

# Acute Pelvic Pain

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## Scope of the Problem

- Pelvic pain in women account for 10-40% of all gynecologic visits
- Most patients with GYN emergencies complain of pelvic pain w or w/o vaginal bleeding
- The first step in women of reproductive age is establishing pregnancy status

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## Causes of Acute Pelvic Pain

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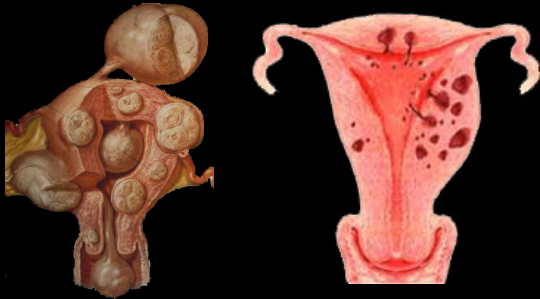
<p><b>Gynecologic</b></p> <ul style="list-style-type: none"> <li>• <b>Uterus</b> <ul style="list-style-type: none"> <li>- Adenomyosis</li> <li>- Leiomyoma</li> <li>- Endometritis</li> </ul> </li> <li>• <b>Adnexa</b> <ul style="list-style-type: none"> <li>- Hemorrhagic cyst, ruptured cyst</li> <li>- Endometriosis</li> <li>- Pelvic inflammatory disease</li> <li>- Ovarian hyperstimulation syndrome</li> <li>- Ovarian torsion</li> </ul> </li> <li>• <b>Pelvic congestion syndrome</b></li> </ul>	<p><b>Non-Gynecologic</b></p> <ul style="list-style-type: none"> <li>• <b>Urologic</b> <ul style="list-style-type: none"> <li>- Lower urinary infection</li> <li>- Ureteral calculi</li> </ul> </li> <li>• <b>Gastrointestinal</b> <ul style="list-style-type: none"> <li>- Acute appendicitis</li> <li>- Acute sigmoid diverticulitis</li> <li>- Crohn's disease</li> <li>- Abdominal wall hernia</li> <li>- Epiploic appendagitis</li> </ul> </li> </ul>
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## Diagnostic Challenge

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## Adenomyosis



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## Adenomyosis – Clinical Presentations

- Most common > 30 y/o multipara
- Menorrhagia - often have clots
- Pelvic pain - unexplained, throughout the cycle
- Dysmenorrhea
- Uterine tenderness - dyspareunia, tender on EV exam
  - Adnexa non-tender in adenomyosis (PID, endometriosis)

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## Adenomyosis – Clinical Presentations

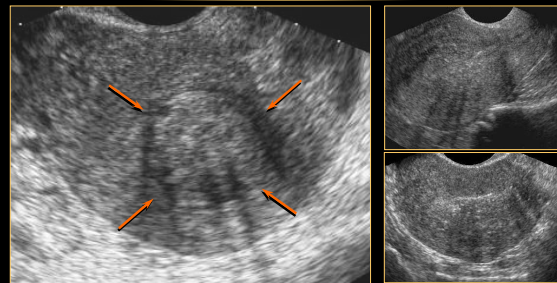
- Most commonly a woman with this condition experience the symptoms like **heavy, prolonged or excessive bleeding during menstruation and periods with severe pain**
- Depending on the severity of disease and its levels of penetration into the uterine walls, the amount of cramps and bleeding varies



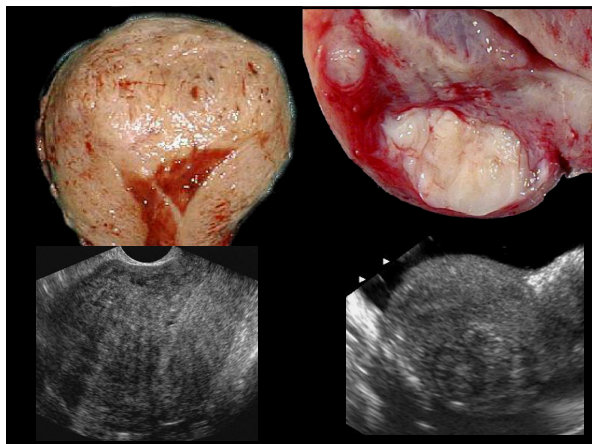
By only conducting the biopsy of the uterine walls, this condition can be diagnosed with certainty.

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## Adenomyosis – US Findings

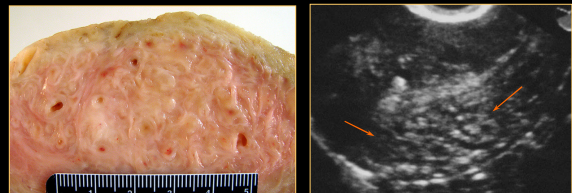


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## Adenomyosis – US Findings

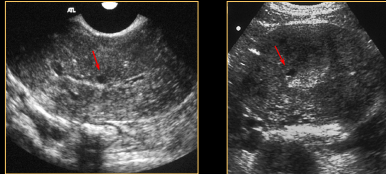
- Cystic areas or abnormal echotexture within the myometrium
  - (a.k.a. “Swiss cheese” appearance)



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## Adenomyosis – US Findings

- Small, anechoic subendometrial cysts
  - Change during cycle
  - Seen best in end secretory stage
  - Most specific US finding



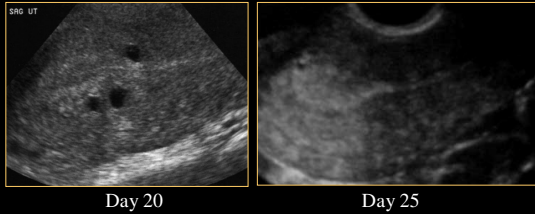
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## A Diagnostic Dilemma

- Age 45
- G<sup>5</sup>P<sup>3</sup>
- Pain & tenderness
- Menorrhagia

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## Myometrial Cyst



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## Pelvic Pain & Cramps Day 1 of Cycle



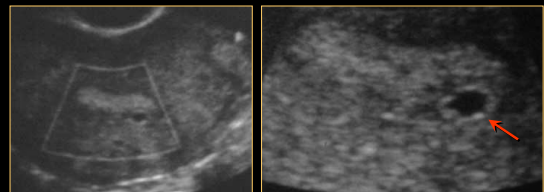
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## Pelvic Pain & Cramps Day 12 of Cycle



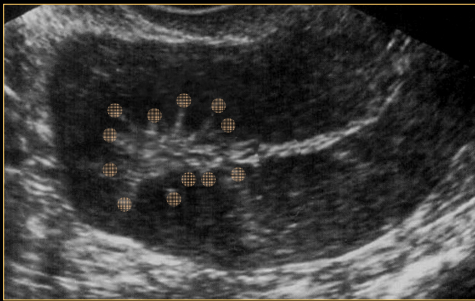
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## Pelvic Pain & Cramps Day 19 of Cycle



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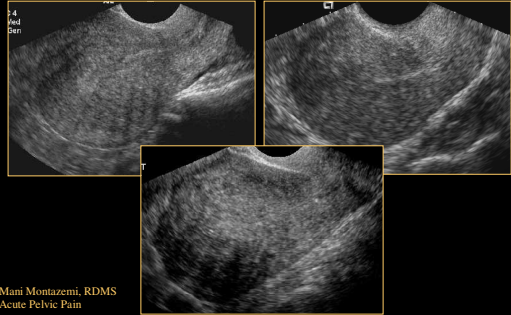
## Adenomyosis – US Findings



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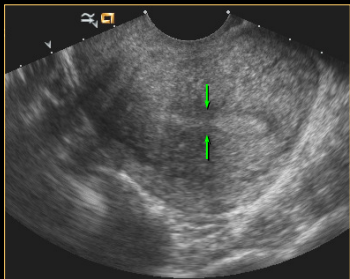
## Adenomyosis – US Findings

"Indistinct endometrial-myometrial border"



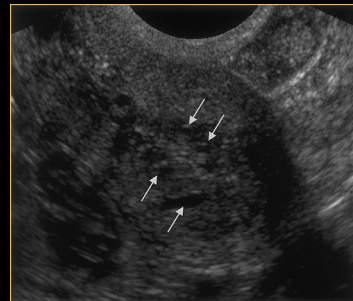
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## Diagnostic Challenge



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Poorly visualized endometrial echo at transvaginal US owing to adenomyosis in a 66-year-old asymptomatic woman who had undergone tamoxifen therapy for 45 months

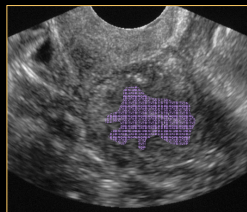


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## Adenomyosis – US Findings

- Heterogeneity and assx widening of subendometrial myometrium / subendometrial halo

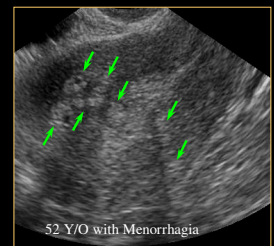
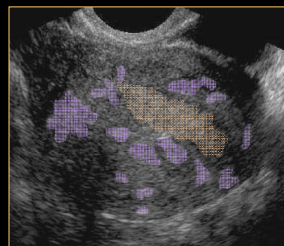
- Hypoechoic
- Poorly marginated



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## Adenomyosis – US Findings

- Echogenic islands of ectopic tissue



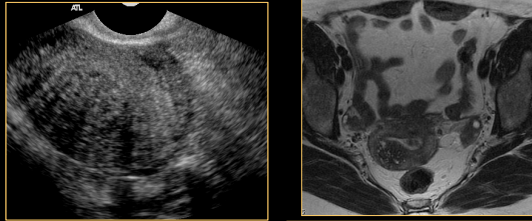
52 Y/O with Menorrhagia

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## Adenomyosis – US Findings

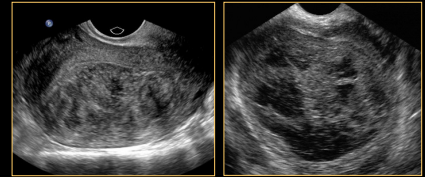
- Striated, linear shadowing w/o definite mass



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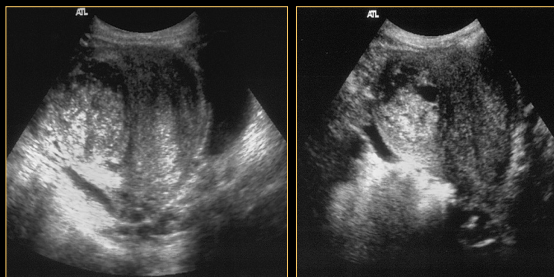
## Uterine Leiomyoma

- As cause of acute pelvic pain:
  - Infarction (usually associated with pregnancy)
    - out grow blood supply (resulting in ischemia)
    - no longer support of blood supply then the vessels involute quickly
  - Torsion



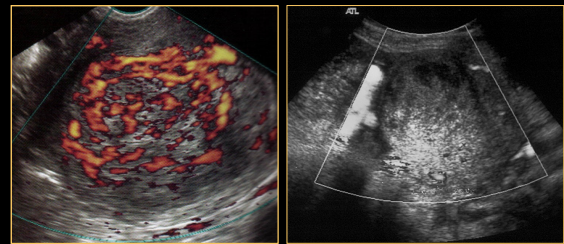
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## RLQ Pain Post Partum



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## RLQ Pain Post Partum



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## Acute Hemorrhagic Infarction of Fibroid



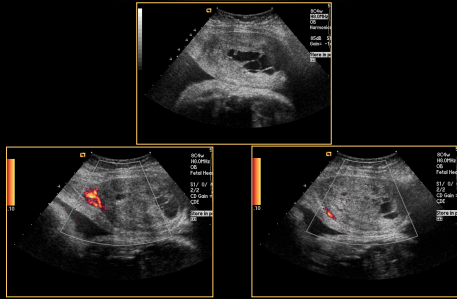
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## Uterine Leiomyoma



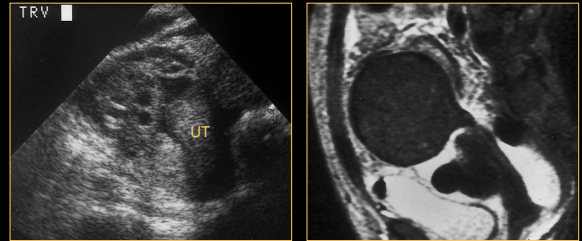
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## Uterine Leiomyoma



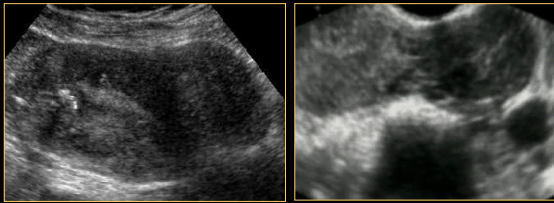
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## Uterine Leiomyoma



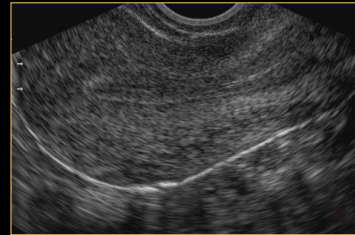
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## Uterine Leiomyoma



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## Myometrium Echogenicity

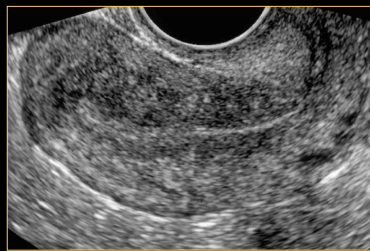


Normal myometrium has a smooth even texture throughout

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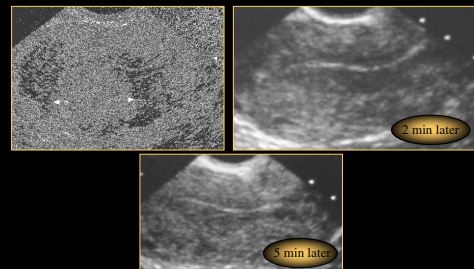
## Inhomogeneous Myometrium

- Transient
- Real



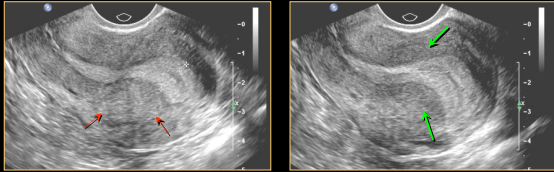
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## Myometrium Echogenicity



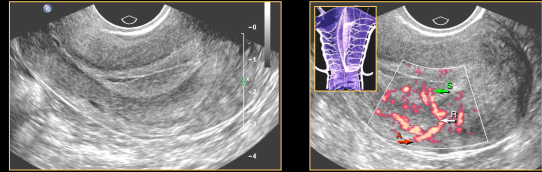
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## Myometrium Echogenicity



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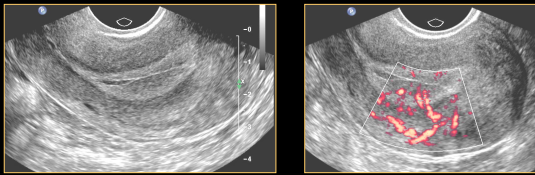
## Myometrium Echogenicity



- Arcuate artery
- Radial artery
- Spiral artery

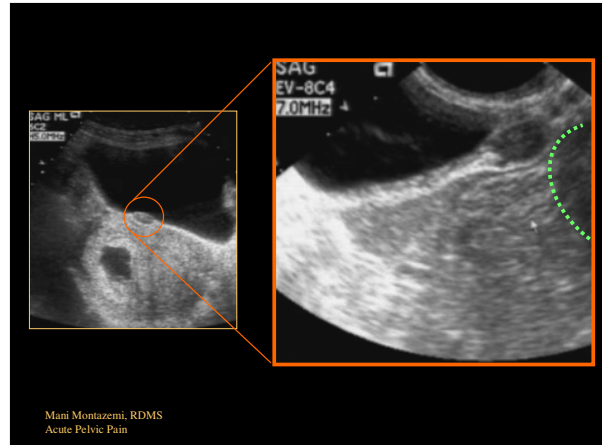
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## Myometrium Echogenicity

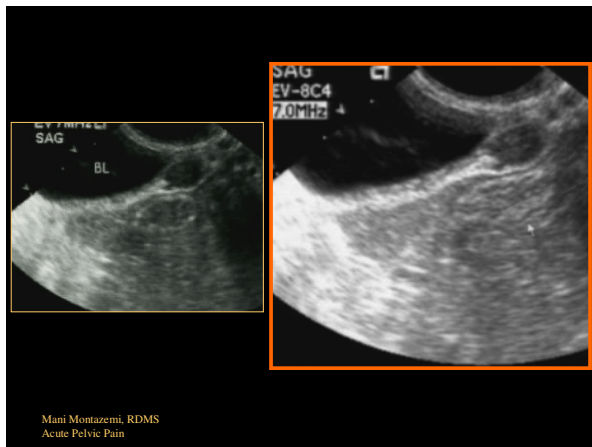


- Arcuate artery
- Radial artery
- Spiral artery

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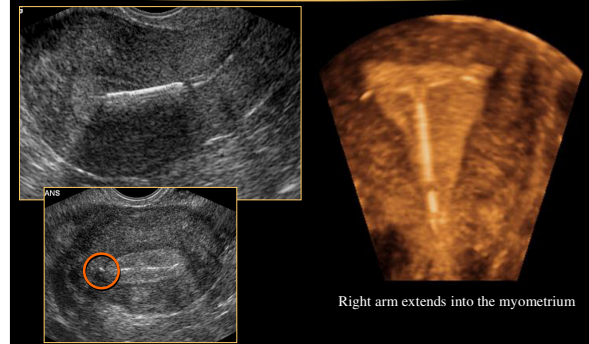


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43 y/o G0P0  
intermenstrual bleed + pain



Right arm extends into the myometrium

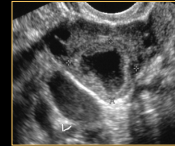
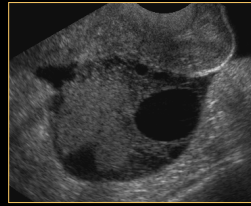
## Ovarian Cyst Rupture

- Common
- Clinical presentation: acute, severe pain
  - +/- rebound tenderness
  - +/- hypotension
  - nl WBC
  - Afebrile
- Normal US examination
  - dx of exclusion

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## Ovarian Cyst Rupture

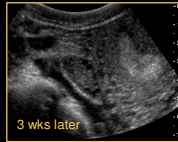
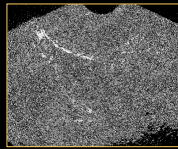
- Crenated cyst
  - +/- internal debris



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## Ovarian Cyst Rupture

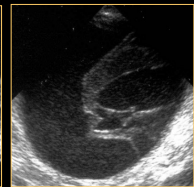
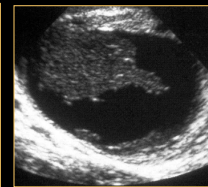
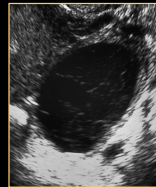
- Crenated cyst
  - +/- internal debris
- Free fluid
  - Around ovary, cul de sac
  - Morrison's pouch



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## Hemorrhagic Cyst

Variety of sonographic findings depending on the amount and age of clot

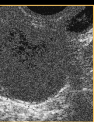
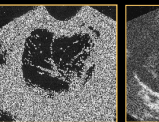
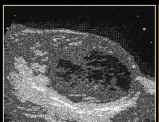
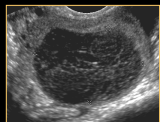


\*Increased through transmission\*

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## Hemorrhagic Cyst

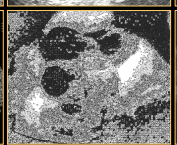
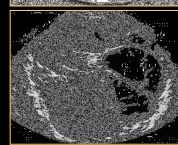
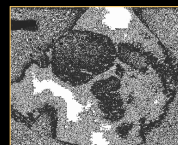
- Thin, regular wall
- Vary in size
- Diffuse, low level echoes



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Changes over time – “Evolving Appearance”

## Hemorrhagic Cyst

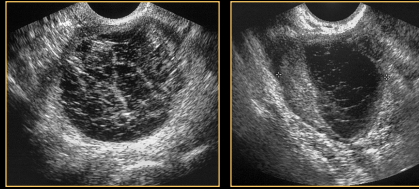


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## Hemorrhagic Cyst

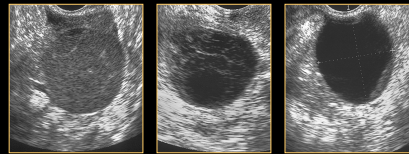
- Most hemorrhagic ovarian cysts resolve spontaneously after one or two menstrual cycles



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## Hemorrhagic Cyst

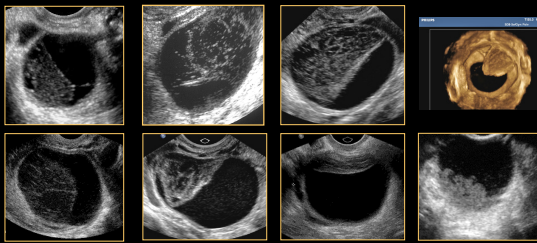
- Ultimately resolves
  - homogeneous low level internal echoes
  - lace-like pattern of internal echoes / septations
  - clot retracting against the wall



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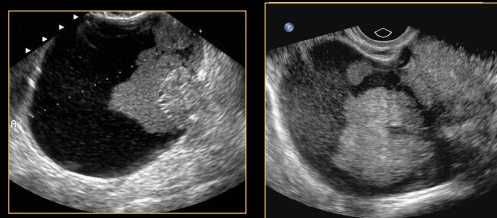
## Hemorrhagic Cyst

- Clot
  - Echogenic & Retractable



## Hemorrhagic Cyst

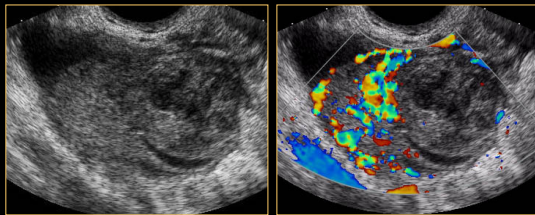
- Acute clot appears solid & intensely echogenic



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## Hemorrhagic Cyst

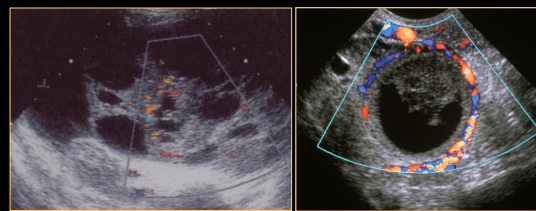
- No internal vascularity



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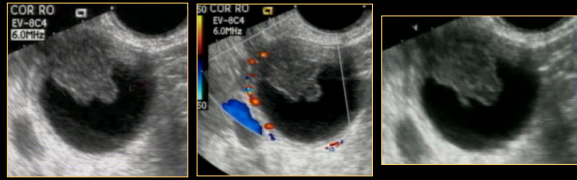
## Hemorrhagic Cyst

- No internal vascularity



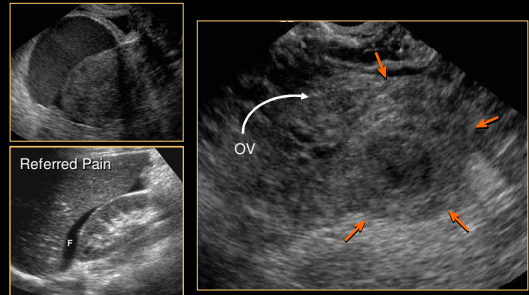
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## Hemorrhagic Cyst



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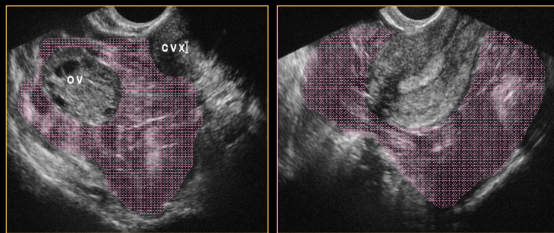
25 year old woman, sharp shooting pelvic pain, difficulty taking deep breaths, started suddenly p sexual intercourse, HCG (-)



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Dx: Ruptured hemorrhagic cyst with hemoperitoneum

## Ruptured Hemorrhagic Cyst



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## Ovarian Cyst Rupture



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## Pelvic Inflammatory Disease

- Usually due to STD
  - Chlamydia Trachomonas / Neisseria Gonorrhea
- Other less common causes
  - Direct extension from appendiceal
  - Diverticular
  - Post-surgical abscesses that have ruptured into the pelvis
  - Post-abortion complications
  - Rarely a TOA develops 2<sup>o</sup> to direct spread of infection from bowel to ovary

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## Pelvic Inflammatory Disease

- Typically presents during/after menses
- Clinical manifestations:
  - Lower abdominal & pelvic pain
  - Vaginal discharge
  - Fever +/- nausea, vomiting & malaise
  - leukocytosis

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## *Pelvic Inflammatory Disease*

### Progression of the disease

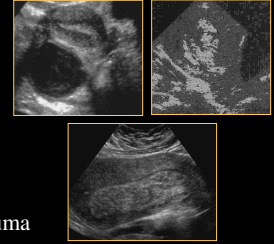
- Endometritis
- Salpingitis
- Oophoritis
- Peritonitis
- Pelvic Abscess



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## *Endometritis*

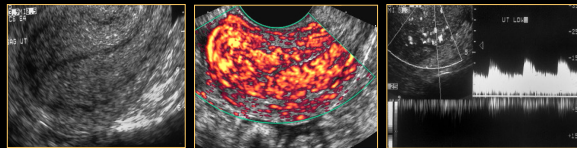
- Clinical presentation:
  - fever
  - leukocytosis
  - tenderness
  - foul smelling discharge
- Causes:
  - PID
  - post-partum (esp C/Sxn)
  - post instrumentation/trauma



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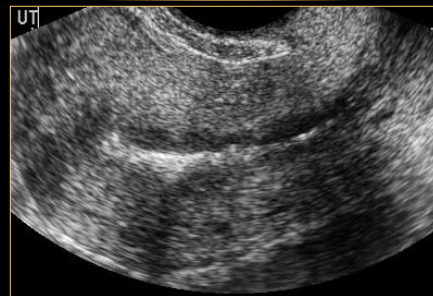
## *Endometritis – US Findings*

- Indistinct, thickened endometrial stripe
  - +/- fluid, air
- Diffuse increased vascularity
  - low resistance arterial waveform



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## *Endometritis – US Findings*



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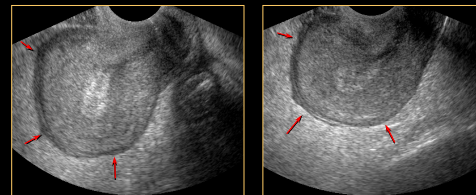
## *Pelvic Inflammatory Disease*

- Early sonographic signs
  - Indistinct serosal surface of uterus
  - Increased echogenicity of pelvic fat

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## *Uterus - Serositis*

- Indistinct serosal surface
- Hypoechoic rim around uterus



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## *Uterus - Serositis*

- Adhesions to ovary (+/- mass)

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## *Diagnostic Challenge*

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## *Pelvic Inflammatory Disease*

- Echogenic fat
  - Infection causes inflammatory changes in the fat in the adnexa

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## *Pelvic Inflammatory Disease*

- Variable sonographic appearance
  - Nonspecific

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## *Pelvic Inflammatory Disease*

- Most patient demonstrate bilateral but asymmetric involvement

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## *Pelvic Inflammatory Disease*

- Enlarged, ill-defined ovaries, cystic or complex adnexal masses

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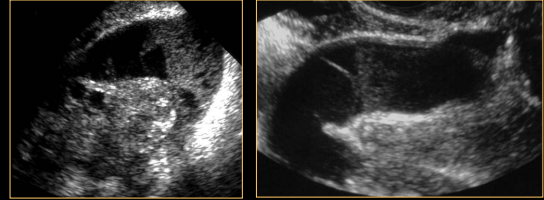
## *Tubal Dilatation – US Appearance*

Acute

- Thick, irregular wall
- Complex fluid

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## *Pelvic Inflammatory Disease*

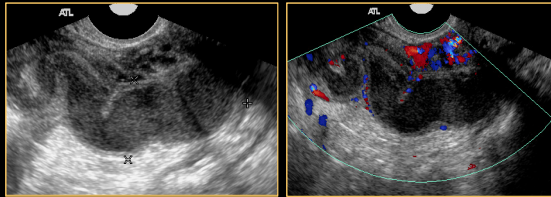


May contain low-level echoes

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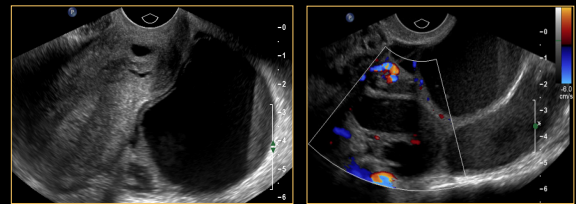
## *Hydrosalpinx*

- Debris: hematosalpinx or pyosalpinx



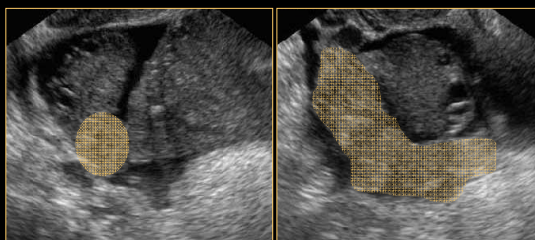
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## *Hematosalpinx*



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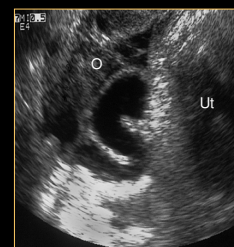
## *Pyosalpinx*



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## *Hydrosalpinx*

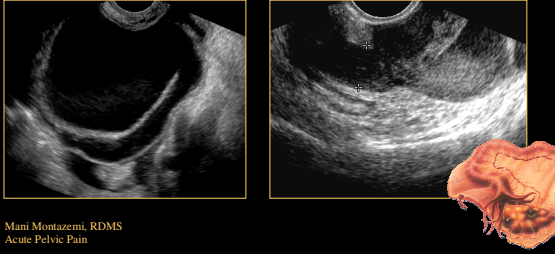
- Dilated, tubular, anechoic structure between uterus and ovary



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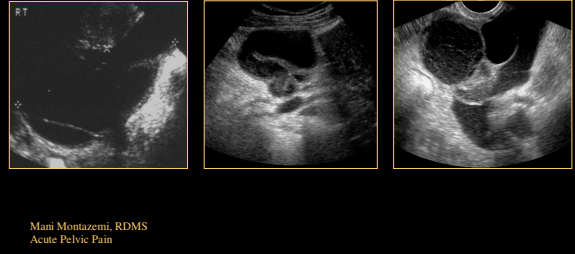
## Hydrosalpinx

- Fimbriated end often relatively more dilated – “waist sign”

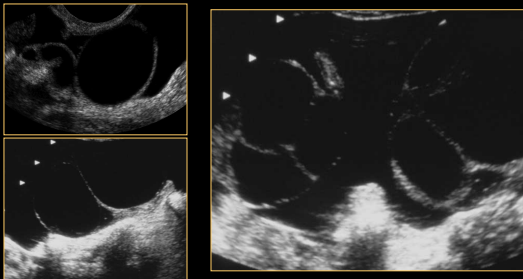


## Hydrosalpinx

- Incomplete septa, correlating with folds or kinks in the dilated tube



## Hydrosalpinx



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## Hydrosalpinx

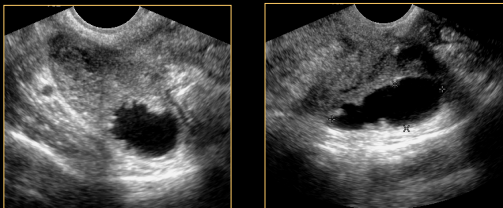
- Thickening of the tube wall of > 5mm



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## Hydrosalpinx

- Cogwheel appearance – “Plica”
- “Beads on a string” (multiple 2-3 mm nodules)



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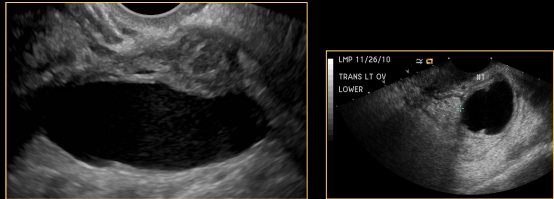
How to distinguish between wall irregularity and small papillary projections?



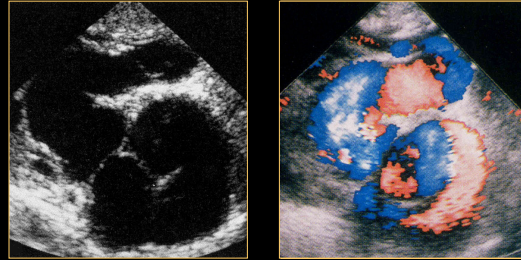
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## Cystic Ovarian Masses

- Papillary projections:
  - Small solid areas that protrude 3mm or more from the cyst wall



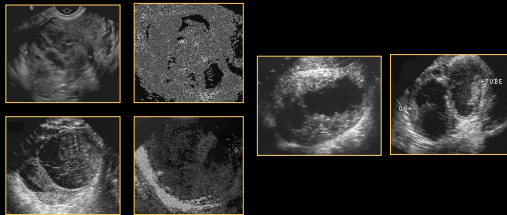
## Warning!



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## Tubo-ovarian Abscess

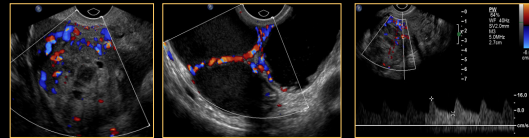
- Complex, multilocular, thick walled mass, internal echoes



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## Tubo-ovarian Abscess

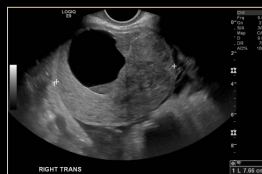
- ↑ Vascularity
- ↑↑ Tenderness
- Often bilateral
- Ovarian margins may be indistinct



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## Ovarian Torsion

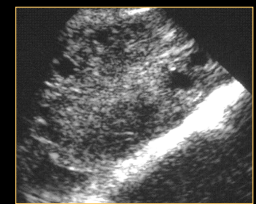
- Clinical presentation
  - Abdominal pain 94%
  - Adnexal tenderness 79%
  - Nausea 58%
  - Vomiting 43%
  - Afebrile
  - Normal CBC
- Caused by twisting of the adnexa around its vascular pedicle with vascular impairment



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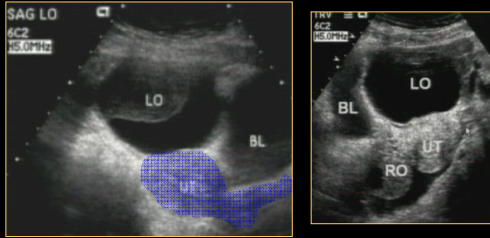
## Ovarian Torsion – US Findings

- Findings variable – depend on duration & degree of torsion
- Unilateral ovarian enlargement (+/- focal mass)
  - Right ovary is more commonly involved
- Heterogeneous central stroma
- Numerous peripheral cysts
- +/- free fluid in the cul-de-sac
- +/- absent blood flow



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## Ovarian Torsion – US Findings

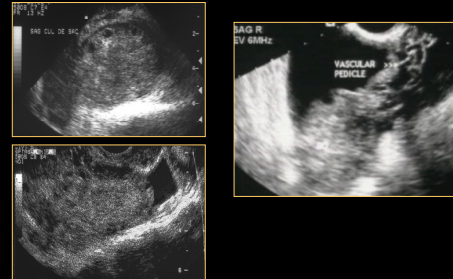


“Clue to Diagnosis”  
Unusual location of ovary!!  
Anterior to uterus

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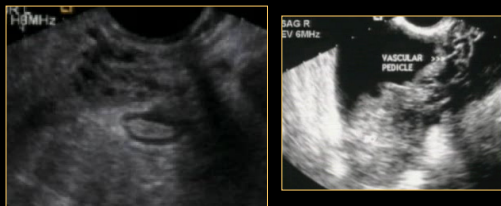
## Ovarian Torsion – US Findings

- Look for torted pedicle



## Ovarian Torsion – US Findings

- Look for torted pedicle

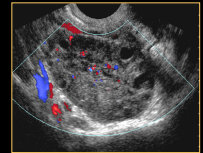


“Whirlpool Sign”

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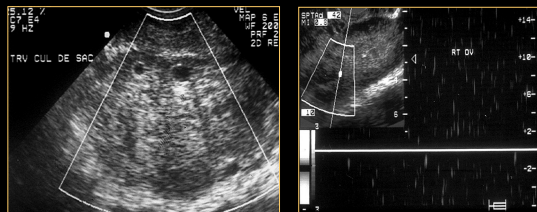
## Ovarian Torsion – Doppler Findings

- Variable
  - dual blood supply
  - varying degrees of torsion
- Lymphatic obstruction
- Decreased or absent venous flow\*
- Decreased arterial flow
- Reversed diastolic flow
- Complete absence of arterial flow



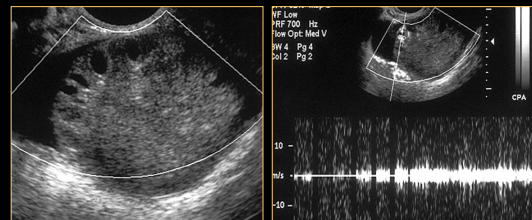
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## Ovarian Torsion



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## Ovarian Torsion

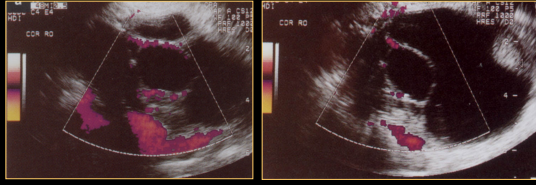


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*Twisted Corpus Luteum Cyst*  
21 year-old woman with RLQ pain worsening over 1 day



Findings are closely related to the duration & degree of torsion

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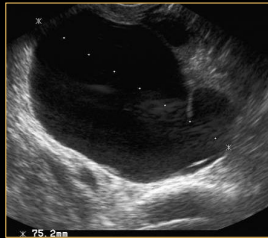
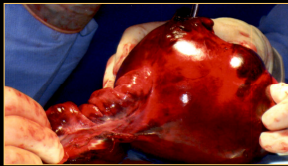
*Tubal Torsion*

- Women who have undergone tubal ligation

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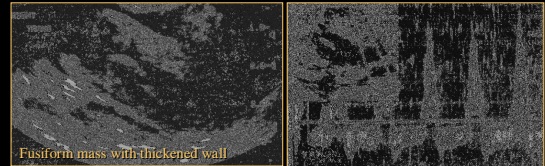
*Tubal Torsion*

- The ligated tubal segment may become filled with fluid and be predisposed to torsion



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*Unilateral Tubal Torsion*

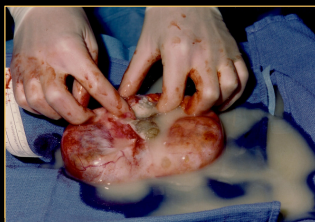


Fusiform mass with thickened wall

43 year-old woman who experienced with RLQ pain several days prior to admission. She had undergone bilateral tubal ligation 8 years previously

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32-year old women complained of vague lower abdominal discomfort. A mass was palpable on pelvic examination



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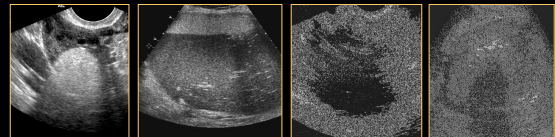
*Cystic Teratoma*

Echogenic mass with posterior sound attenuation

Fat-fluid level

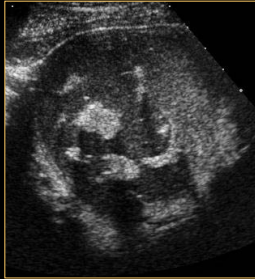
Echogenic linear speckles (*dermoid mesh*)

Mural nodules, +/- Ca++ (*dermoid plug*)



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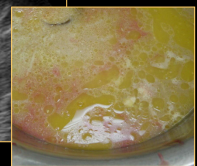
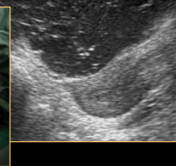
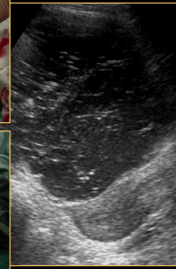
## Cystic Teratoma



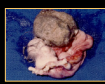
The shadowing caused by the dermal plug reflects its composition as a mixture of hair & sebum as well as fragments of bone or teeth

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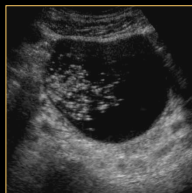
20 y/o with lower abdominal fullness & pain



## Cystic Teratoma



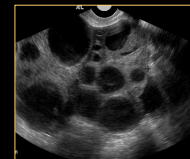
- The most frequent complication of a cystic teratoma is torsion



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## Ovarian Hyperstimulation Syndrome

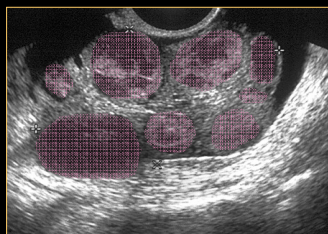
- Complication of ovulation induction
- Bilaterally enlarged, multi-cystic ovaries
  - Diagnosed when ovary > 5 cm
  - Typically symptomatic if ovary > 10 cm
- Regress after ~ 6 weeks
- Complications
  - Hemorrhage or rupture
  - Ovarian torsion



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## Ovarian Hyperstimulation Syndrome

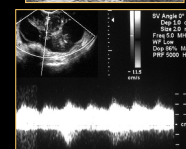
- Assess cysts for:
  - irregular shape
  - debris
  - adjacent free fluid



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## Ovarian Hyperstimulation Syndrome

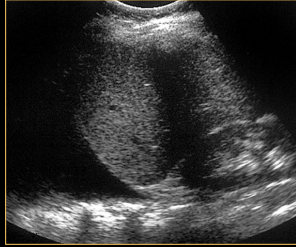
- Assess cysts for:
  - irregular shape
  - debris
  - adjacent free fluid
- Document ovarian blood flow



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## Ovarian Hyperstimulation Syndrome

- Assess cysts for:
  - irregular shape
  - debris
  - adjacent free fluid
- Document ovarian blood flow
- Assess for ascites, pleural effusion



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## Pelvic Congestion

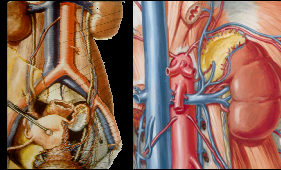
- Primary
- Secondary



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## Pelvic Congestion

- Primary congestion may result from obstructing anatomic anomalies
  - left ovarian vein congestion 2° to compression of the LRV by the SMA



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## Pelvic Congestion

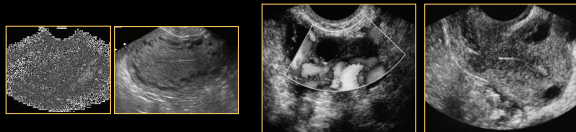
- Secondary congestion may be seen with a number of different disorders
  - valvular incompetence, portal hypertension, or acquired inferior vena cava syndrome



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## Pelvic Congestion – US Findings

- Numerous, tortuous, dilated pelvic veins
  - > 3 - 4 mm
  - ↑ following val salva
  - Dilated arcuate veins - esp if connect to pelvic varix\*



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## Pelvic Congestion – US Findings

- Numerous, tortuous, dilated pelvic veins
  - > 3 - 4 mm
  - ↑ following val salva
  - Dilated arcuate veins - esp if connect to pelvic varix\*



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## *Summary*

- The three things you **ALWAYS** include in your d/dx for a menstruating woman who presents with pelvic pain:
  - Ectopic pregnancy
  - Ovarian torsion
  - TOA/PID

## *Summary*

- The three **OTHER** things you include in your d/dx for a menstruating woman who presents with pelvic pain:
  - Appendicitis (right-sided pain)
  - Diverticulitis (left sided pain)
  - UVJ (either side)

