Ectopic Pregnancy
The Role of Ultrasonography

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Our 1st Patient: C.M.

- **CC:** Vaginal spotting & cramping x 2 wks
- **HPI:** 34 yo G3P1 at 6 wks 2 d GA by LMP with intermittent LLQ cramping and occasional vaginal spotting for two weeks, with increased pain last night.
  - Denies dizziness, lightheadedness, F/C.
- **PE:** T 98.4 HR 95 BP 122/65 RR 16
  - Abd: Well-healed LTCS scar. Mild tenderness on deep palpation of LLQ, otherwise nontender. No masses palpated.
- **Labs:** hCG 3539, Hct 35.4

Differential Diagnosis

- Non-Gynecologic Causes:
  - Appendicitis
  - Crohn's disease
  - Urinary calculi
- Gynecologic Causes:
  - Ectopic pregnancy
  - PID
  - Ovarian torsion
  - Ruptured corpus luteum cyst
  - Aborting IUP
  - Molar pregnancy
  - Normal IUP

Classic Triad of Symptoms in Ectopic Pregnancy

Abdominal Pain

Vaginal Bleeding

Adnexal Mass

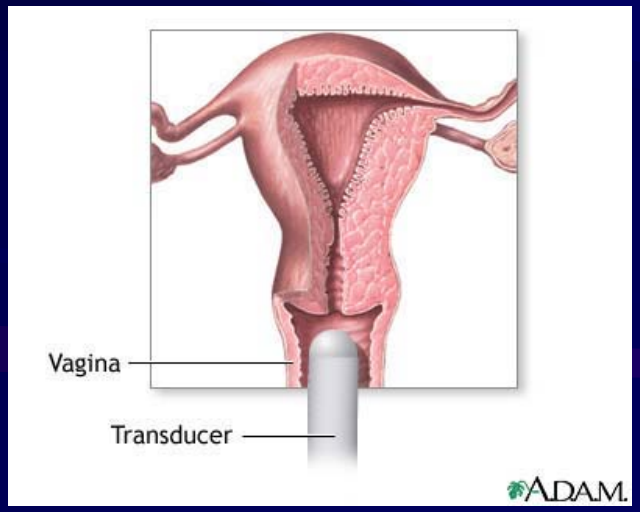
- Only present in 45% of patients with ectopic pregnancy
  - Clinical presentation is not specific
- Most common GA at diagnosis is 6-10 weeks
- ***Consider ectopic pregnancy in any female of child-bearing age who presents with abdominal pain***

Risk Factors for Ectopic Pregnancy

- Previous ectopic pregnancy
- History of tubal surgery
- History of pelvic or abdominal surgery
- History of STDs or PID
- Intrauterine contraceptive devices (IUCDs)
- In vitro fertilization and other assisted reproduction

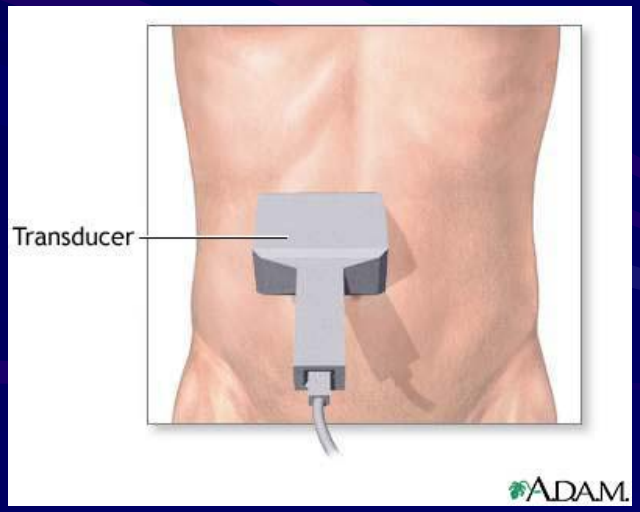
Imaging Test of Choice: **Transvaginal Ultrasound**

Transvaginal Ultrasound (TVS)



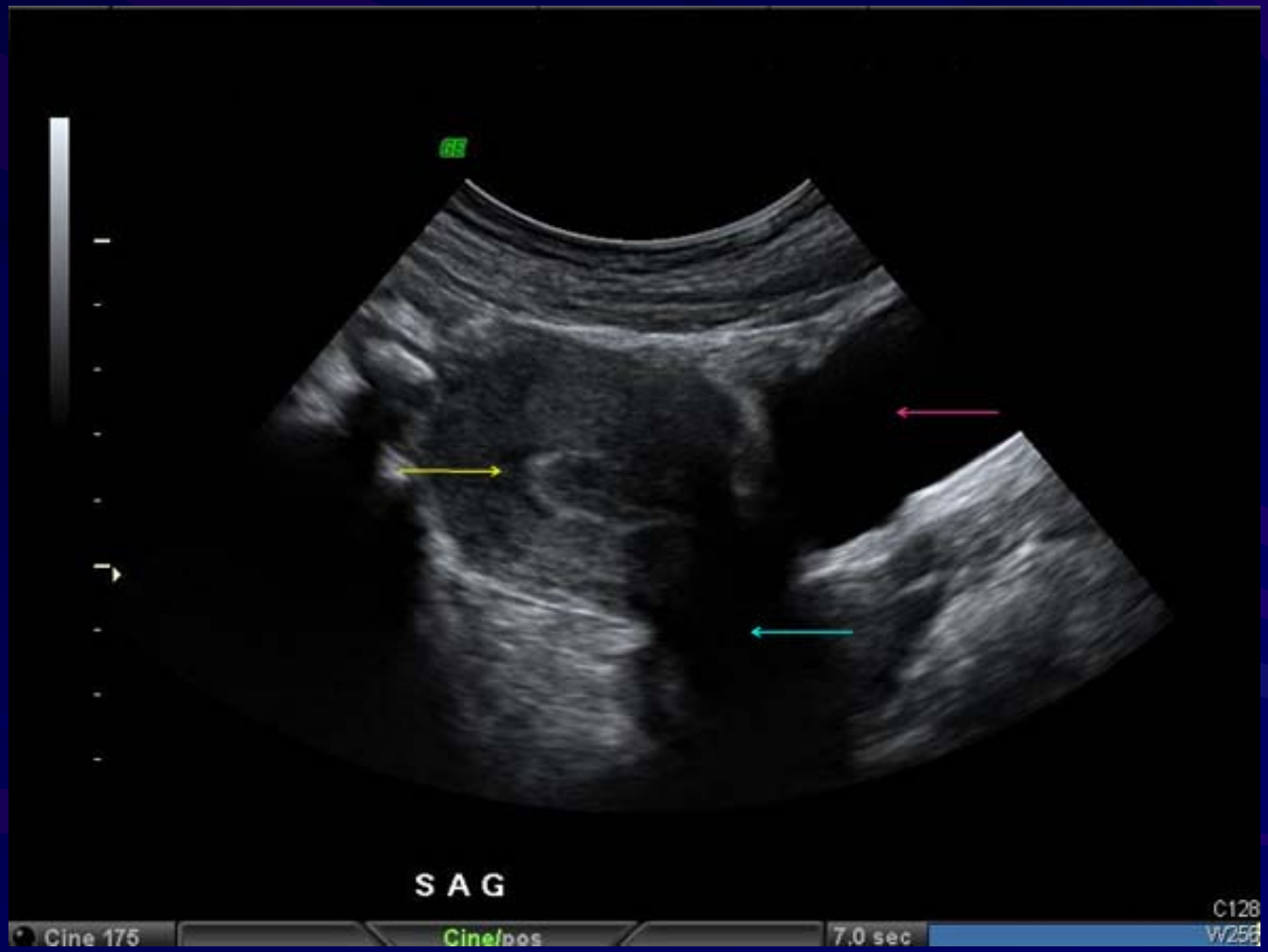
http://www.nlm.nih.gov/medlineplus/ency/imagepages/9987.htm

Transabdominal Ultrasound (TAS)



http://www.nlm.nih.gov/medlineplus/ency/imagepages/8607.htm

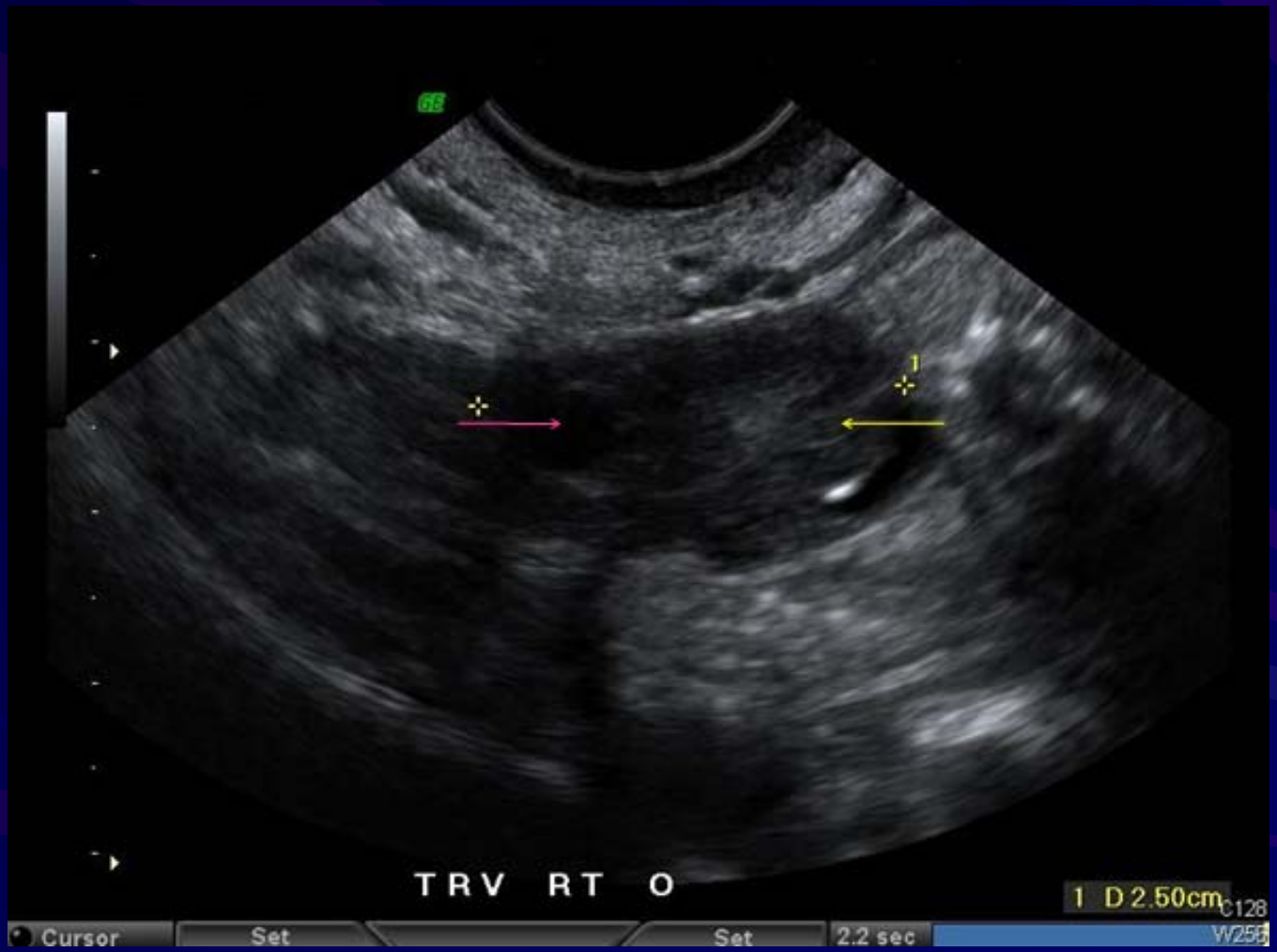
Patient C.M.: Uterine US



- Uterus, with prominent endometrial reaction
- Bladder
- Cervix

Transabdominal Ultrasound (PACS, BIDMC)

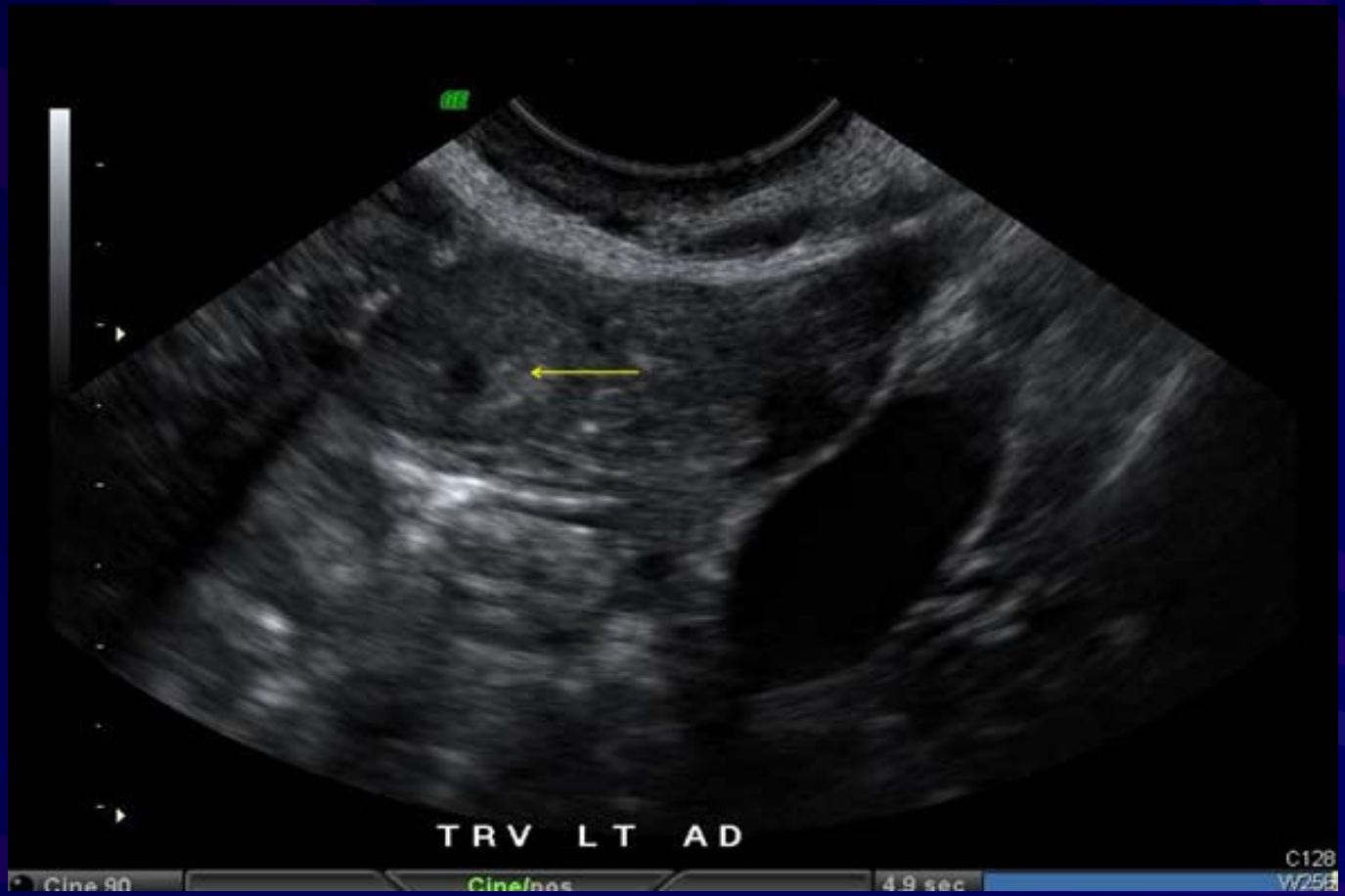
Patient C.M.: Normal R Ovary on US



- Right ovary
- Corpus luteum cyst

Transabdominal Ultrasound (PACS, BIDMC)

Patient C.M.: L Adnexal Ectopic on US

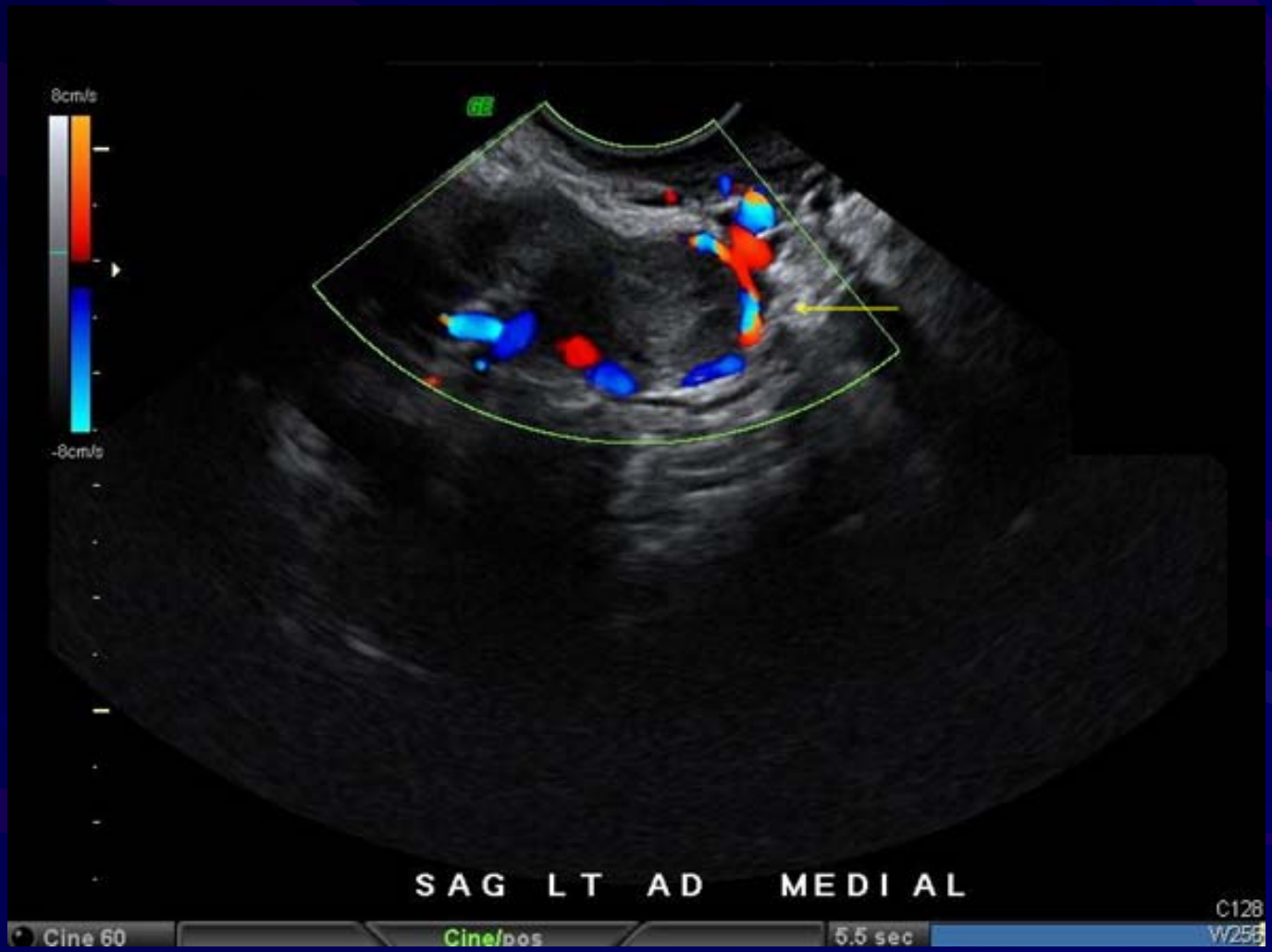


- Ectopic pregnancy

Transabdominal Ultrasound (PACS, BIDMC)

L adnexal mass measuring 2.2 x 1.4 x 2.3 cm

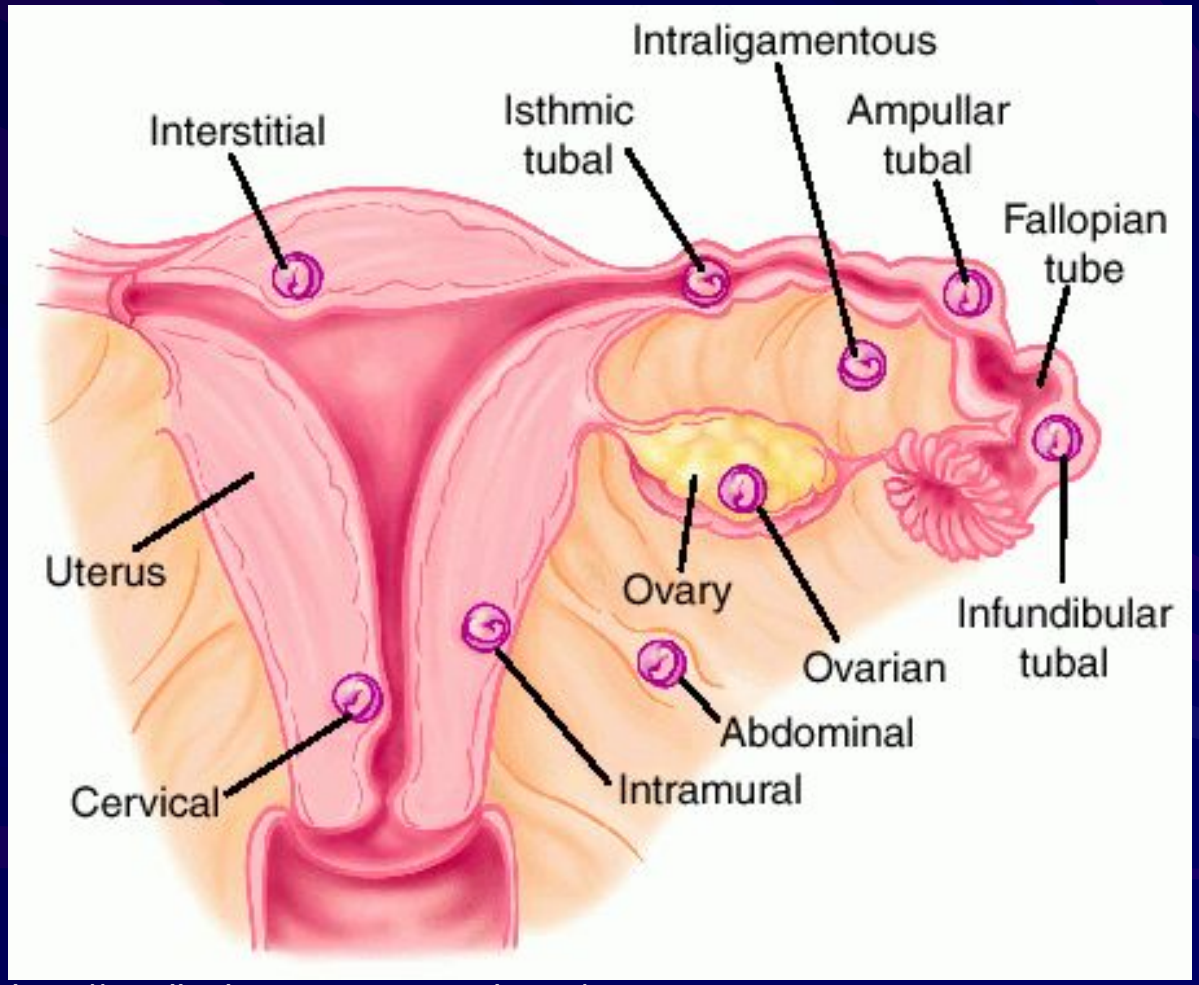
Patient C.M.: “Ring of Fire” on US



- “Ring of Fire” on Doppler US due to high velocity, low impedence blood flow surrounding gestational sac

Transabdominal Doppler Ultrasound (PACS, BIDMC)

Common Locations of Ectopic Pregnancy



http://medicalsymptomssearch.net/

Interpretation of β-hCG

- Plays a role in non-specific US findings:
  - If >1500-2000 mIU/mL, normal intrauterine gestational sac should be visualized via TVS
- Serial hCG levels:
  - In normal IUP, hCG levels should double in approximately 48 hrs
  - In ectopic pregnancy, hCG levels rise at less rapid rate
  - In dead or dying gestation, hCG levels fall

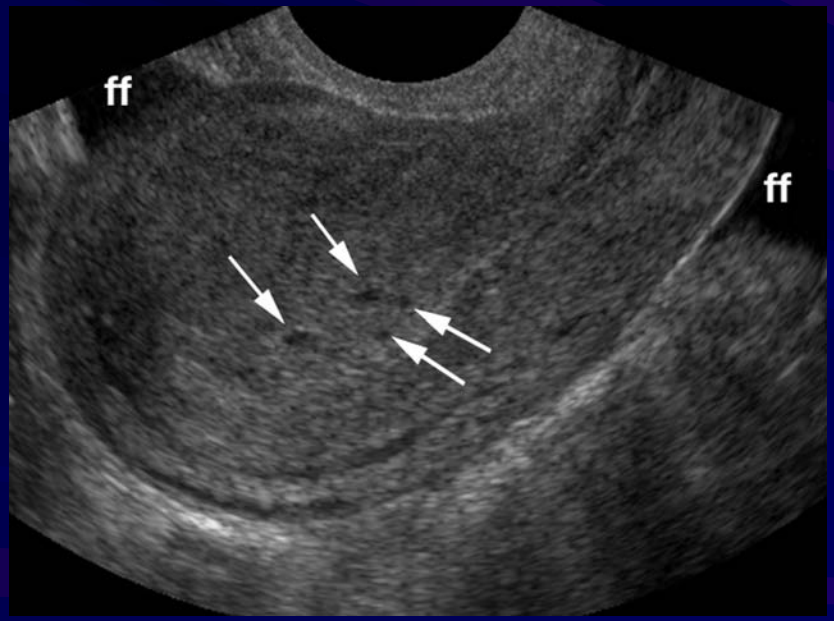
Management of Ectopic Pregnancy

- Ultrasound findings crucial in triaging patients to surgery, medical treatment, or expectant management
  - Size of ectopic pregnancy, presence of cardiac activity, and presence of free fluid
- **Patient C.M.:** Methotrexate 80 mg IM x1 dose with f/u of hCG on days 4 & 7
- Let's view some classic findings found in ectopic pregnancy.

Companion Patients #2 & #3:
Decidual Cyst vs. Intradecidual Sign on US

Decidual Cysts

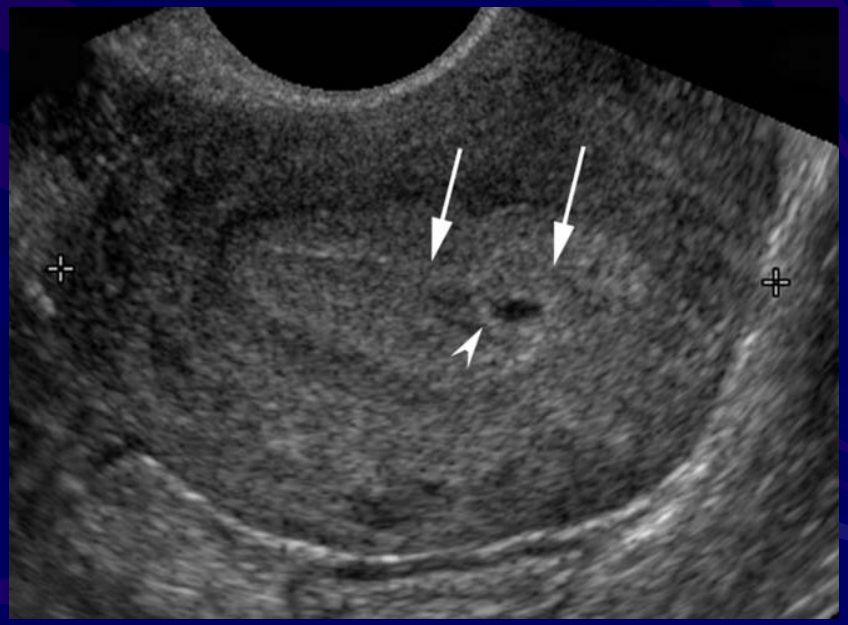
Often found in ectopic pregnancy, normal IUP, or even in non-pregnant patients; often multiple.



Levine, D. Radiology 2007;245:385-397 (Figure 5)

Intradecidual Sign in Normal Early Pregnancy

Hyperechoic ring around hypoechoic center; must be differentiated from decidual cysts.

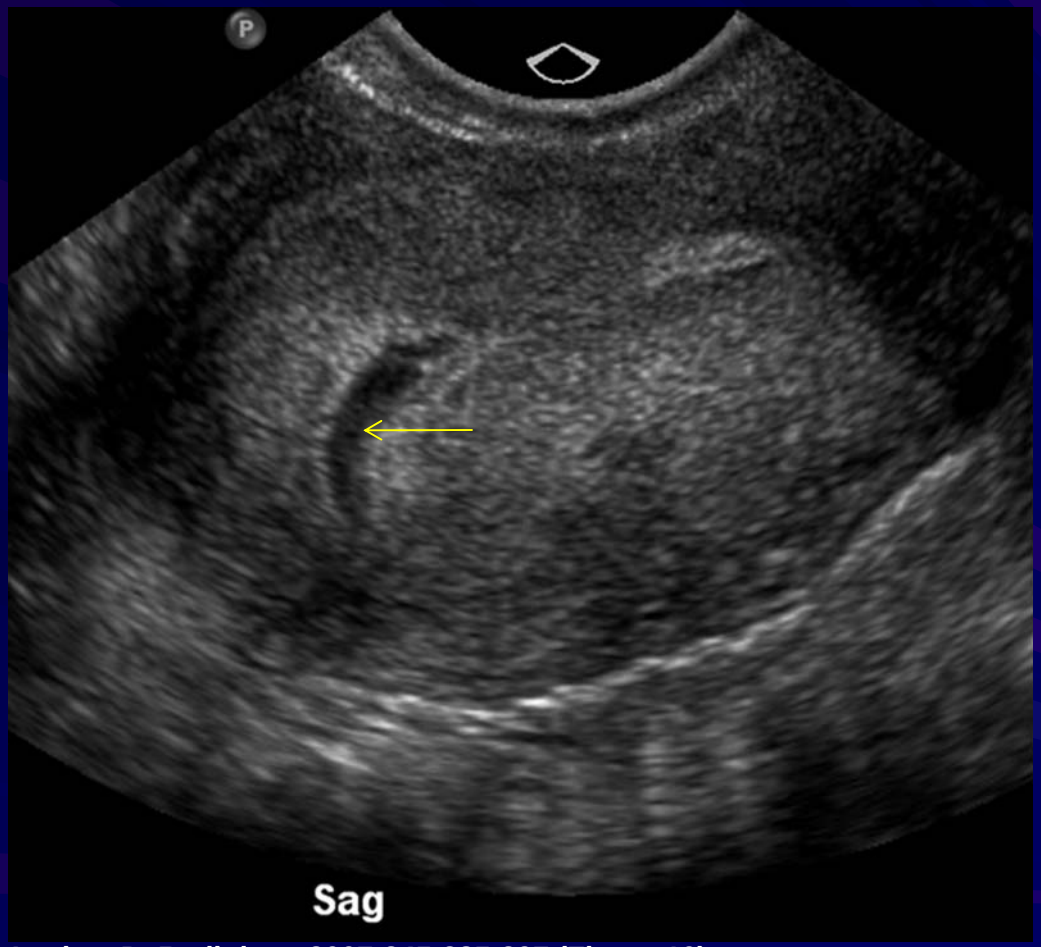


Levine, D. Radiology 2007;245:385-397 (Figure 6)

Radiology

Companion Patient #4:

Pseudo-gestational Sac



Levine, D. Radiology 2007;245:385-397 (Figure 10)

Radiology

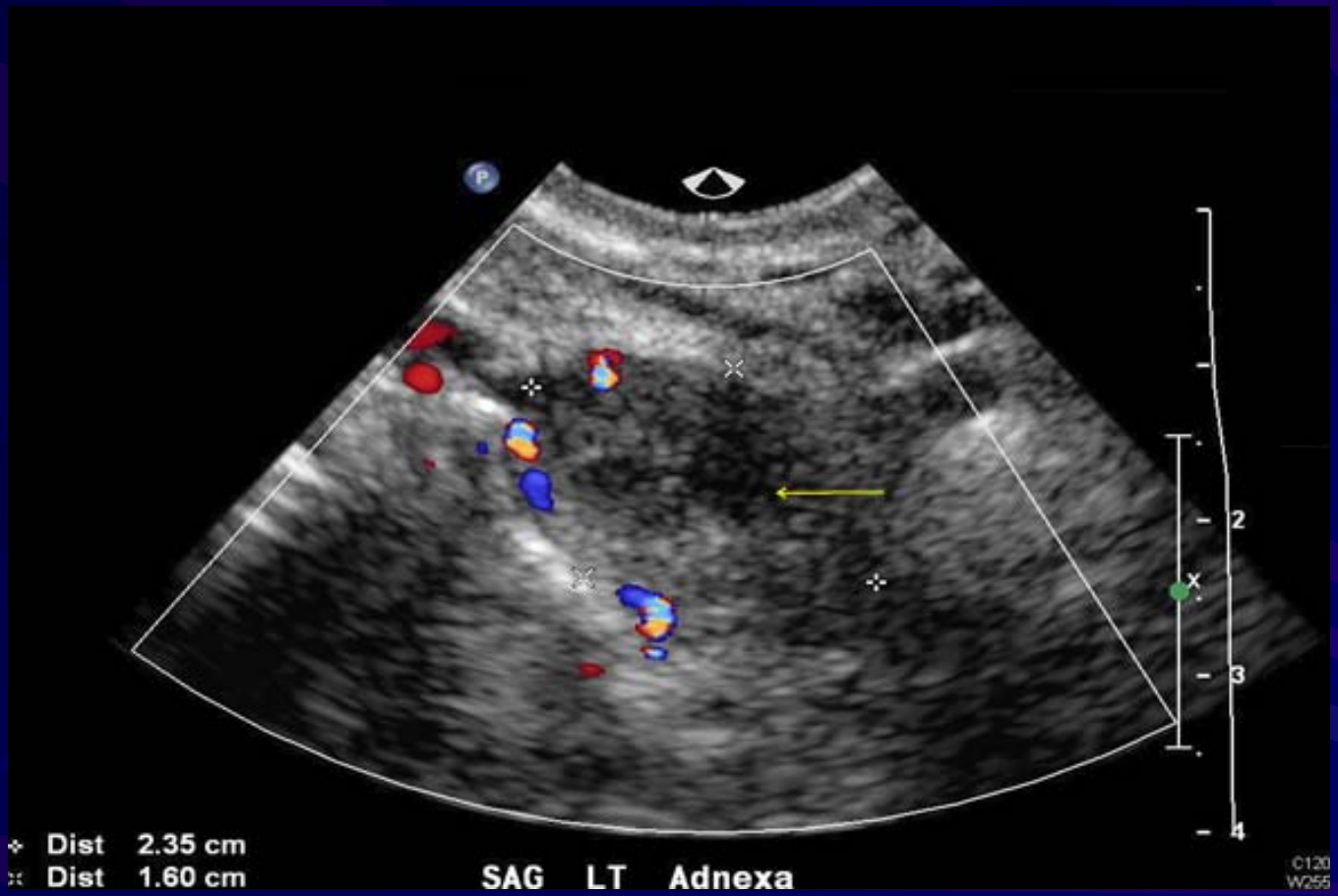
Patient C.M.: Follow-Up on Day 4

- **HPI:** More persistent LLQ pain than before. Heavier vaginal bleeding.
- **PE:** T 99.6 HR 83 BP 109/63 RR 18
  - Abd: Non-tender to deep palpation in all 4 quadrants. No guarding or rebound tenderness. No masses palpated.
- **Labs:** hCG 5846, Hct 37.7
- **Plan:** Will f/u on day 7 for serial hCG

Patient C.M.: Follow-Up on Day 7

- **HPI & PE:** No remarkable changes since day 7.
- **Labs:** hCG 6174
  - Desire 15% decrease in hCG value between days 4 and 7
- **Plan:** Transvaginal ultrasound obtained in context of rising hCG.
  - Given 2nd dose of methotrexate
  - Advised regarding signs and symptoms of rupture

Patient C.M.: F/U US on Day 7



- Ectopic Pregnancy

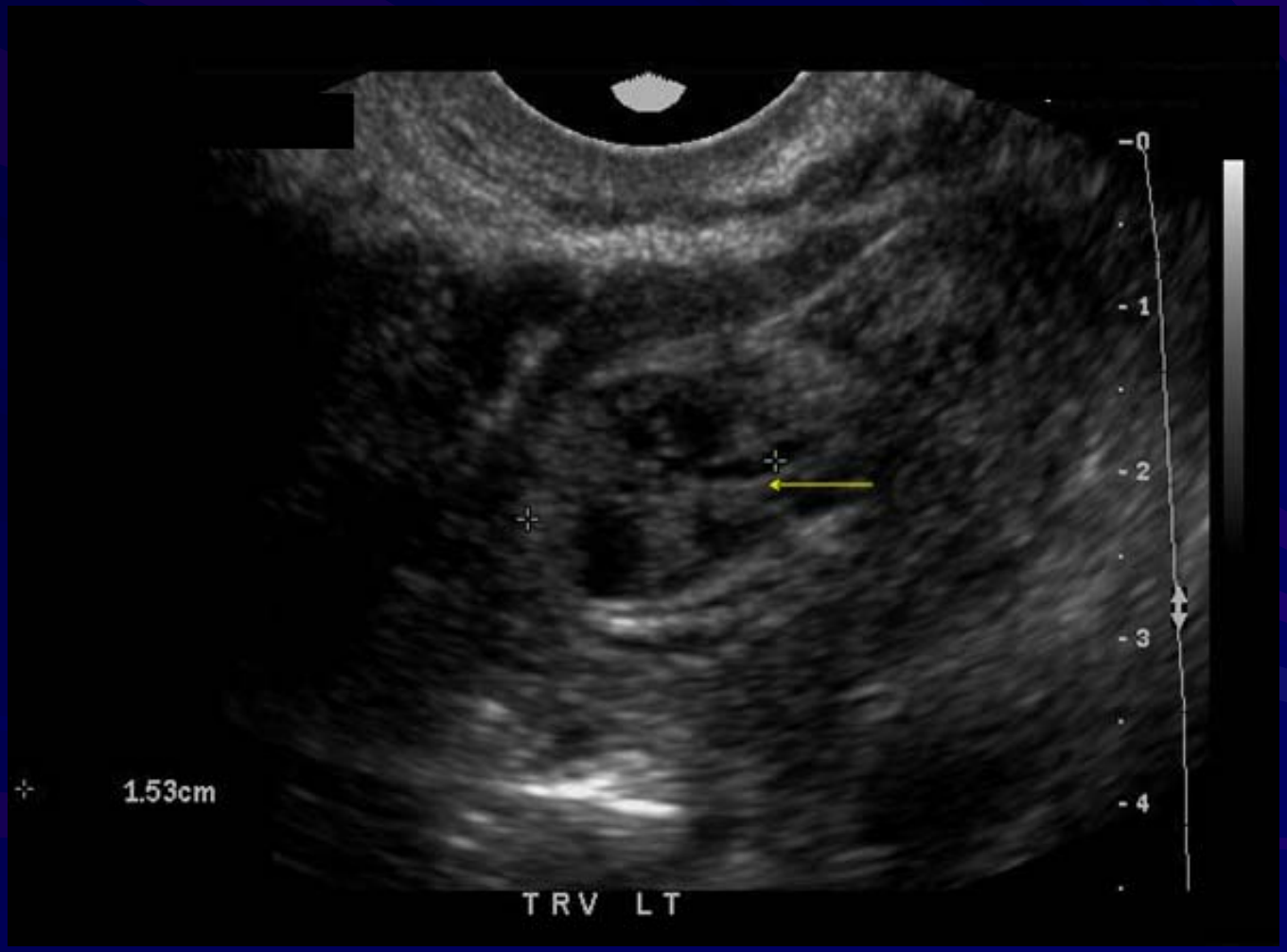
Transabdominal Ultrasound (PACS, BIDMC)

L adnexal mass measuring 2.4 x 1.6 x 1.9 cm

Patient C.M.: Course

- **CC:** Severe abdominal pain
- **HPI:** C.M. presents to ED with severe 10/10 pain in LLQ. Dizzy, nauseated, feeling “like a truck hit [her]”.
- **PE:** T 99.0 HR 72 BP 112/68 RR 18
  - Abd: Tender to palpation in L & RLQ. Cried out when stretcher knocked.
- **Labs:** Hct 35 @ 17.30 and 21.30

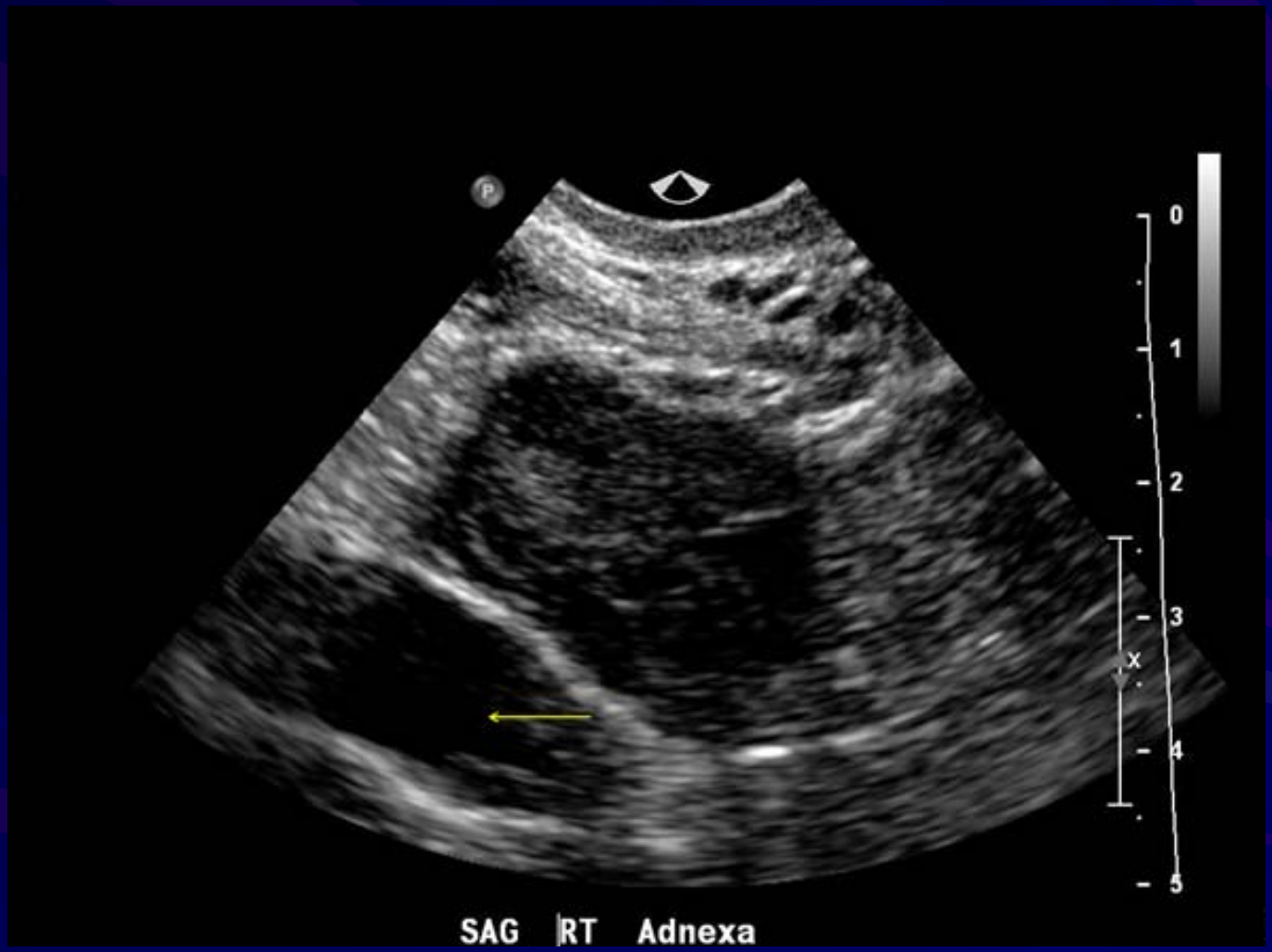
Patient C.M.:
Ruptured Ectopic on Ultrasound



- Left adnexal mass, indicative of ruptured ectopic pregnancy

Transabdominal Ultrasound (PACS, BIDMC)

Patient C.M.: Free Fluid on US



- Free intraperitoneal fluid with heterogenous echogenicity, suggestive of presence of blood and debris

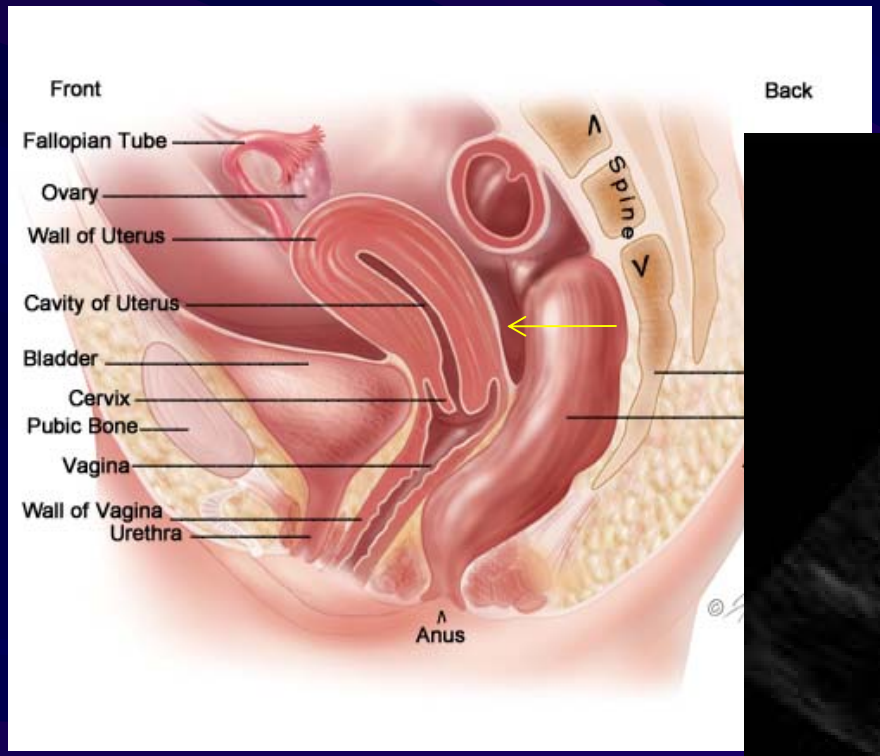
Transabdominal Ultrasound (PACS, BIDMC)

Ruptured Ectopic Pregnancy

- #1 cause of mortality during first trimester
- Risk of tubal destruction, hemorrhage, and subsequent hemodynamic instability
- Assess for fluid in Pouch of Douglas
  - If fluid is present, assess for fluid in Morison's pouch to detect degree of hemoperitoneum

Companion Patient #5: Free Fluid Collection

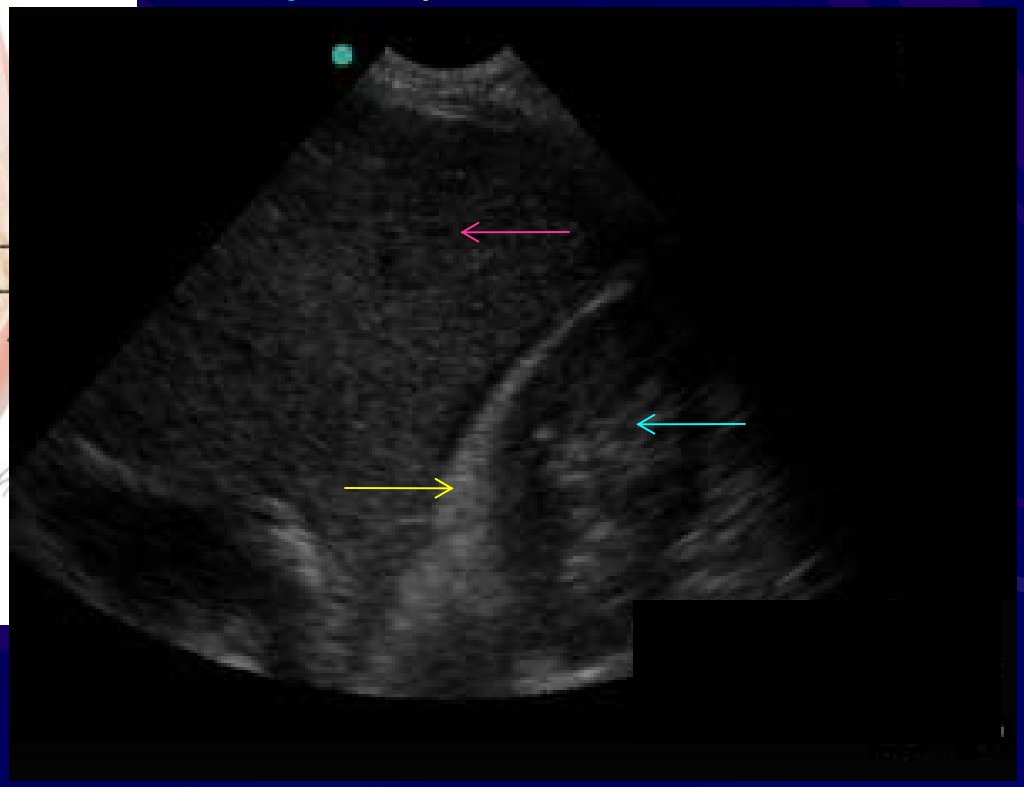
Pouch of Douglas



http://www.massgeneral.org/cancer/crr/types/gyn/illustrations/pelvis_female.asp

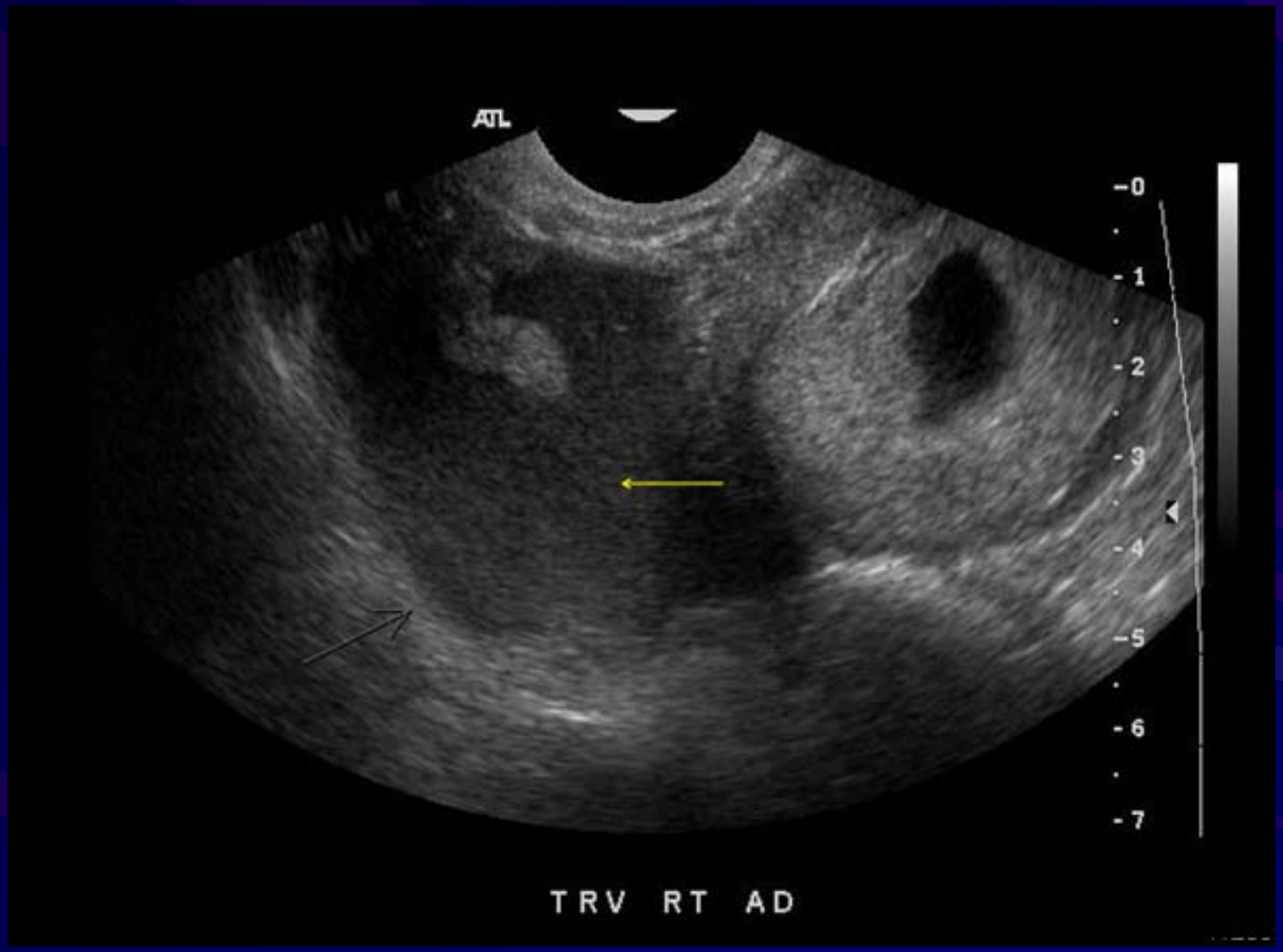
Morison's Pouch:

Space between Gerota's fascia of kidney & capsule of liver



http://www.slredultrasound.com/ImageBank/Abdomen.html

Companion Patient #6: Hemoperitoneum



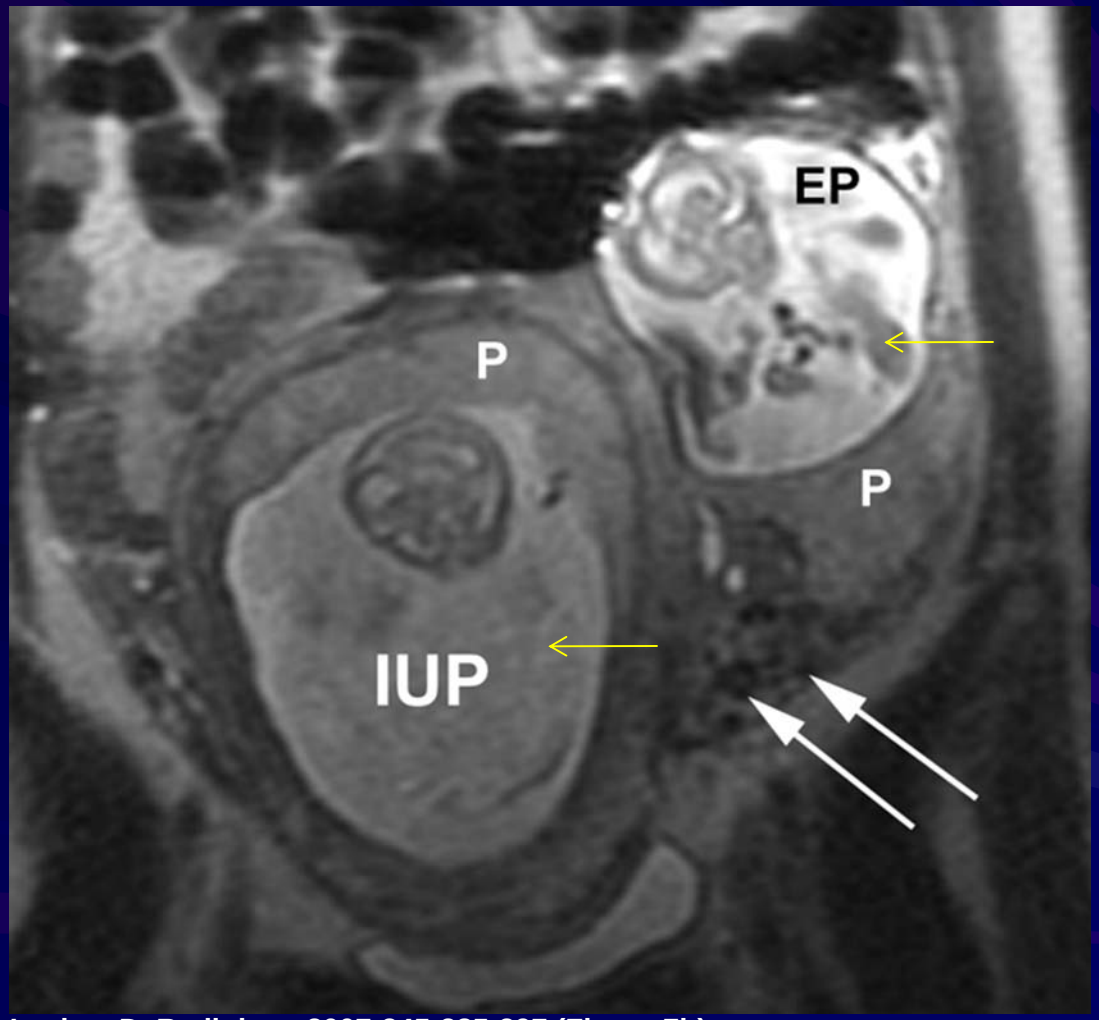
- Pronounced free fluid in peritoneum in patient presenting with symptoms of ruptured ectopic pregnancy

Transabdominal Ultrasound (PACS, BIDMC)

Special Consideration:
In Vitro Fertilization & Assisted Reproduction

- Heterotopic pregnancies more common
  - Risk for heterotopic is 1-3%
  - Assess adnexa carefully in these patients, even if IUP is detected
- Due to pre-existing tubal damage in IVF and use of superovulation and multiple embryo transfer

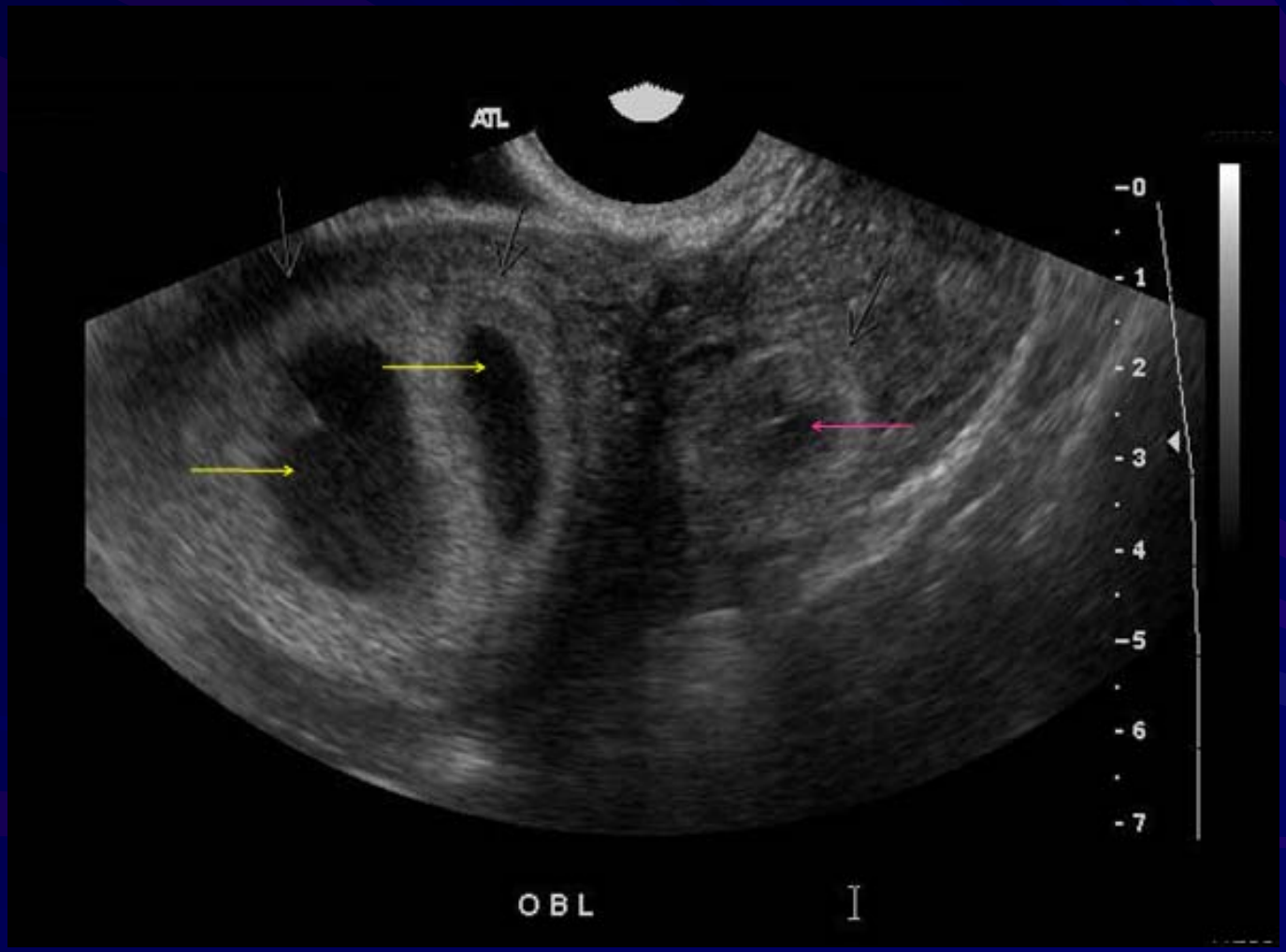
Companion Patient #7:
Heterotopic Pregnancy on Coronal MRI



Levine, D. Radiology 2007;245:385-397 (Figure 7b)

Radiology

Companion Patient #8:
Heterotopic Pregnancy on US



- Intrauterine gestational sacs
- Extrauterine gestational sac

Transabdominal Ultrasound (PACS, BIDMC)

Take-Home Points

- Ectopic pregnancy should be considered in any female of child-bearing age presenting with abdominal pain
- Incidence increasing, but morbidity and mortality decreasing
- Non-operative management more widely used
- Transvaginal ultrasound considered gold standard for diagnosis and triage of patients for management

References

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Acknowledgements

- James Kang, MD
- Deborah Levine, MD
- Catherine Wells, MD
- Aarti Sekhar, MD
- Maria Levantakis