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Ovarian Torsion

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Agenda

- Case Presentation
- Anatomy of the female pelvis
- Differential Diagnosis
- Ultrasound Evaluation of an Ovary
- The use of Color Doppler Flow in the diagnosis of ovarian torsion
- The use of CT in the diagnosis of ovarian torsion

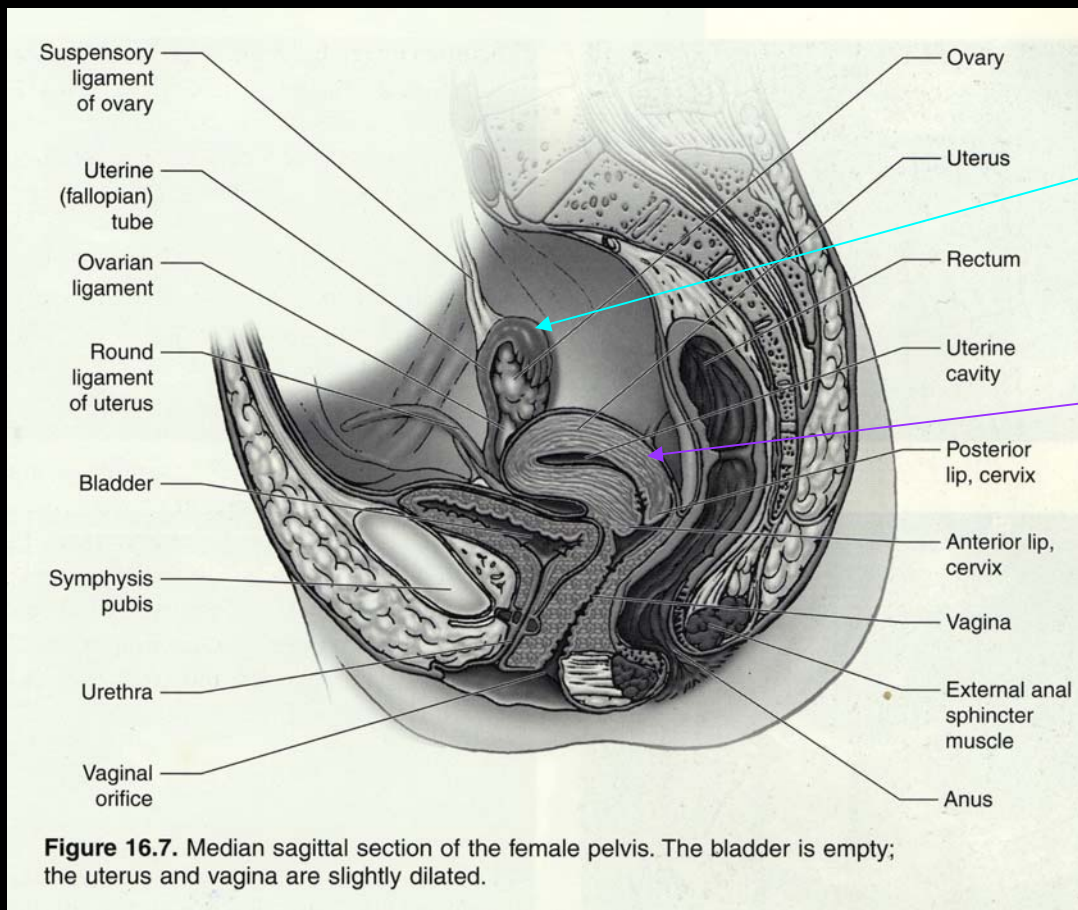


Patient Presentation

- The Ms. T is a 24 yo G2P2 presenting with an acute onset of severe intermittent right-sided lower quadrant pain, accompanied by nausea and vomiting



Anatomy of the Female Pelvis



Ovary

Uterus

Novelline RA. Squire's Fundamentals Of Radiology. 6th Edition. Harvard University Press. Feb. 2004. Pg 415



A Surgeon's Differential for Right Lower Quadrant Pain in a Female

- Appendicitis
- Diverticulitis
- Inflammatory Bowel Disease
- Urinary Tract Stone
- Cystitis
- Pelvic Infection



A Gynecologist's Differential of RLQ Pain

- Pregnancy complications (ie Ectopic)
- Ovarian neoplasm
- Ovarian torsion
- Ovarian vein thrombosis
- Ruptured Ovarian Cyst
- Intracapsular or extracapsular ovarian hemorrhage

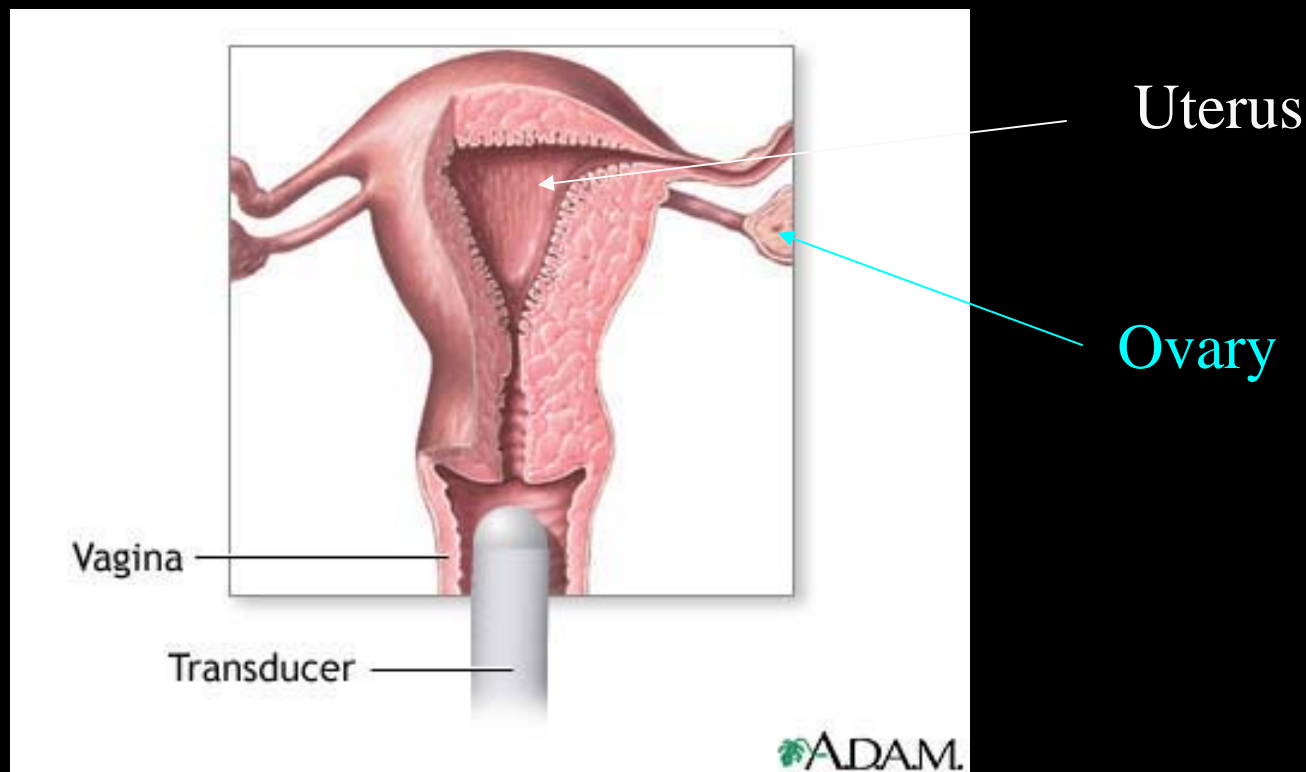


What is the Preferred Imaging Test?

- Abdominal Ultrasound
- Transvaginal Ultrasound
 - Noninvasive method
 - Full bladder is not necessary
 - Gain considerable detail
 - Total ovary size
 - Number of developing follicles



Transvaginal Ultrasound



Medline Plus, Medical Encyclopedia

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



Evaluate this Ovary: 47 yo RLQ pain



•2.74 X 1.84 X 2.6 cm
(6.7 ml) Normal Ovary

Courtesy of Deborah Levine, MD



Appearance of the Ovary on Ultrasound

- Depends on age and stage of the menstrual cycle
- Pubertal ovary may have numerous large cysts
- Postmenopausal women have smaller ovaries with absence of follicular structure



Evaluate this Ovary: 26 yo with RLQ pain

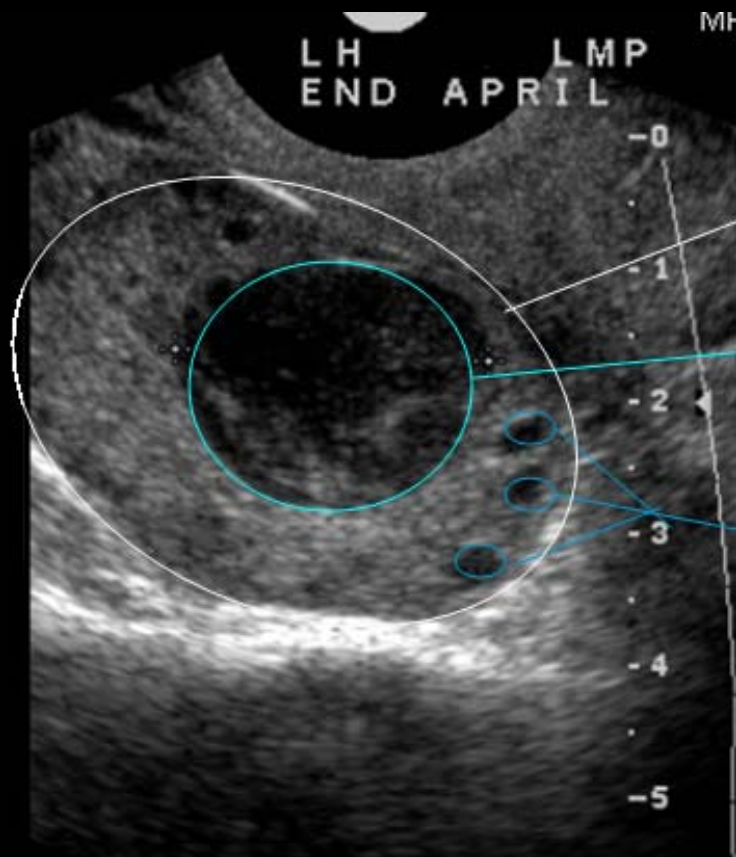


- 2.9 X 2.7 X 2.7 cm (11 ml)
- heterogeneously echogenic cyst with central areas of decreased echogenicity which demonstrates a cobweb appearance

Courtesy of Deborah Levine, MD



Evaluate This Ovary: The Case of Ms. T



• 7.5 x 2.7 x 3.0 cm (31.6ml)
Ovary

• 2.0 X 1.9 X 2.3 cm
Hemorrhagic Cyst

• Peripheral Follicles

Courtesy of Colin McArdle, MD



Why is it Important to Understand the Difference Between these Ovaries?

- The hemorrhagic cyst resolved within six months without intervention
- Ovarian torsion is a surgical emergency



What Findings Aid in the Diagnosis of Ovarian Torsion?

- Enlarged ovary (>15 ml)
- Multiple Peripheral follicles (8-12mm)
- Complex cystic mass
- May mimic the morphology of the underlying lesion
- May see fluid in the cul-de-sac



Are the Cyst and the Torsed Ovary Related?

- Secondary torsion account for 50-81% of cases
- Most common association is a benign cystic ovarian tumor (follicular cysts, corpus luteum and theca lutean cysts, and endometrial cysts)
- Other associations include ovarian hyperstimulation syndrome, malignant neoplasm and benign ovarian neoplasms such as dermoids,
- Primary torsion may result from a hypermobile adnexa

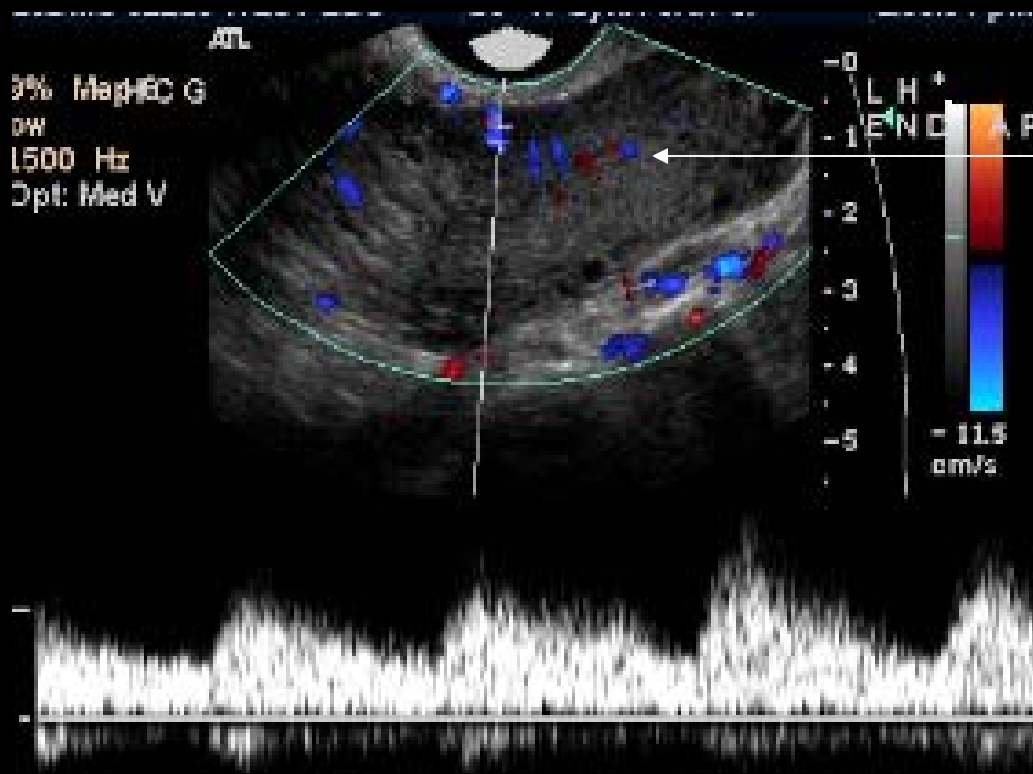


Is Color Doppler Flow Imaging (CDFI) diagnostic?

- A complex cystic mass without torsion may appear similar to one with torsion making torsion difficult to diagnose
- Torsion is due to adnexal rotation with venous, arterial and lymphatic obstruction
- Therefore, it has been suggested that CDFI may help assess venous stasis and aid in the diagnosis of torsion



Doppler Image of Ms. T's Right Ovary



Normal Doppler
Flow

Courtesy of Colin McArdle, MD



Is Color Doppler Flow Imaging (CDFI) diagnostic?

- CDFI aids in the diagnosis of torsion if no flow is detected
- Unfortunately, it is not reliable if flow is detected. In one study flow showed in 9 out of 20 torsed ovaries. Another study showed flow in 6 out of 10 torsed ovaries
- It has however been suggested that flow in an ovary may indicate the ovary may be saved by untwisting of the adnexa



Possible Explanations for Normal Flow in Torsed Ovaries

- Venous thrombosis from torsion may lead to symptoms prior to arterial thrombosis
- Flow may be provided through a dual ovarian blood supply
- Intermittent torsion
- Unlike the testicle, the ovary lacks a confining capsule and may increase in size substantially before intraorgan pressure affects the circulation



Flow on CDFI is not Reliable

- The presence of flow may delay diagnosis
- A delay in diagnosis may increase the risk of infertility, necrosis with peritonitis, and even death



What other imaging modalities could aid in the Diagnosis?

- CT
- MRI



CT Findings in Ovarian Torsion



Large, predominately solid, oval mass with low density center

Gittleman AM, Price AP, Goffner L, Katz DS. Ovarian Torsion: CT Findings in a child. *J Pediatr Surg.* 2004 Aug;39(8):1270-2



CT Findings in Ovarian Torsion



High density periphery with multiple small cysts consistent with follicles

Gittleman AM, Price AP, Goffner L, Katz DS. Ovarian Torsion: CT Findings in a child. *J Pediatr Surg.* 2004 Aug;39(8):1270-2



Three Other Suspicious Findings on CT and MRI

- 1) Lesion protrusion on the affected side where engorged blood vessels converge
- 2) Draping of the lesion by thick and straight blood vessels
- 3) Lesion nonenhancement
- Bonus: the presence of intravascular air within an ovarian tumor is rare but diagnostic



Summary

- Ovarian torsion should be suspected in female patients with lower abdominal pain
- Ultrasound is the primary imaging modality for Ovarian Torsion
- CDFI may aid in the diagnosis of ovarian torsion if flow is absent but is not reliable if flow is present
- CT findings may help diagnose ovarian torsion



References

- Crowley WF. CHAPTER 300 Disorders of the Ovary. *Internal Medicine, Stein –5th Ed.* (1998).
- Emonts M, Doornewaard H, Admiraal JC. Adnexal torsion in very young girls: diagnostic pitfalls. *Eur J Obstet Gynecol Reprod Biol.* 2004 Oct 15;116(2):207-210
- Gittleman AM, Price AP, Goffner L, Katz DS. Ovarian Torsion: CT Findings in a Child. *J Ped Surg* 2004 Aug; 39(8):1270-1272
- Khan A, Muradali D. Imaging Acute Obstetric and Gynecologic Abnormalities. *Seminars in Roentgenology* 2001 Apr; 36(2):165-172
- McGee DM, Connolly SA, Young RH. Case 24-2003: A 10-Year-Old Girl with Recurrent Bouts of Abdominal Pain. *N Eng J Med* 2003; 349(5):486-494
- Medline Plus, **Medical Encyclopedia**
<http://www.nlm.nih.gov/medlineplus/ency/imagepages/9987.htm>
- Pena JE, Uberg D, Cooney N, Denis AL. Usefulness of Doppler sonography in the diagnosis of ovarian torsion. *Fertil Steril* 2000 May; 73(5):1047-1050
- Schiller VL, Grant EG. Doppler Ultrasonography of the Pelvis. *Radiologic Clinics of North America* 1992 Jul; 30(4): 735-742
- States LJ, Bellah RD. Imaging of the Pediatric Female Pelvis. *Seminars in Roentgenology* 1996 Oct; 31(4):312-329
- Wilms AB, Schlund JF, Meyer WR. Endovaginal Doppler ultrasound in ovarian torsion: a case series. *Ultrasound Obstet Gynecol* 1995 Feb; 5(2): 129-132



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