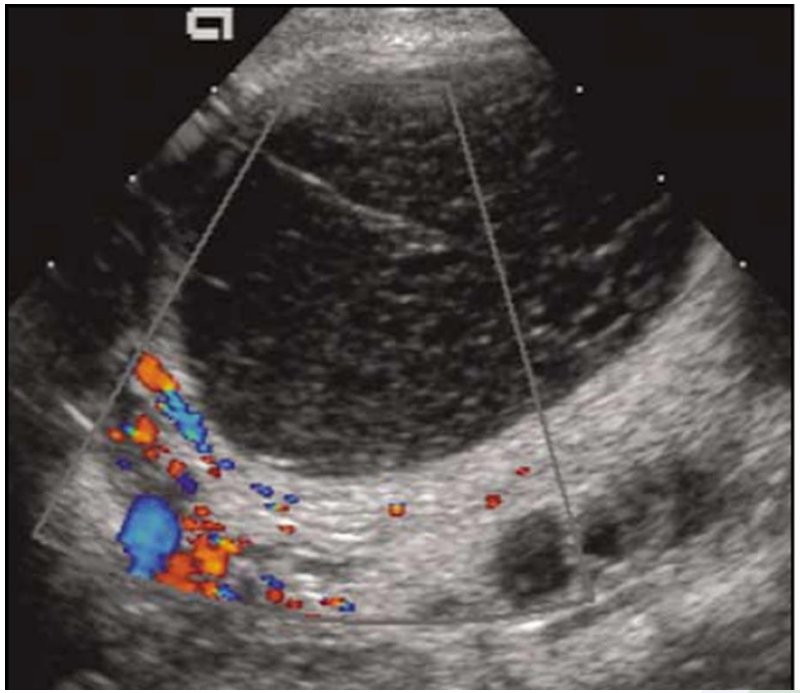


HEMORRHAGIC CYSTS

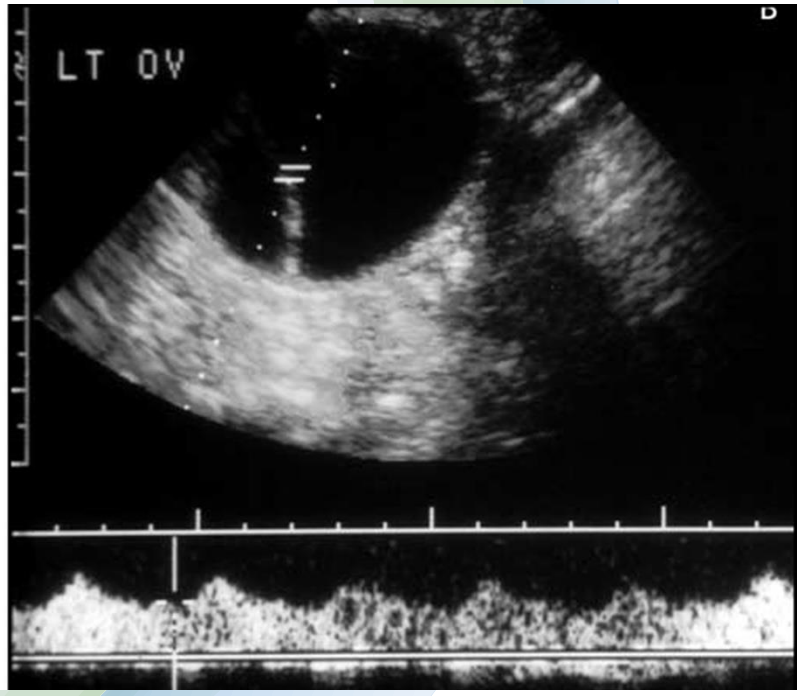
Caution: clot can organize and appear solid or form pseudoseptations - applying Doppler or ‘wobbling’ can help distinguish



artificially solid-appearing organized clot



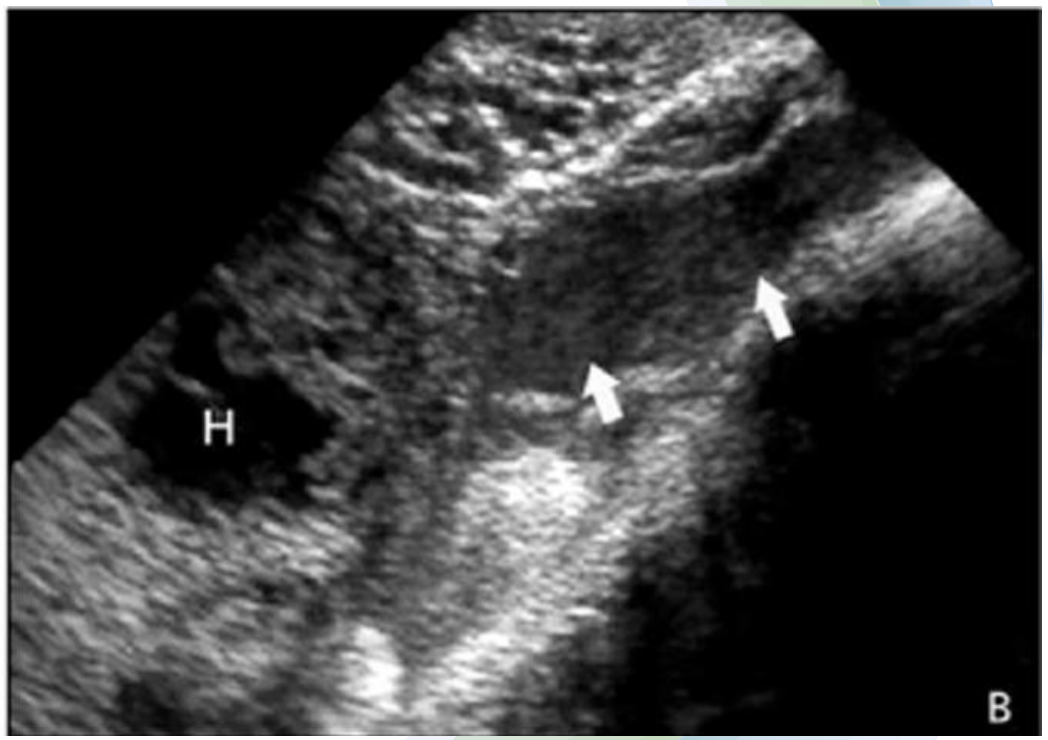
fibrin strand with no color flow



true septum with Doppler flow

RUPTURED HEMORRHAGIC CYSTS

collapsing cyst wall



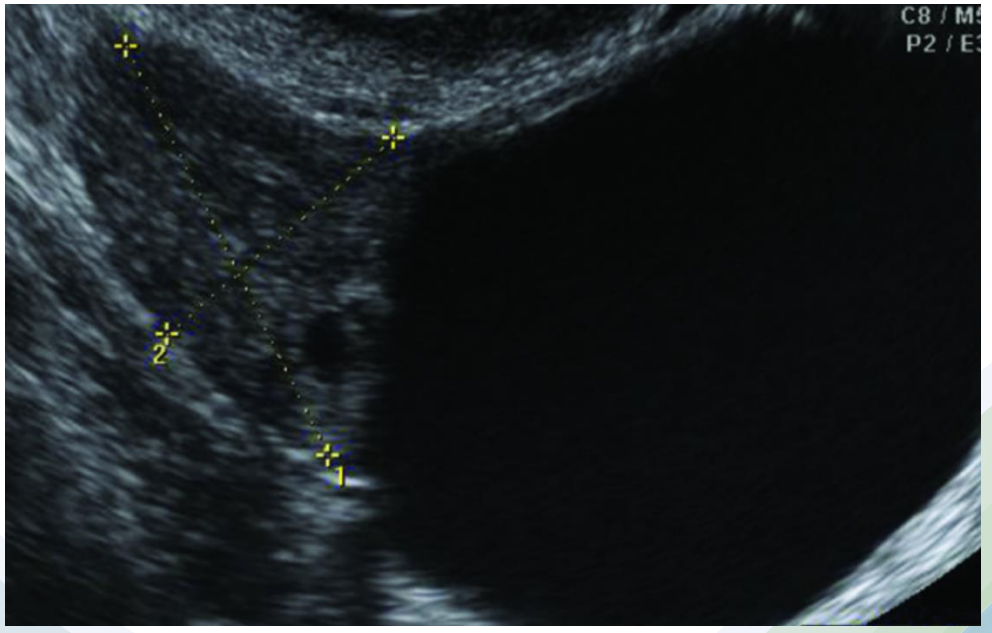
surrounding blood products

DERMOIDS

- Complex echotexture patterning, echogenic nodules, septae, posterior shadowing
- Typically do not evolve in pregnancy

PARATUBAL/PARAOVARIAN CYSTS

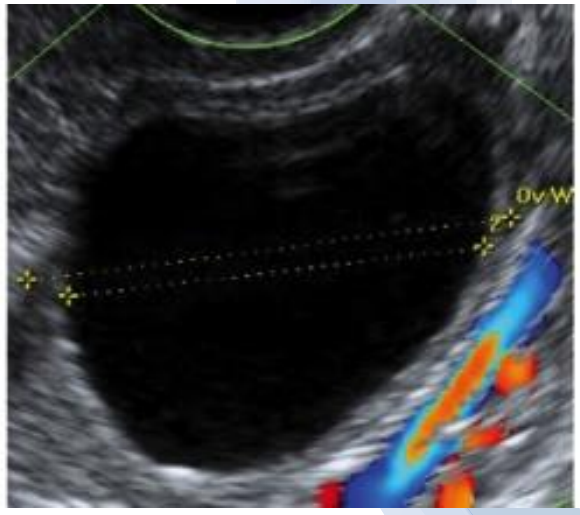
- Simple, avascular, sometimes with papillary projections, up to 5cm
- “Split sign” when pressure from probe to adjacent ovary applied



CYSTADENOMAS

Serous:

- Typically unilocular, can be septated
- Avascular
- Often bilateral



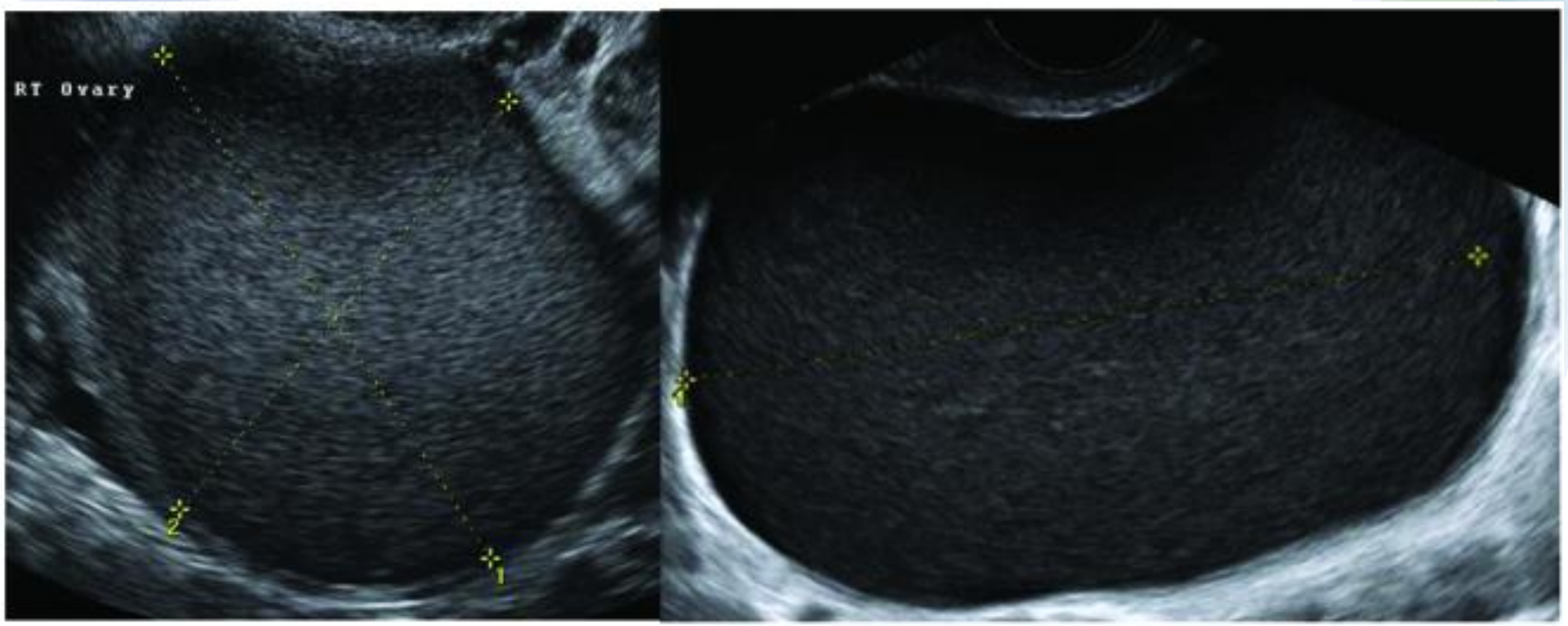
Mucinous:

- Multilocular
- Varying low level echoes

Both can grow, up to 10+cm, during pregnancy

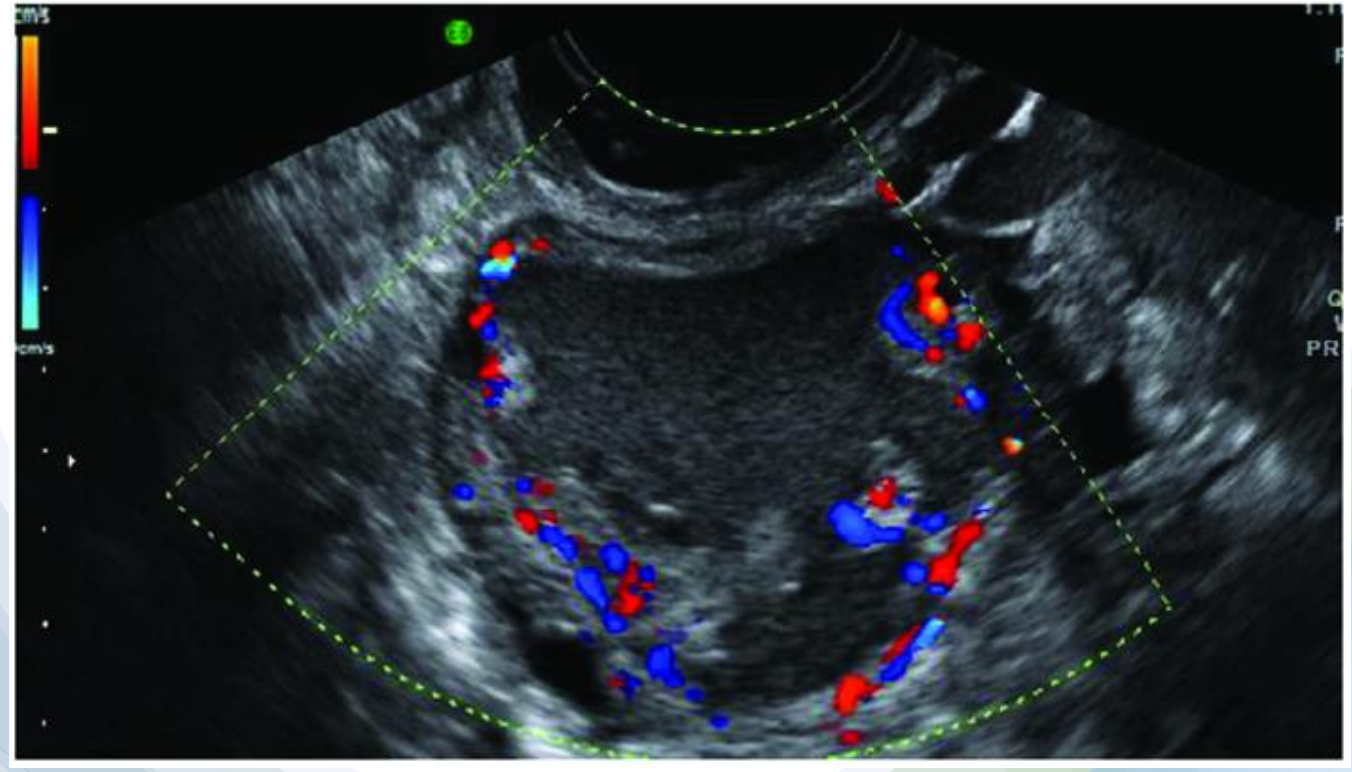
ENDOMETRIOMAS

Unilocular with “ground glass” homogenous echoes

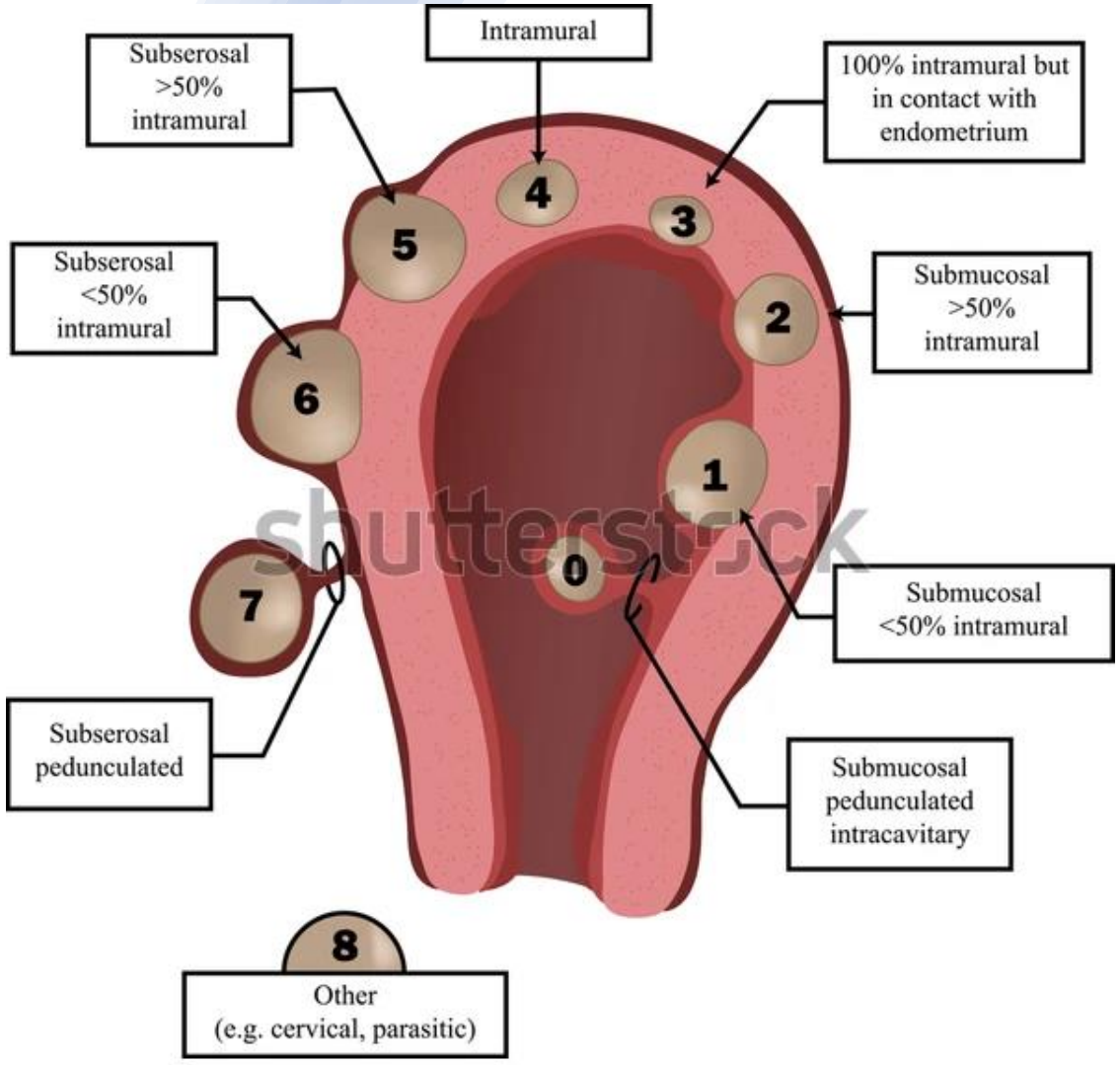


ENDOMETRIOMA

- During pregnancy, often shrink or stabilize
- However, decidualization can result in solid vascular projections



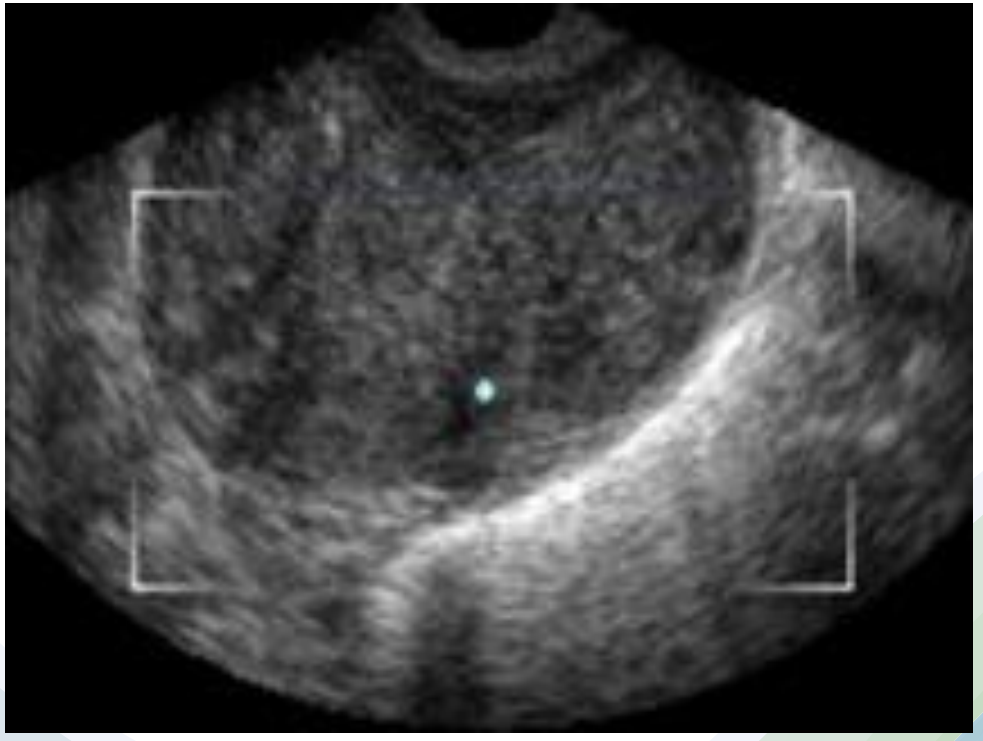
FIBROIDS



Pedunculated from uterus or arising from broad ligament (FIGO type 7 or 8)

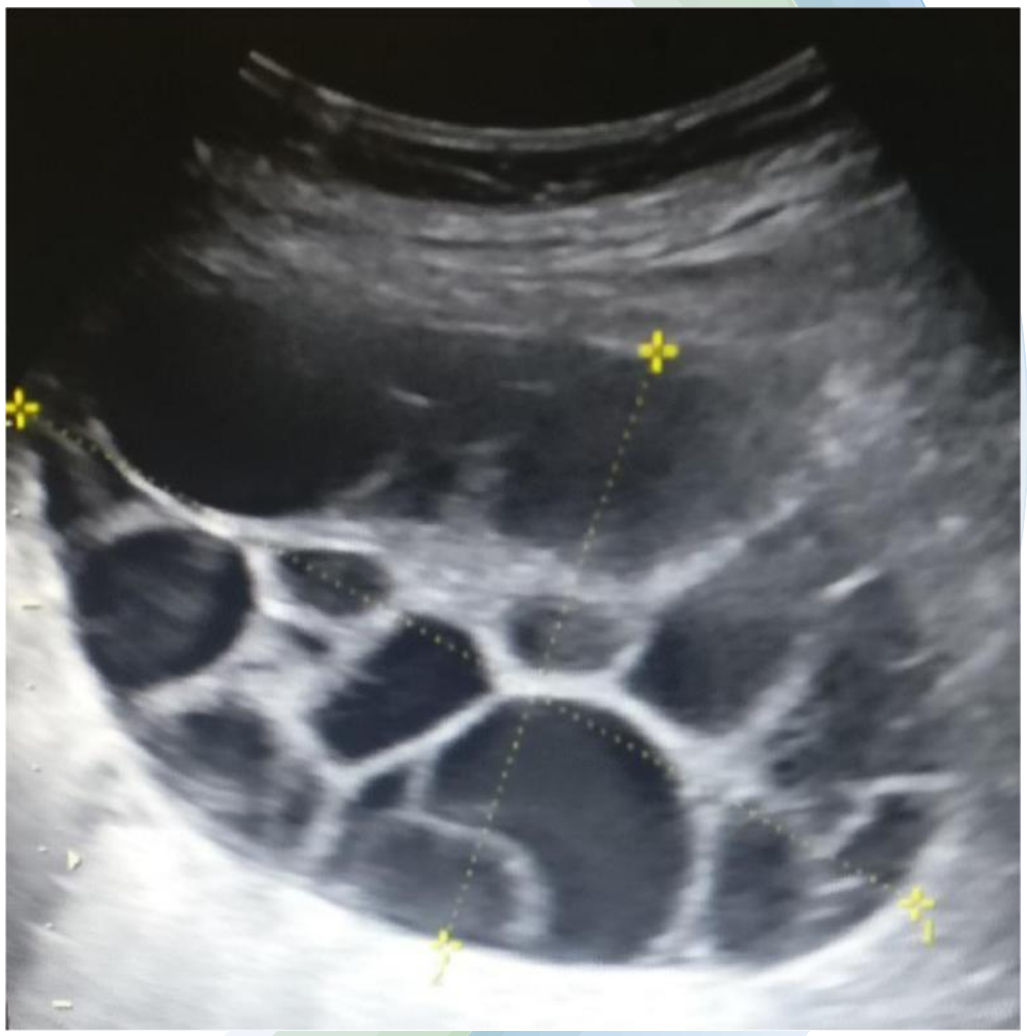
FIBROIDS

- Well circumscribed, hypoechoic
- Complex if degenerating (more common in pregnancy)



THECA LUTEIN CYST

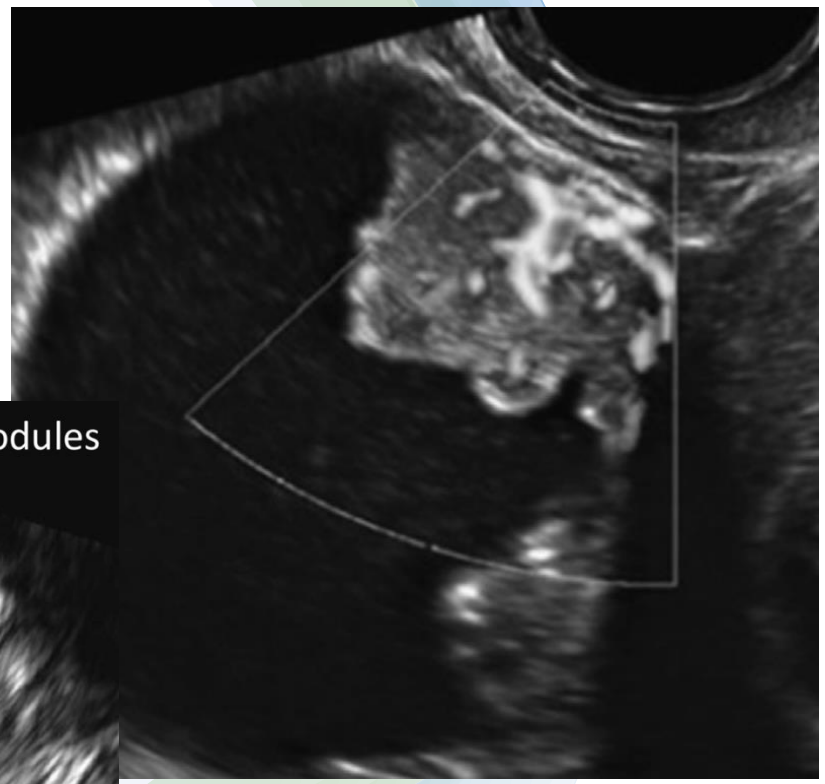
- Bilateral, anechoic, multiseptated cysts
- Due to HCG overstimulation (e.g. molar pregnancy, multifetal gestation)
- Regress after pregnancy



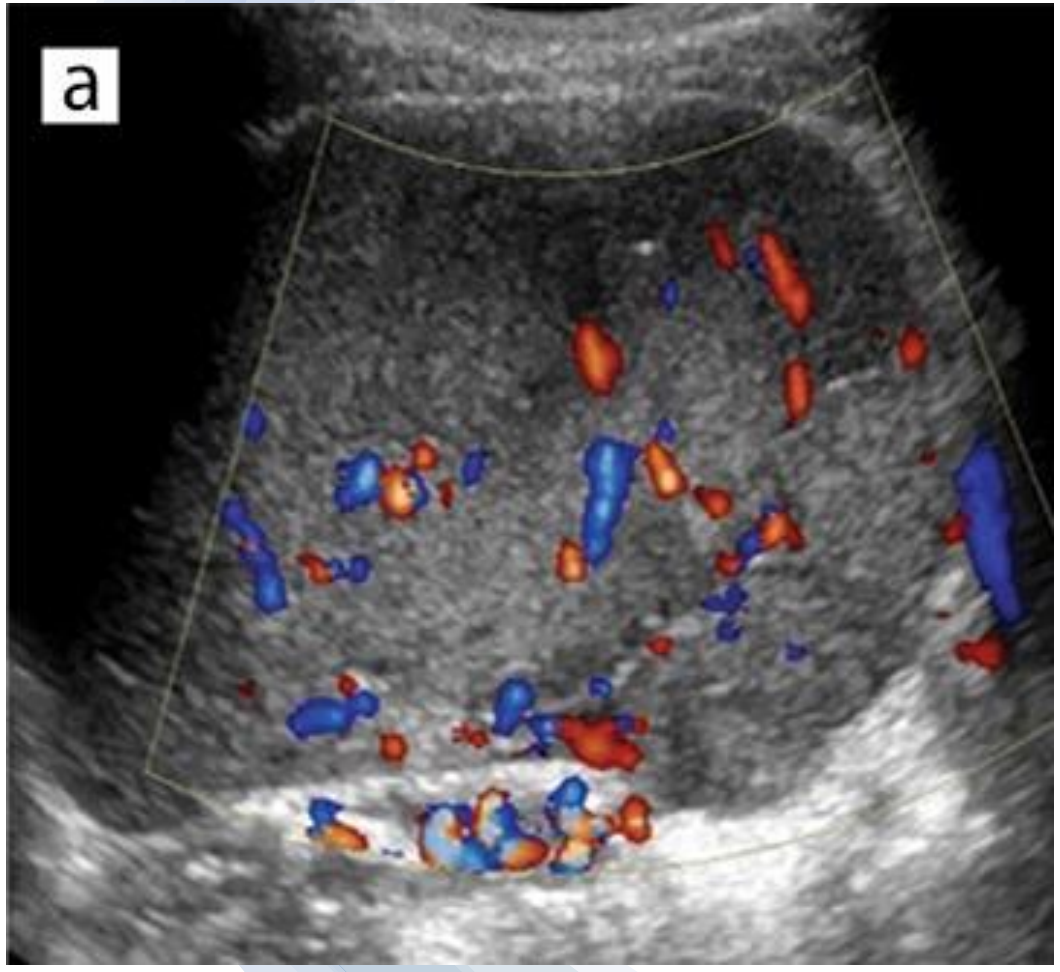
MALIGNANCIES

Epithelial carcinomas and borderline tumors

- Papillary excrescences
- Mural wall nodules
- Thick septations
- Hypervascularity



MALIGNANCIES



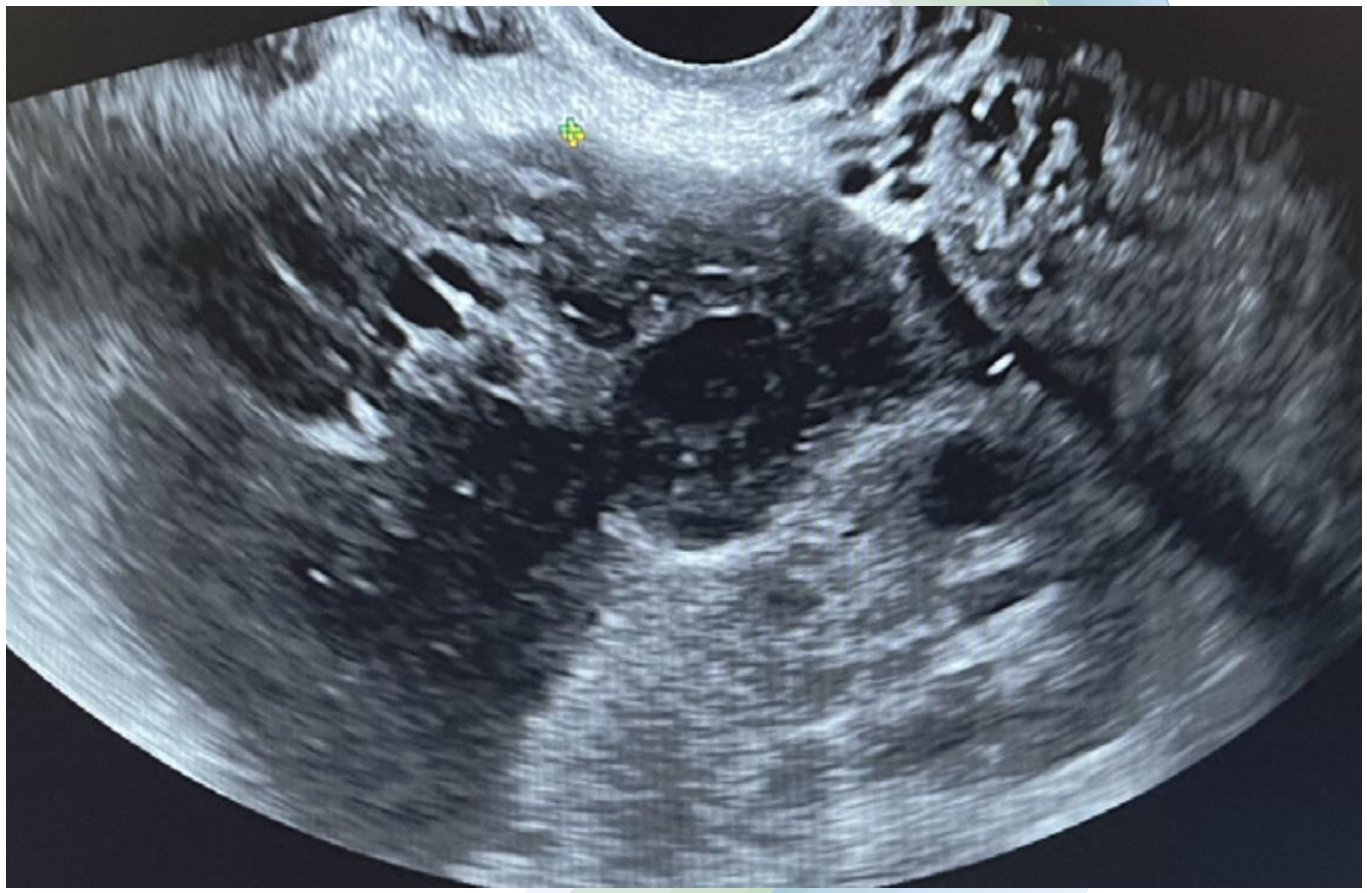
Germ cell tumors

- Most common: dysgerminoma
- Heterogenous
- Hyperechoic
- Vascular septae

MALIGNANCIES

Sex cord stromal tumors

- Most common: granulosa cell tumor
- Highly variable imaging, most often multilocular with solid components



OTHER UNCOMMON LESIONS

- Luteoma
- Fibroma
- Ovarian hyperstimulation syndrome
- Hydrosalpinx
- Tubo-ovarian abscess
- Metastatic nonovarian malignancy
- Heterotopic pregnancy

INTERNATIONAL OVARIAN TUMOR ANALYSIS (IOTA)

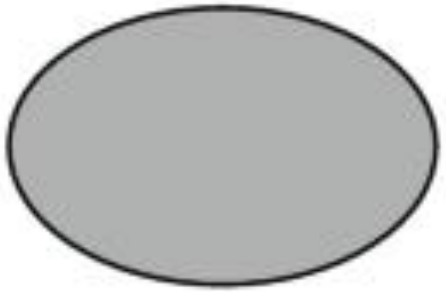
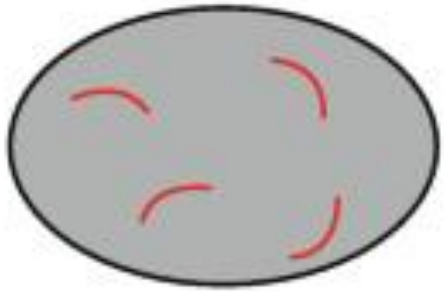
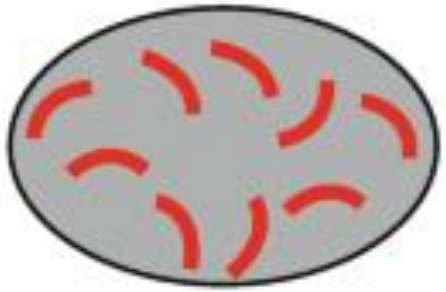
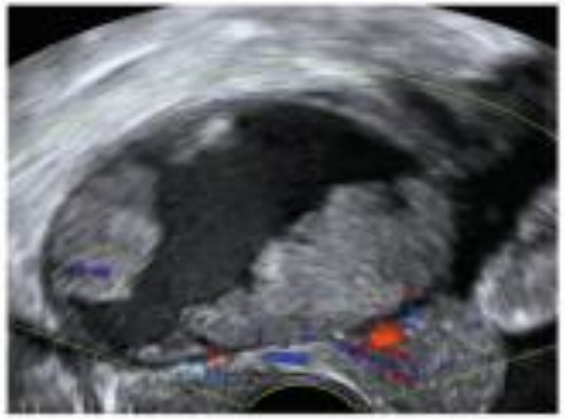
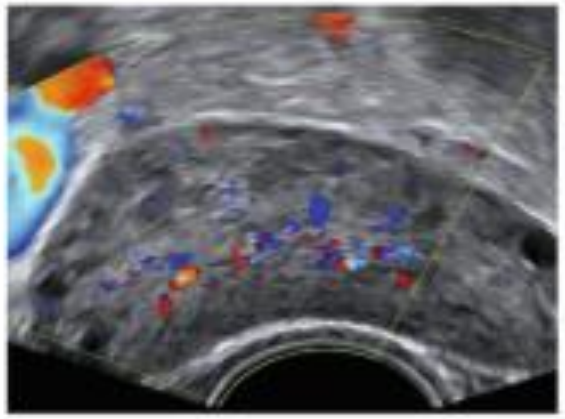
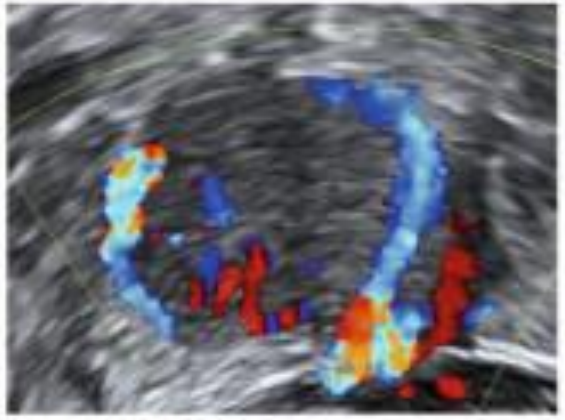
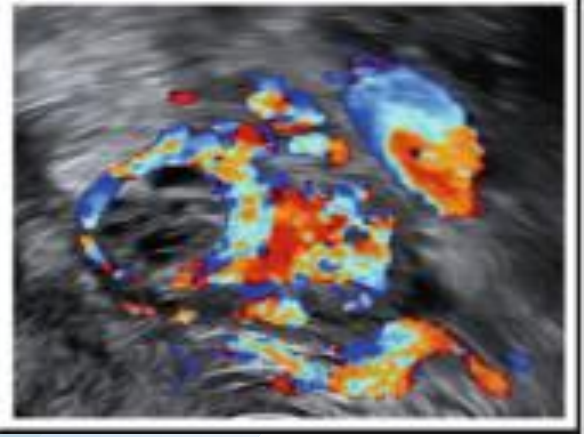
Rules for predicting a malignant tumor (M-rules)			Rules for predicting a benign tumor (B-rules)		
M1	Irregular solid tumor	▫	B1	Unilocular	▫
M2	Presence of ascites	▫	B2	Presence of solid components where the largest	▫
M3	At least four papillary structures	▫		solid component has a largest diameter < 7 mm	
M4	Irregular multilocular solid tumor with largest	▫	B3	Presence of acoustic shadows	▫
	diameter ≥ 100 mm		B4	Smooth multilocular tumor with largest diameter < 100 mm	▫
M5	Very strong blood flow (color score 4)	▫	B5	No blood flow (color score 1)	▫

Only M rules = malignant

Only B rules = benign

Neither or both = inconclusive

IOTA COLOR SCORE

Score 1	Score 2	Score 3	Score 4
			
			

OVARIAN-ADNEXAL REPORTING AND DATA SYSTEM (O-RADS)

O-RADS Group	Ultrasound Descriptors	Risk of Malignancy
O-RADS 0	Incomplete evaluation	Not stated
O-RADS 1	Normal premenopausal ovary	0%
O-RADS 2	Classic hemorrhagic cyst ≥ 5 cm to <10 cm Classic dermoid cyst < 10 cm Classic endometrioma < 10 cm Unilocular smooth cyst ≤ 3 cm Other unilocular smooth cyst ≥ 3 cm to <10 cm	<1%
O-RADS 3	Unilocular smooth ≥ 10 cm Unilocular irregular wall Multilocular smooth CS 1–3 < 10 cm Solid smooth CS 1	1% to <10%
O-RADS 4	Multilocular smooth ≥ 10 cm CS 1–3 Multilocular smooth CS 4 Multilocular irregular Unilocular-solid no papillary projection Unilocular-solid 1–3 papillary projections Multilocular-solid CS 1–2 Solid smooth CS 2–3	10% to <50%
O-RADS 5	Unilocular-solid with ≥ 4 papillary projections Multilocular-solid CS 3–4 Solid smooth CS 4 Solid irregular	50% to 100%

PERFORMANCE OF RISK STRATIFICATION

- Only study in pregnancy:
  - IOTA: excluding inconclusive masses, 88% sensitivity and 94% specificity
- Meta-analysis of 13 studies (not in pregnancy):
  - IOTA: 91% sensitivity and 86% specificity
  - O-RADS: 95% sensitivity and 75% specificity
- IOTA has better interobserver reliability

Any system is better than no system!

OTHER IMAGING

- Non-contrast MRI can be a safe adjunct, particularly with inconclusive, complex or large masses or to evaluate for metastatic disease
- CT exposes fetus to significant radiation but can be useful in emergent settings
- PET is rarely used in pregnancy but can modify staging and thus treatment in cases of confirmed malignancy

TUMOR MARKER ASSESSMENT

Most of these are elevated in pregnancy, affecting interpretation

Ovarian cancer WHO classification [12]	**Marker used [11]**
Epithelial tumors (serous, mucinous, endometrioid, clear cell, transitional cell tumors, epithelial-stromal)	CA125 (epithelial) CEA (mucinous)
Sex cord- stromal tumors (granulosa, Sertoli)	Estradiol Testosterone Anti-Mullerian hormone Inhibin A and B
Germ cell tumors (teratoma, dysgerminomas)	HCG AFP Lactate dehydrogenase Placental alkaline phosphatase (PALP)

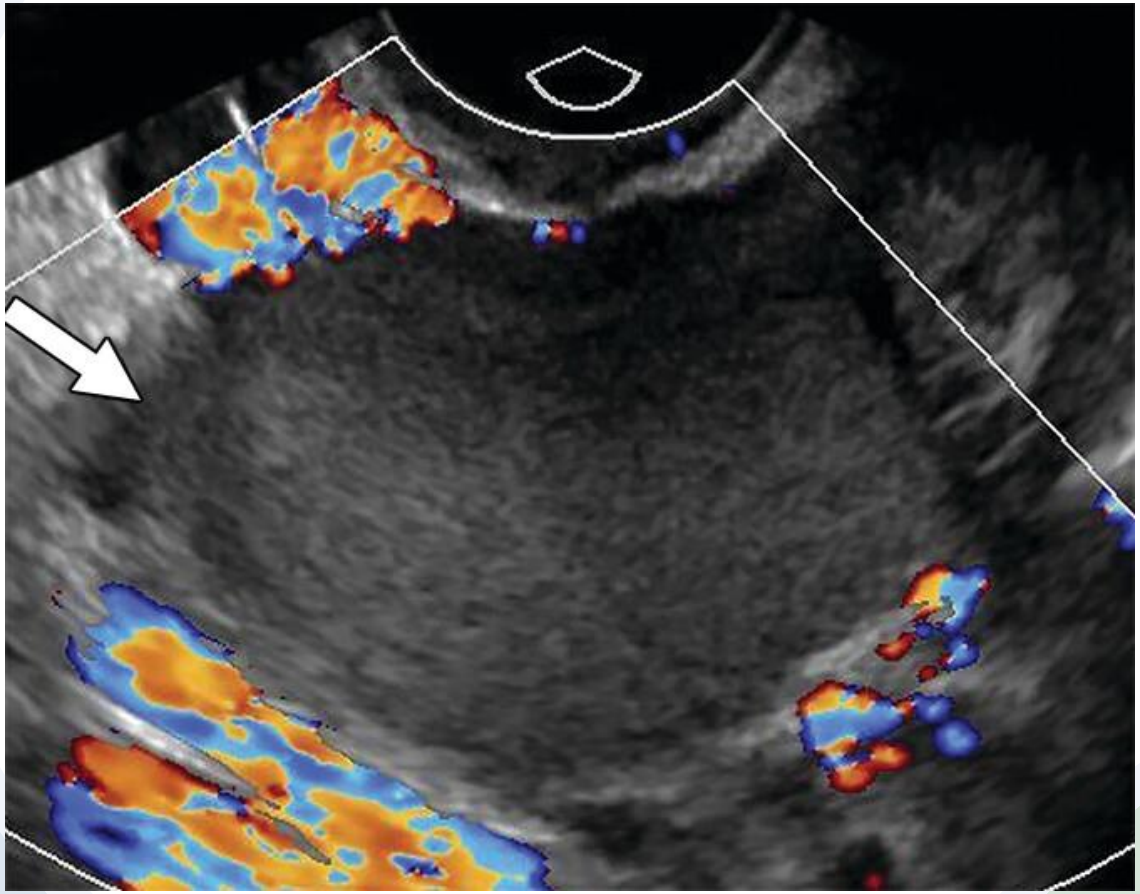
MANAGEMENT CONSIDERATIONS

- Risks: torsion, hemorrhage, labor dystocia, malignancy progression
- Approximately 60% spontaneously resolve by postpartum period; more likely if small and simple

- Low risk for malignancy -> serially image
- Intermediate/high risk for malignancy -> referral to gynecologic oncology
- If Cesarean performed -> evaluate and remove if >5cm*

RETURNING TO OUR CASE

Left adnexa



3.8x3.2x4.0cm

Describe your findings. How would you counsel her?

RETURNING TO OUR CASE

- <5cm
- Unilocular
- Homogenous low level echoes
- Absent internal vascularity

RETURNING TO OUR CASE

Endometrioma!

RETURNING TO OUR CASE

Endometrioma!

Benign by IOTA or O-RADS 2 with <1% risk of malignancy

RETURNING TO OUR CASE

Endometrioma!

Benign by IOTA or O-RADS 2 with <1% risk of malignancy

More than 50% likely to resolve during pregnancy

RETURNING TO OUR CASE

Endometrioma!

Benign by IOTA or O-RADS 2 with <1% risk of malignancy

More than 50% likely to resolve during pregnancy

Repeat ultrasound in third trimester; refer to gynecology postpartum if persistent

IN CONCLUSION

- Assess adnexae, including with Doppler if mass is identified, during routine obstetric ultrasound
- Most adnexal masses during pregnancy are benign and will resolve spontaneously; 2% are malignant; masses also carry risk of torsion or rupture
- Use standardized language to characterize masses
- Apply risk stratification tools to determine next steps, such as serial imaging or referral to gynecologic oncology

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THANK YOU FOR YOUR ATTENTION

QUESTIONS?