Gynecological Ultrasound Case Study Workshop

The 18th Interregional Symposium
for Certified Nurse-Midwives, Nurse Practitioners, Physician Assistants and Other Healthcare Professional Colleagues
November 2, 2017

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Ultrasound

The term "ultrasound" refers to sound waves of a frequency greater than that which the human ear can appreciate. Frequencies greater than 20,000 cycles per second or Hertz (Hz).

- To obtain images of the pregnant or nonpregnant pelvis, frequencies of 2 to 10 million Hertz (2 to 10 megahertz [MHz]) are typically required.
- Usually used in real-time.
  Multiple individual B-mode gray-scale images are obtained and rapidly displayed in succession, thereby creating a video of the area of interest over time that can be used to evaluate its structure and some aspects of its function.
- Real-time ultrasound is especially useful for imaging mobile subjects, such as the fetus or heart, and for quickly viewing an organ from different orientations

Always have an indication for imaging

The sonographer should know the reason for the ultrasound examination and results of other evaluations related to the patient's problem.

This information is critical for:

- targeting specific structures
- chosing whether to use a transvaginal and/or transabdominal technique
- deciding whether additional studies may be helpful
  - (eg, saline infusion sonohysterography, Doppler velocimetry)

Clinical Indications for US in OBGYN

Evaluation of gynecologic conditions

Ovaries Fallopian Tubes Uterus Endometrium

Pregnancy

Early pregnancy – evaluation for viability, multiple gestation, ectopic

Mid pregnancy – fetal size/growth/anatomy, placentation, cervical length

Late pregnancy – fetal size/growth/anatomy, placentation, presentation

Evaluation of Fertility

Ovary Fallopian Tubes Uterus Endometrium

Assessment of Abnormalities

Transvaginal scanning can provide added information on most abnormalities found during abdominal scans. It can help differentiate between:

Cystic vs Solid

Simple vs Complex

Ovarian vs Tubal

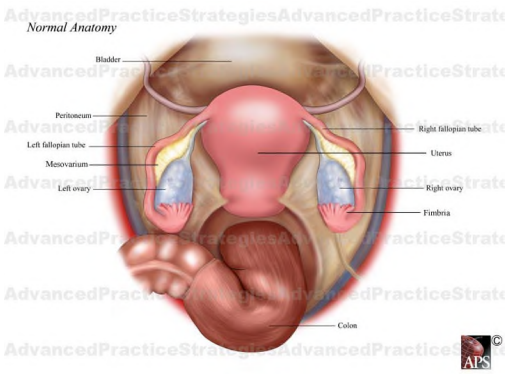
Ovarian vs Uterine

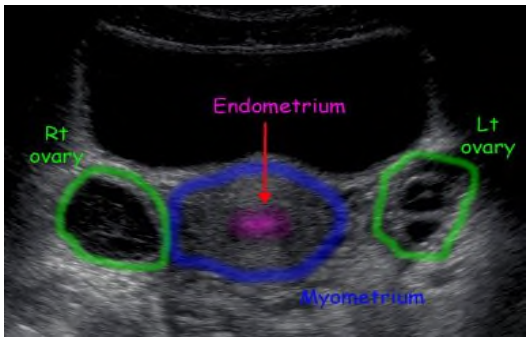
Free Fluid vs Bowel

Can obtain color and spectral doppler information from the uterus, ovaries and adnexal regions, including velocity and resistive index of blood flow.

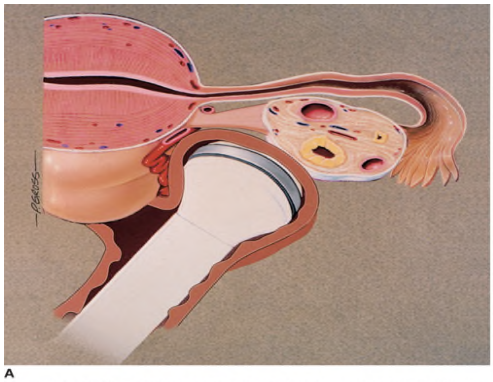
Ovaries

Pelvis Transabdominal View





Ovary Transvaginal



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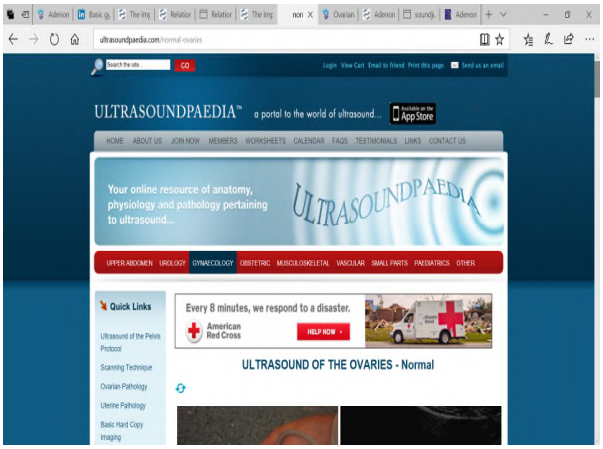
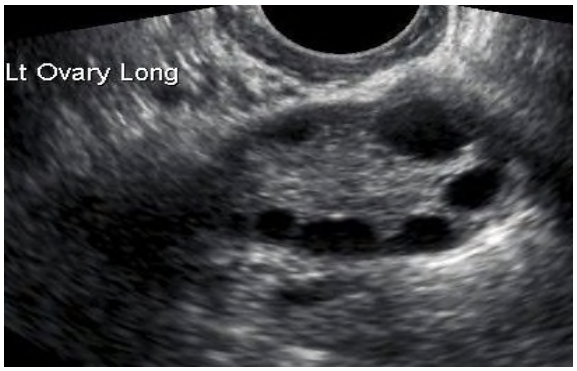
Ovary Evaluation Techniques

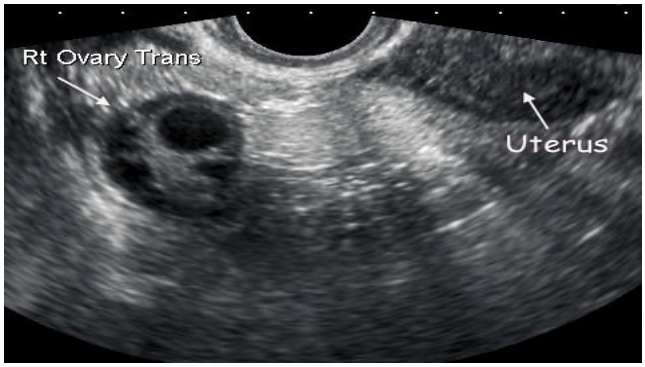
http://www.ultrasoundpaedia.com/normal-ovaries/



Normal Ovary



Axial Transvaginal Image of Ovary



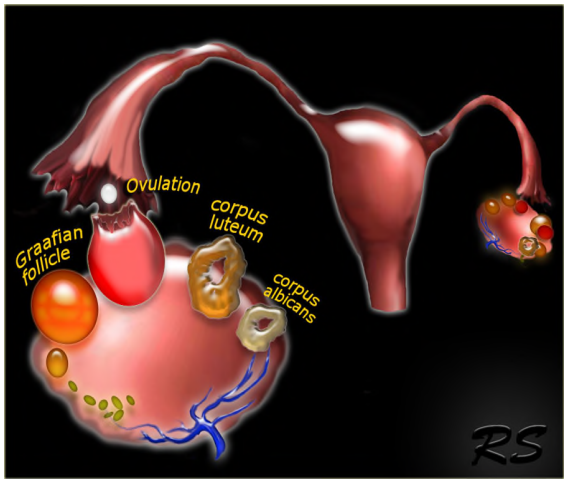
Ovarian Function

The normal ovary contains over two million primary oocytes at birth, about 10 of which mature each menstrual cycle.

Of the 10 Graafian follicles that begin to mature, only one becomes the dominant follicle and grows to a size of 18-20 mm by mid-cycle, when it ruptures to release the oocyte. The other nine follicles become atretic and fibrous.

After release of the oocyte, the dominant follicle collapses, and the granulosa cells in the inner lining proliferate and swell to form the corpus luteum of menstruation.

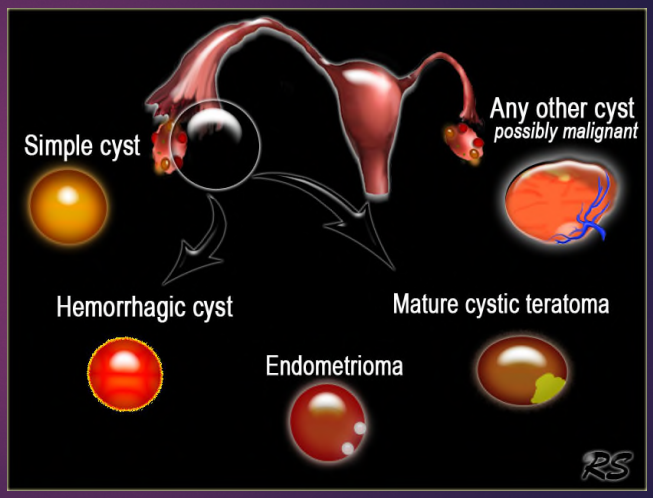
Over the course of 14 days the corpus luteum degenerates, leaving the small scarred corpus albicans.



Ultrasound can often allow for a fairly confident diagnosis of common cystic ovarian masses.

This means that in many cases the diagnostic work-up is based on determining the probability that we are dealing with a common benign lesion.

Most other cystic therefore possibly malignant. These lesions are indeterminate and require further evaluation, either with MRI or surgical excision



Pattern Recognition

Step 1
If a pelvic mass is present, is it cystic or not?
If cystic, if is it ovarian or non-ovarian?
Is it symptomatic or in incidental finding?

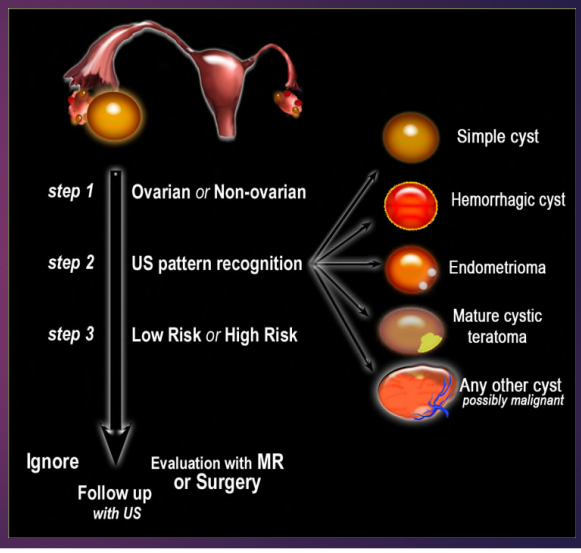
Step 2
Can this lesion be categorized as one of the common, **benign** ovarian masses:

- simple cyst
- hemorrhagic cyst
- endometrioma
- mature cystic teratoma
- or is indeterminate

Step 3
Determine whether the patient is high risk or low risk.

Based on these steps we can determine further management:

- Ignore
- Follow-up with US
- Further evaluation with MRI or excision

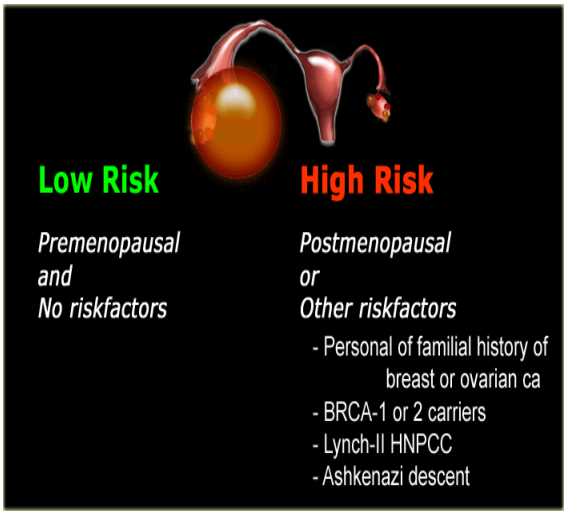


Risk Stratification

The final decision to: Ignore
Follow
Excise

Is based on:

- Characterization of the lesion
- Risk stratification (low vs high)
- Symptomatic vs incidental finding
- Additional findings such as ascites, lymphadenopathy or peritoneal implants



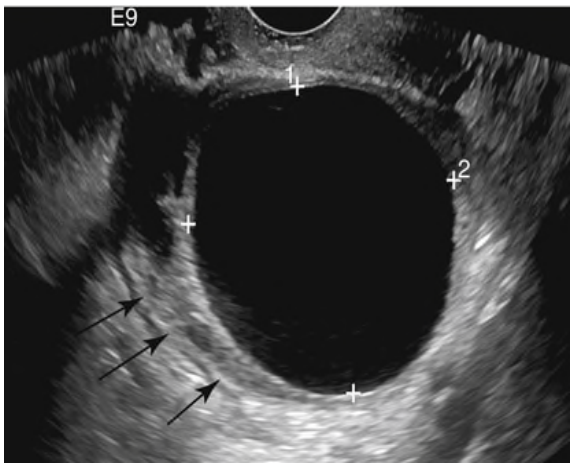
Simple Ovarian Cysts

Follicular Ovarian Cysts (<3cm)

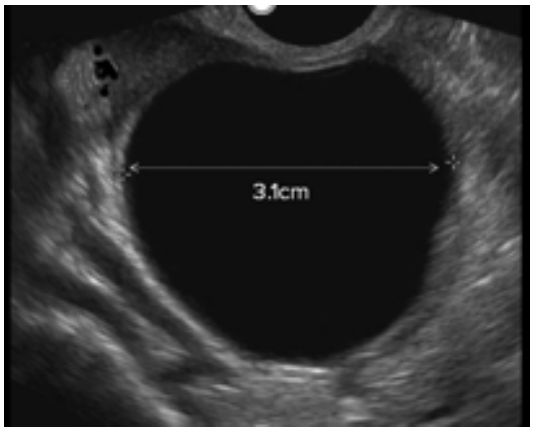
Simple Ovarian Cyst

Characteristic US findings:

- Anechoic lesion with posterior acoustic enhancement
- Unilocular
- Thin, smooth walls
- No solid or well-vascularized component

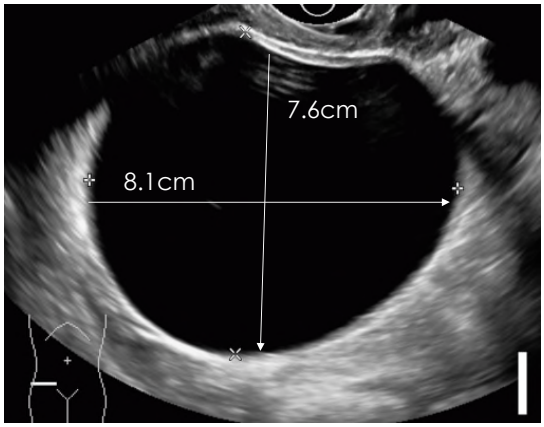


Simple Ovarian Cyst



Simple Ovarian Cyst

Simple Ovarian Cyst



POINT OF INFORMATION

Simple cysts of up to 10 cm in a patient of any age are highly likely to be benign with a malignancy rate of less than 1%

American College of Obstetricians and Gynecologists . ACOG Practice Bulletin. Management of adnexal masses . Obstet Gynecol 2007 ; 110 (1): 201 – 214

Castillo G , Alcázar JL , Jurado M . Natural history of sonographically detected simple unilocular adnexal cysts in asymptomatic postmenopausal women . Gynecol Oncol 2004 ; 92 (3): 965 – 969 .

Ekerhovd E, Wienerroith H, Staudach A, et al. Preoperative assessment of unilocular adnexal cysts by transvaginal ultrasonography: a comparison between ultrasonographic morphologic imaging and histopathologic diagnosis. Am J Obstet Gynecol 2001;184(2):48–54. 9.

Modesitt SC , Pavlik EJ , Ueland FR , DePriest PD , Kryscio RJ , van Nagell JR Jr . Risk of malignancy in unilocular ovarian cystic tumors less than 10 centimeters in diameter . Obstet Gynecol 2003 ; 102 (3): 594 – 599 .

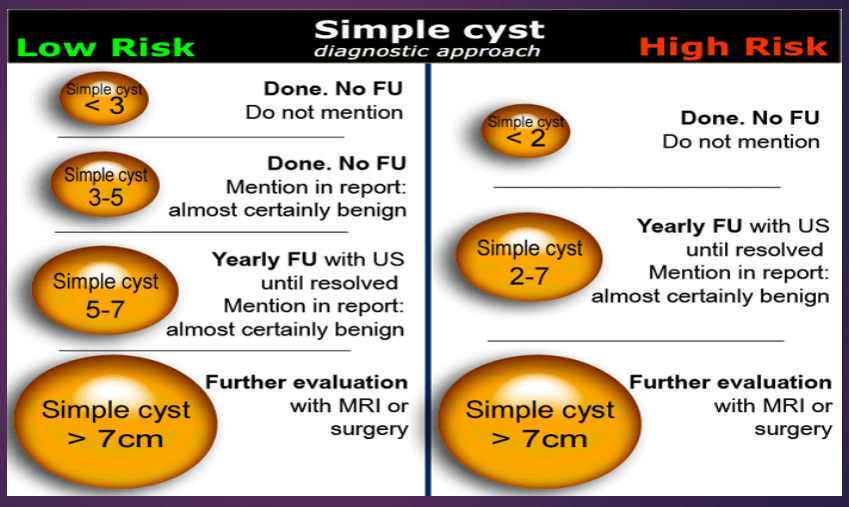
Simple Ovarian Cyst Differential

- Most simple cysts are functional cysts, usually follicular cysts.
- They are commonly seen in premenopausal women, but functional cysts also still do occur in early postmenopausal women (<5yrs).
- Some simple cysts may turn out to be: **paraovarian cysts** (includes paratubal)
  hydrosalpinx
- Cystadenomas can also present as simple cysts, but they usually present as a large cyst in a postmenopausal woman.

In a large cancer screening study from 1987 to 2002, N=15,106 women of 50 years or older, 2763 women (18%) were diagnosed with a unilocular ovarian cyst. None of these isolated unilocular cysts turned out to be ovarian cancer.

Risk of malignancy in unilocular ovarian cystic tumors less than 10 centimeters in diameter Modesitt SC, Pavlik EJ, Ueland FR, DePriest PD, Kryscio RJ, van Nagell JR Jr. Obstet Gynecol. 2003 Sep;102(3):594-9.

Follow up



Case: Simple Cyst

28yo G2P1 presenting to the ED with worsening left sided pelvic pain.

No abnormal discharge. No vaginal bleeding. No fevers.

LMP: 2 weeks ago

Not currently sexually active

VSS

Gen: uncomfortable, non-toxic

Abdomen: soft, mild LLQ tenderness to palpation 2/4, No R/G

Speculum exam: normal

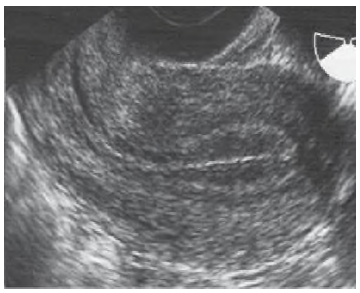
BME: Uterus normal size, mobile. No frank CMT. Fullness on the left.

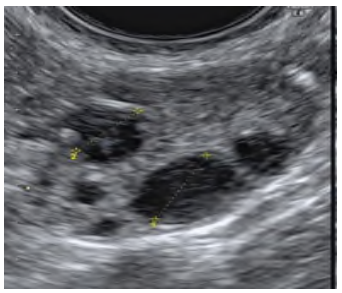
Urine pregnancy test negative

Abd/pelvic US ordered

Case: Simple Cyst

Abdominal / Pelvic US:





Normal uterus, homogeneous myometrium. Trilamninar endometrial echo.
Left ovary with a 3.71 cm simple cyst. RO with follicular cysts.
No free fluid.

Case: Simple Cyst

- FOLLOW UP…

  Simple, 3.7cm (3-5cm)

  Pain

NSAIDS

F/u in 8-10 weeks or earlier if pain

Torsion precautions

Office US, if still present, but no more pain, then no further f/u.

If larger, but <7cm, then follow up 8-10 weeks.

If not resolving, or characteristics are changing, then refer for possible surgical evaluation.

Simple Cyst and Fertility

The literature is devoid of data assessing the impact of treatment of nonendometriotic cysts before ART

The general approach to a simple cyst and fertility is:

If greater than 7 cm follow up with GYN

If < 7 cm course of BCP (2 daily)

If not producing estrogen will not interfere with treatment

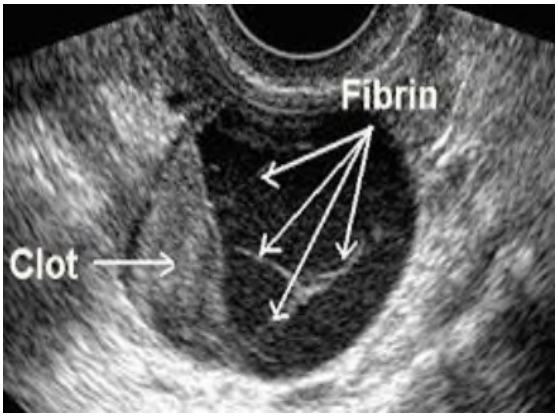
Relationship between ovarian cysts and infertility: what surgery and when? Legendre, Guillaume et al. Fertility and Sterility , Volume 101 , Issue 3 , 608 - 614

Hemorrhagic Ovarian Cyst

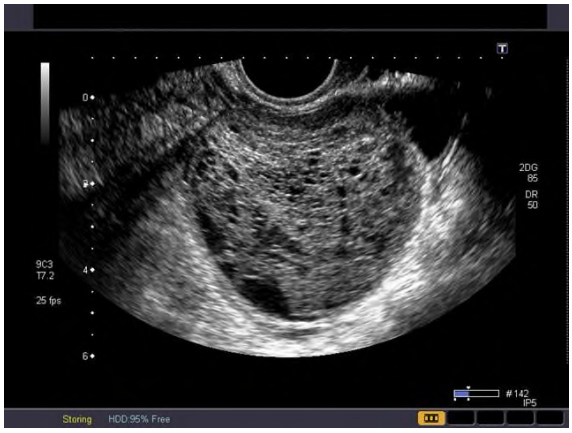
Hemorrhagic Ovarian Cyst

Characteristic findings:

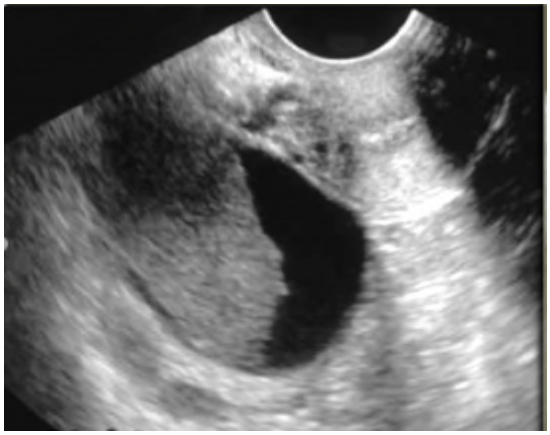
- ***Low risk*** patient
- Cystic mass with diffuse ***low level echoes***; "reticular pattern of internal echoes"
- May contain a solid-appearing area with good through-transmission, ***without internal flow with color Doppler***, and typically with concave margins, consistent with a blood clot.



Hemorrhagic Ovarian Cyst



Hemorrhagic Ovarian Cyst

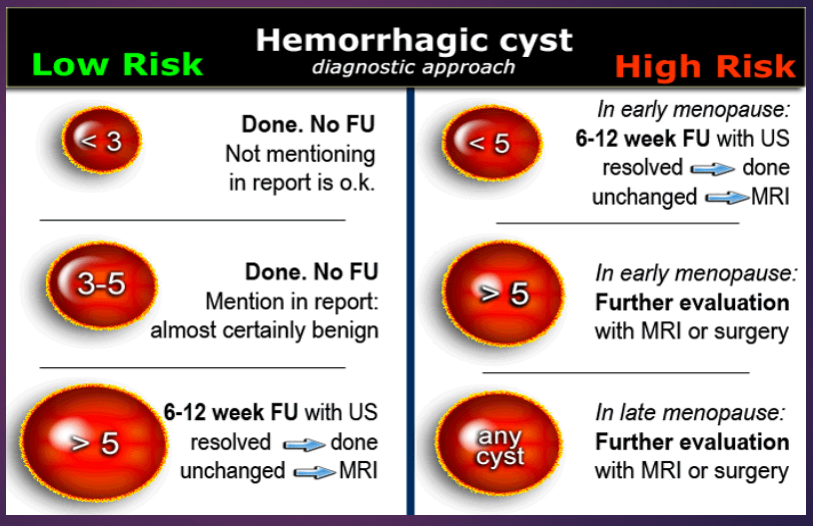


POINT OF INFORMATION HEMORRHAGIC CYST

- Hemorrhagic cysts typically resolve within 8 weeks.
- In premenopausal women short term follow-up is recommended in hemorrhagic cysts > 5 cm. The same follow-up is recommended in early postmenopausal women who have a cyst with all the characteristics.
- A larger hemorrhagic cyst (>5cm) in early menopause and any hemorrhagic cyst in late menopause should be considered possibly neoplastic and MRI or surgical evaluation should be considered.

Laing FC, Allison S. US of the ovary and adnexa: to worry or not to worry? Radiographics 2012;32: 1621–39.
Patel MD, Feldstein VA, Filly RA. The likelihood ratio of sonographic findings for the diagnosis of hemorrhagic ovarian cysts. J Ultrasound Med 2005;24(5): 607–14.
Valentin L. Use of morphology to characterize and manage common adnexal masses. Best Pract Res Clin Obstet Gynaecol 2004;18(1):71–89

Follow up



Case: Hemorrhagic Ovarian Cyst

36yo G3P2 with sudden onset pain in right lower quadrant.

Some N/V associated with pain, now better. No vaginal discharge. No fevers. Not currently sexually active.

LMP 3 weeks ago, some irregularity

VSS – mild tachy at 105, reg

Gen: uncomfortable

Abdomen: soft, ND, RLQ TTP 2-3/4, No R/G

Speculum exam: normal

BME: normal uterus, mild CMT but localizes to the right. Tender mass on the right. Voluntary guarding

Urine pregnancy test neg

WBC 11.2

Hgb 10.9

Plts 287

Imaging ordered

Case: Hemorrhagic Ovarian Cyst

Abdominal / Pelvic US:

Right ovarian cyst adjacent to a normal uterus and left ovary. LO normal, inferior. No FF. Right hemorrhagic ovarian cyst, 6.6cm, with internal septations forming a reticular pattern throughout the cyst. The cyst wall is slightly thickened on one side.

Case: Hemorrhagic Ovarian Cyst

- FOLLOW UP…

  Hemorrhagic Cyst 6cm (>5cm)
  Low risk patient
  Pain

NSAIDS / Toradol
6-12 week f/u US, earlier if pain
If not resolving, then MRI to r/u endometrioma

Hemorrhagic Cyst and Fertility

The literature is devoid of data assessing the impact of treatment of nonendometriotic cysts before ART

The general approach to a hemorrhagic cyst and fertility is:

If greater than 7 cm follow up with GYN
Wait for resolution if 4-7 cm
Less than 4 cm ok to begin treatment

Relationship between ovarian cysts and infertility: what surgery and when? Legendre, Guillaume et al. Fertility and Sterility , Volume 101 , Issue 3 , 608 - 614

HEMORRHAGIC CYST DIFFERENTIAL

Endometrioma: When hemorrhagic cysts present with diffuse low-level echoes, their appearance can be similar to that of endometriomas. Patients will often have a history of worsening dysmenorrhea. The ovaries are involved in approximately 75% of patients with endometriosis.

Neoplasm: In the acute phase a hemorrhagic cyst may be completely filled with low-level echoes, simulating a solid mass. Clot in a hemorrhagic cyst may occasionally mimic a solid nodule in a neoplasm. Clot, however, often has concave borders due to retraction, while a true mural nodule has outwardly convex borders. In both cases there will be no internal flow at Doppler US and there will be good through-transmission.

Adnexal Masses: US Characterization and Reporting Douglas L. Brown, MD, Kika M. Dudiak, MD and Faye C. Laing, MD February 2010 Radiology, 254, 342-354

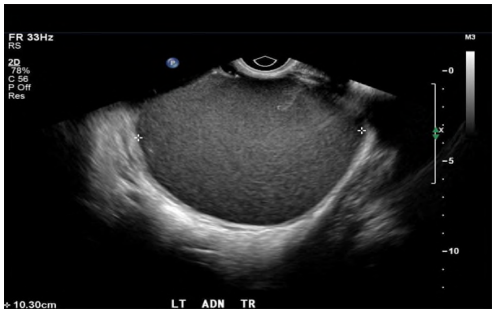
Hemorrhagic Cyst versus Endometrioma

Hemorrhagic Cyst

- Lace Like Internal echogenicity

Endometrioma

- Homogenously hypoechoic

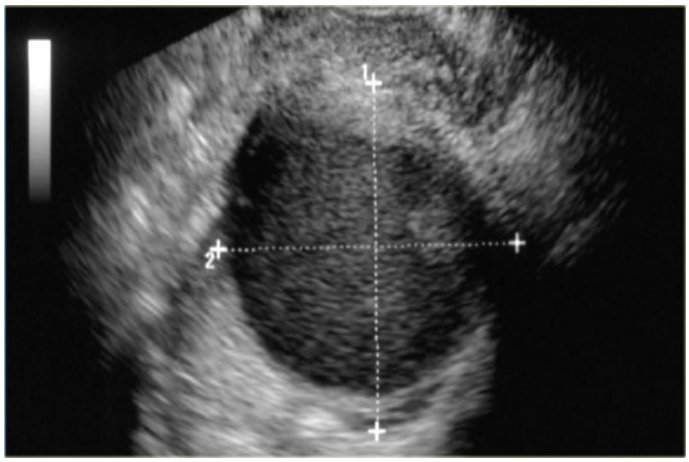


Endometriotic Ovarian Cyst (Endometrioma)

Endometrioma

Ultrasound Characteristics:

- ***Homogenous*** and ***hypoechoic*** masses
- Diffuse ***low-level echoes*** (Ground Glass)
- ***No internal flow*** of color Doppler
- ***No enhancing modules*** of solid masses
- In ***30% echogenic foci*** are seen within the cyst wall

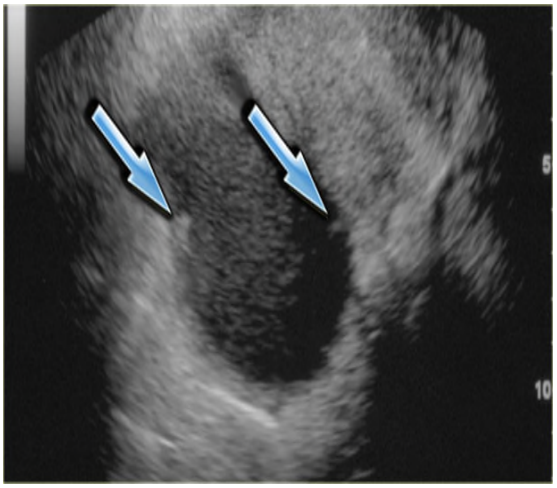


Endometrioma

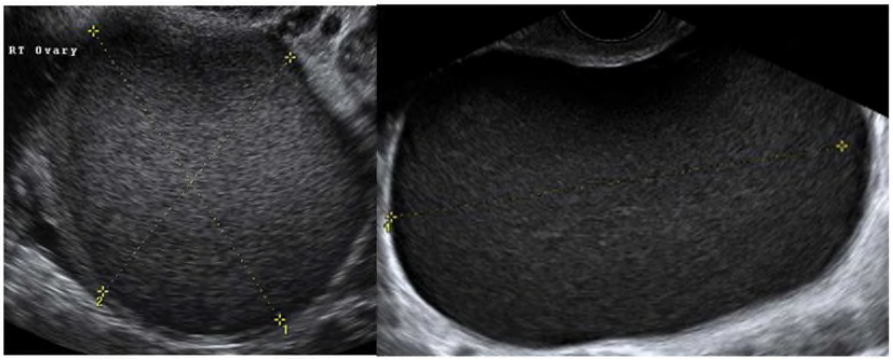
This image from a vaginal ultrasound shows a large hypoechoic, cystic lesion with diffuse low-level echoes and two small echogenic foci.

These have been postulated to be cholesterol deposits, but may also constitute small blood clots or debris.

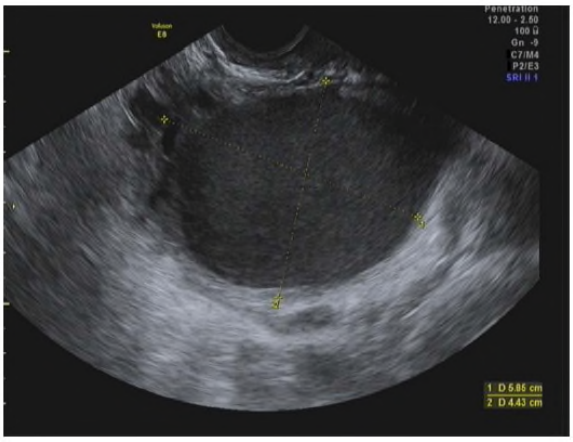
It is important to differentiate these echogenic foci from true wall nodules. Finding these echogenic foci makes the diagnosis of an endometrioma very likely.



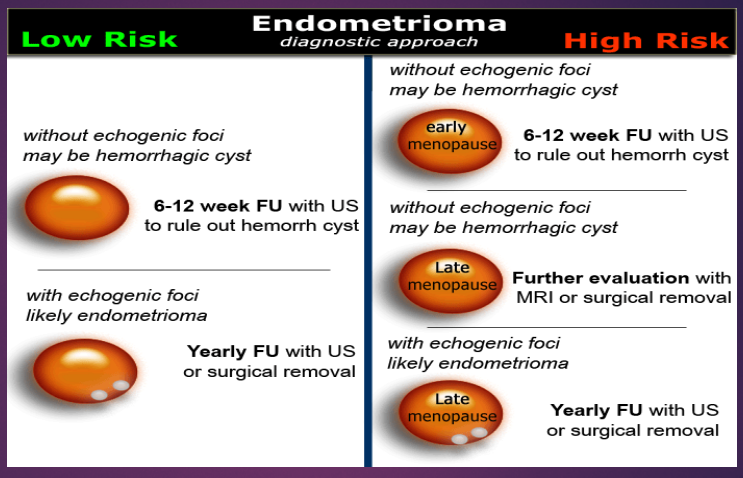
Endometrioma



Endometrioma



Follow up



In women of any age, probable endometriomas require initial 6-12 week follow-up to rule out a hemorrhagic cyst.
Until surgically removed, endometriomas require follow-up with ultrasound, on a yearly basis.

Case: Endometrioma

35yo G0 presenting with severe menstrual pain. Life long problem, seems to be getting worse with longer episodes of pain, mostly around menstrual cycle, but pretty much anytime. Using NSAIDS for pain but no longer enough.

Is developmentally delayed but speaks for herself and is appropriate

LMP; on day 5 today. Mostly regular

VSS

Gen: Tired. Non-toxic

Abdomen: soft, diffuse mild tenderness. Large anterior firm mass. Mild R/G.

Speculum: normal

BME: Large anterior mass.

RVE: no nodularity. Tender

Urine pregnancy test neg

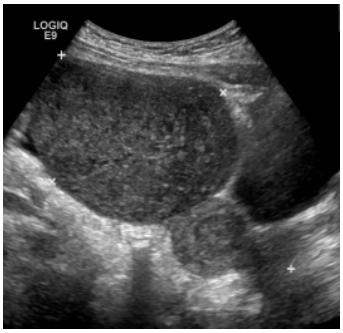
WBC 7.2

Hgb 10.7

Plts: 299

Imaging ordered

Case: Endometrioma



TVUS: 9cm cystic lesion w/ low level echoes superior to the uterus.
MRI: 17cm hemorrhagic cyst presumed to arise from the right ovary. Uterus normal

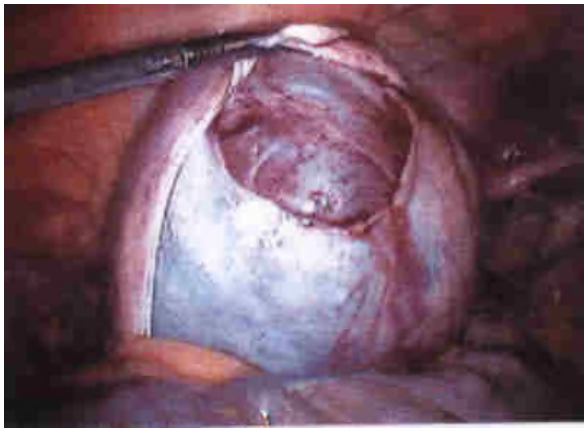
Case: Endometrioma

- FOLLOW UP…

  Hemorrhagic Cyst 9cm (>5cm)
  Low risk patient
  Pain

NSAIDS / COCs
6-12 week f/u US, earlier if pain
Not resolving, MRI done and consisted with endometrioma
Went to OR for dx LS, right oophorectomy, mini-laparotomy

Case: Endometrioma



Endometriomas and Fertility

- Endometriotic ovarian cysts (known as endometriomas) can be found in up to 17–44% of women with endometriosis and are often associated with the severe form of the disease
- Endometriomas can be detrimental to the ovarian reserve, surgical therapy may further lower a woman's ovarian reserve
- ASRM recommend surgery as the gold standard for symptomatic endometriomas and asymptomatic endometriomas > 4 cm

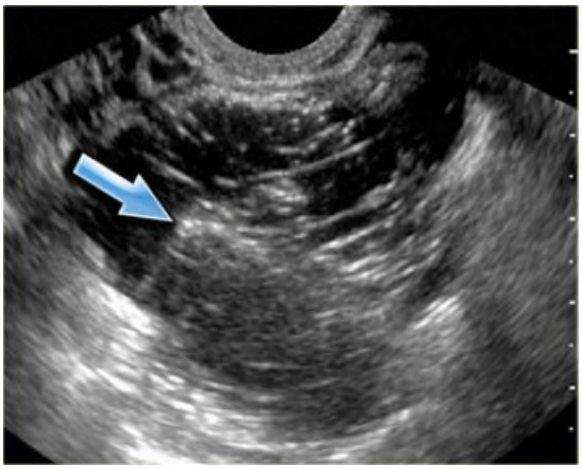
2017 ASRM, American Society for Reproductive Medicine. Endometriosis

Mature Cystic Teratoma (Dermoid Cyst)

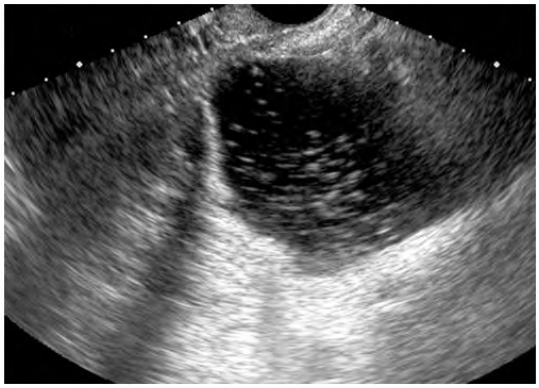
Dermoid Cyst

Characteristic US findings:

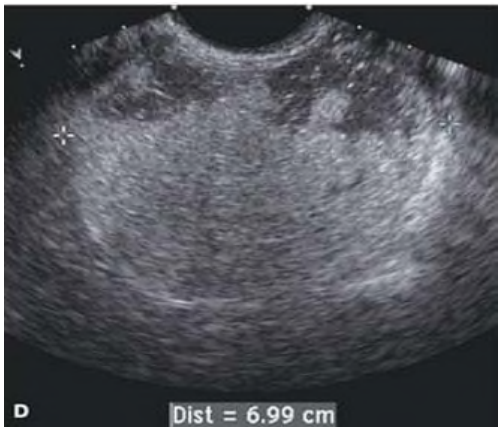
- Hypoechoic mass with ***hyperechoic nodule*** (Rokitansky nodule or dermoid plug)
- Usually unilocular (90%)
- May contain ***calcifications*** (~60%)
- May contain hyperechoic lines caused by floating hair
- May contain a ***fat-fluid level***, i.e. fat floating on aqueous fluid (diagnostic)
- May be ***bilateral*** lesions (~10%)



Dermoid Cyst



Dermoid Cyst



Dermoid Cyst

Point of Information
Dermoid Ovarian Cyst

Highest incidence of torsion (heavy)

10-15% can be bilateral

Rare relationship to NRMP encephalopathy

Follow up

Mature cystic teratoma
diagnostic approach

Dermoid < 7 cm → **6 - 12 months FU with US**
until resected.
If not resected, continue FU (yearly?)

Case: Dermoid Cyst

31yo G1P0 presenting with a history of intermittent severe left sided pelvic pain. Has occurred two separate times. Not related to menstrual cycle. Was going to come in earlier, but pain went away. No abnormal discharge. No fevers.

On COCs, satisfied.

Monogamous, married. Considering conception soon.

VSS

Gen: Well. Healthy

Abdomen: soft, non tender throughout.

Vaginal: normal

BME: 5-6cm left sided mass, non tender, mobile.

Urine pregnancy test neg

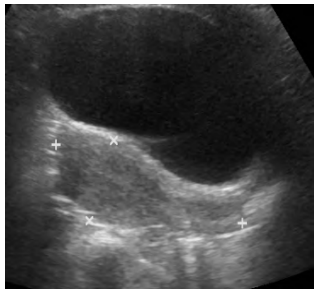
WBC 6.3

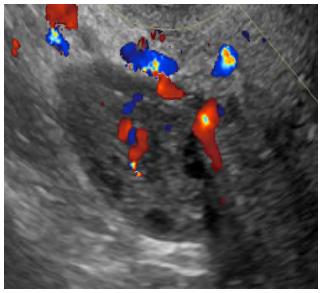
Hgb 13.2

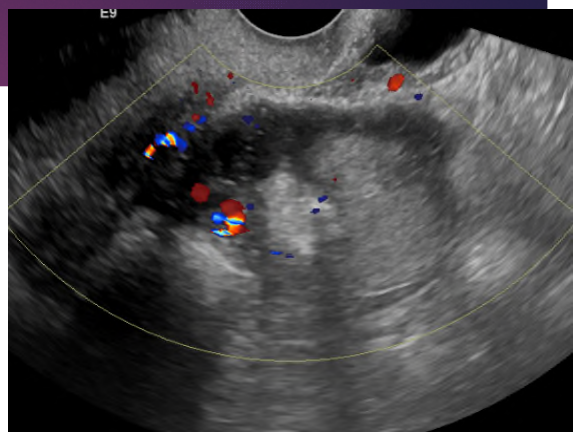
Plts: 342

Imaging Ordered

Case: Dermoid Cyst



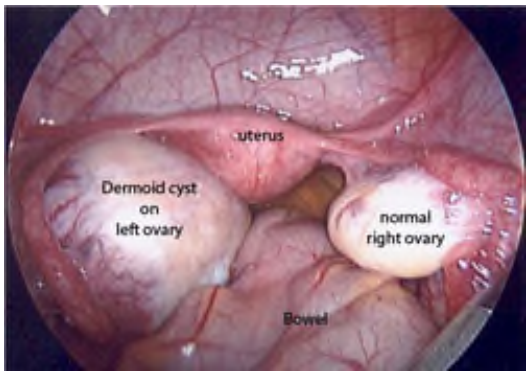


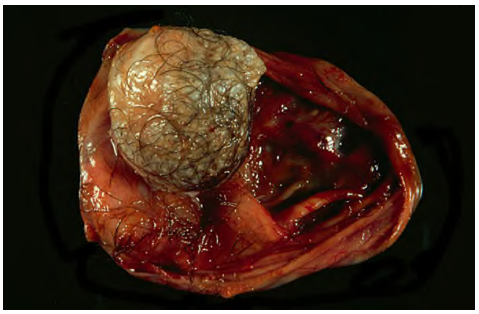


Abdominal/Pelvic US: Normal Uterus, Right ovary normal. No FF.
Left ovary with a complex mass is measuring 4.7 x 4.4 x 3.6 cm. This contains a 3.6 cm echogenic structure and fat fluid levels.

Case: Dermoid Cyst

Laparoscopic left cystectomy





Dermoid Cyst and Fertility

The literature is devoid of data assessing the impact of treatment of nonendometriotic cysts before ART.

The general approach to a dermoid cyst and fertility is:

A wait-and-see attitude for asymptomatic women, especially for moderate-sized dermoid cysts (4–6 cm), where the risk of secondary interventions is low.

Relationship between ovarian cysts and infertility: what surgery and when? Legendre, Guillaume et al. Fertility and Sterility , Volume 101 , Issue 3 , 608 - 614

Dermoid Cyst and Fertility

- A single-center retrospective study of 17 excisions of nonendometriotic cysts that averaged 37 mm (one serous and seven dermoid cysts) found that after excision, compared with a healthy ovary, ovarian reserve decreased in volume by 40%; the number of dominant follicles also decreased
- The small prospective cohort study by Chang et al. found a significantly greater decrease in the AMH rate after cystectomy for the seven nonendometriotic cysts (one mucinous and six dermoid) compared with results after removal of 13 endometriomas (69% vs. 34% of the preoperative AMH value)

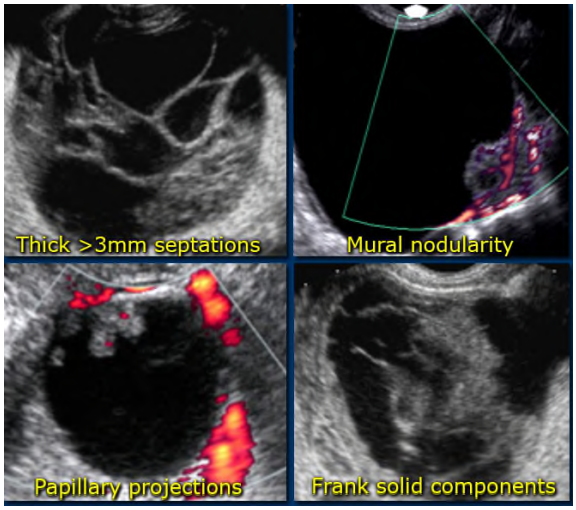
Relationship between ovarian cysts and infertility: what surgery and when? Legendre, Guillaume et al. Fertility and Sterility , Volume 101 , Issue 3 , 608 - 614

Indeterminate Cyst

Indeterminate Cyst

Large size
While benign lesions can be very large, the likelihood that a lesion is neoplastic increases with size.
Also the likelihood that a neoplastic lesion is malignant, increases with the size of the lesion.

Vascularized septations
The presence of septations indicates a possible neoplasm. When septations have a ***thickness of more than 3mm*** and are well-vascularized - while non-specific - both increase the likelihood that a neoplasm is malignant.

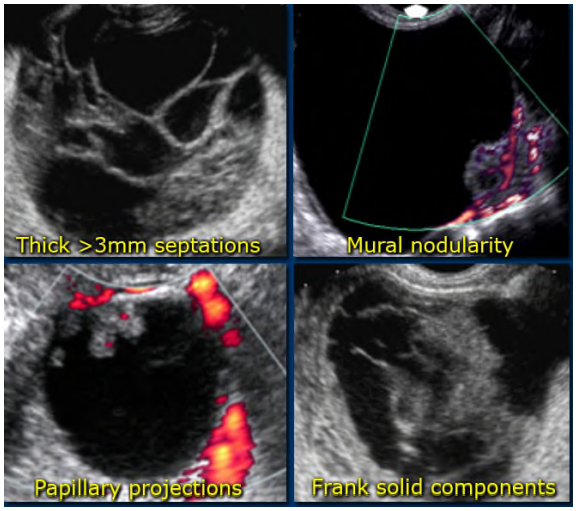


Indeterminate Cyst

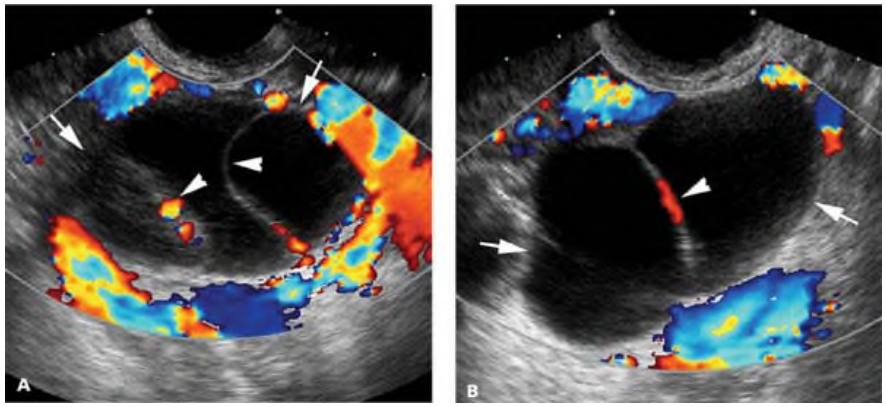
Vascularized nodularities, ***papillary projections***, or frank ***solid masses*** all increase the likelihood of a neoplastic nature.

Vascularized thick, irregular wall
Lesions with thin walls are more often benign and lesions with ***thick, irregular walls*** are more often malignant. However, there is some overlap, making wall thickness a less useful criterion. For example a corpus luteum cyst may also have a thickened, vascularized wall.

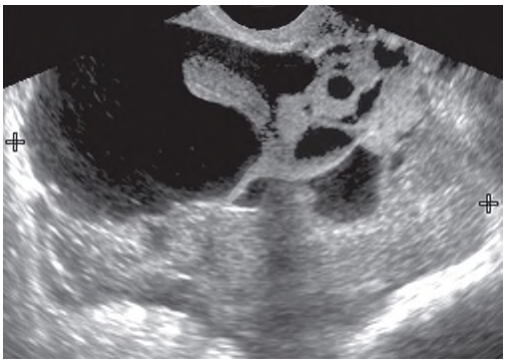
Secondary findings *associated with malignant lesions:* Large quantities of ***ascites***, ***lymphadenopathy*** and ***peritoneal deposits*** are strongly associated with an increased likelihood of malignancy.



Indeterminate: Cystadenoma



Indeterminate: Malignant



- All indeterminate cystic lesions are regarded as possibly neoplastic and therefore possibly malignant.
- Surgical resection is recommended.
- Further preoperative imaging may be recommended (CT or MRI)
- Referral to Gynecologic Oncologist.

Case: Indeterminate Cyst

58yo G3P2 presenting with vaginal spotting. No pain. Mild GI dyspepsia. No constipation or diarrhea. Otherwise well.

Menopausal ~6 years. No HRT.

Married, male, monogamous

VSS

Gen: Well. Healthy

Abdomen: soft, non tender throughout.

Vaginal: normal, no blood in vault, no lesions.

BME: normal uterus, right sided fullness, non tender, moderately mobile. Normal left adnexa

Bedside TVUS done:

Endometrial echo 5.3mm, homogeneous.

6cm right sided cystic adnexal lesion, with nodularity. LO not seen. No FF.

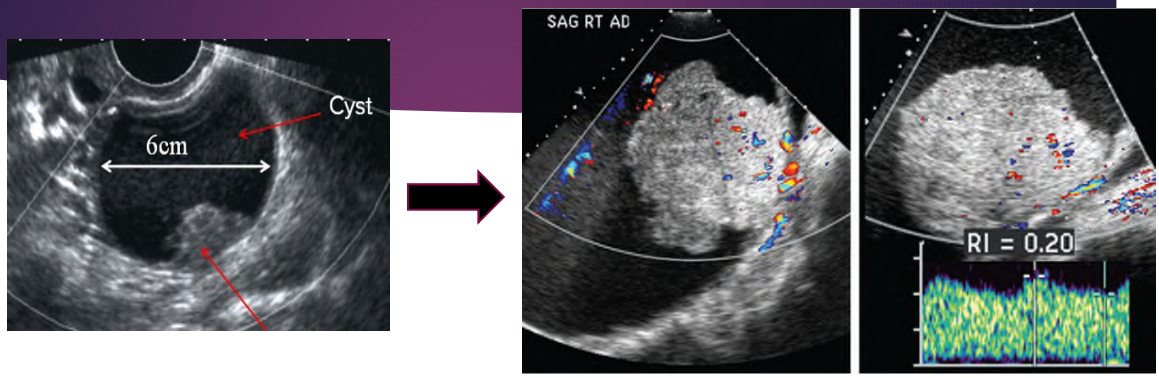
Endometrial biopsy done

CA125 ordered

Formal Abd/Pelvic sono ordered.

+/- referral to Gyn Onc or Gen Gyn

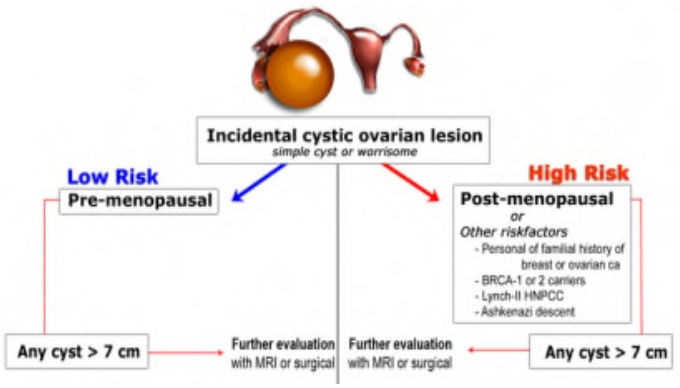
Case: Indeterminate Ovarian Cyst



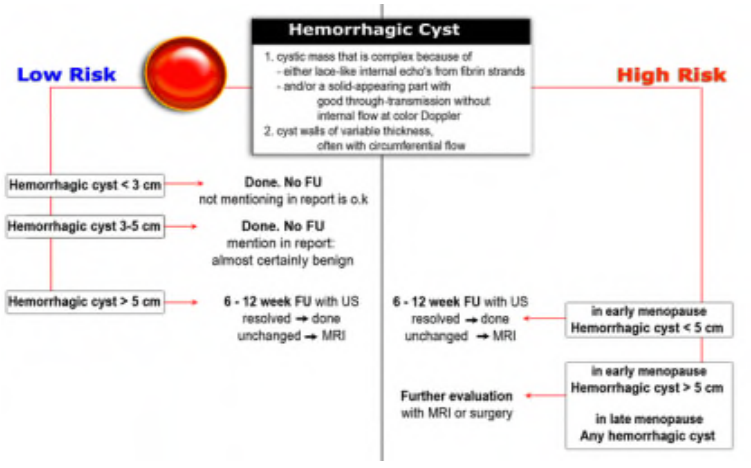
Abd/Pelvis US: Normal Uterus. LO normal. Right sided adnexal cystic lesion, 6cm, with a mural nodularity. Positive for doppler flow. No FF.

OVARIAN CYST CASE REVIEW

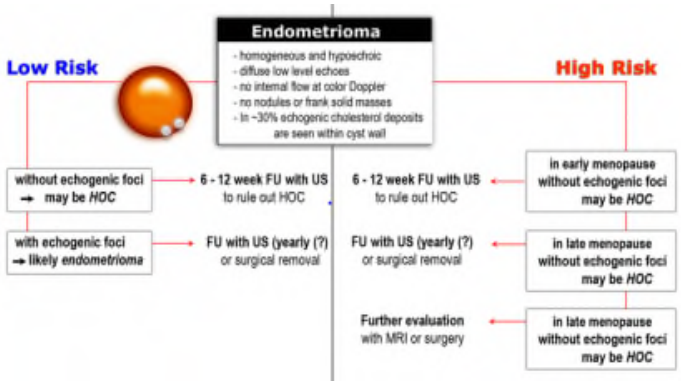
WORK UP: CYSTIC OVARIAN LESION



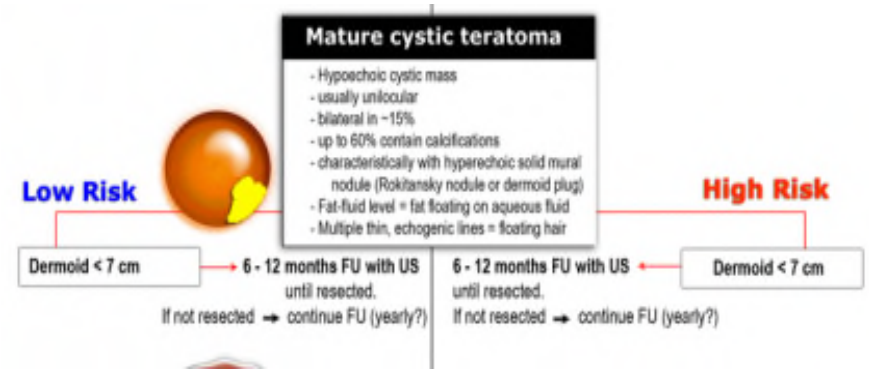
WORK UP: HEMORRHAGIC OVARIAN CYST



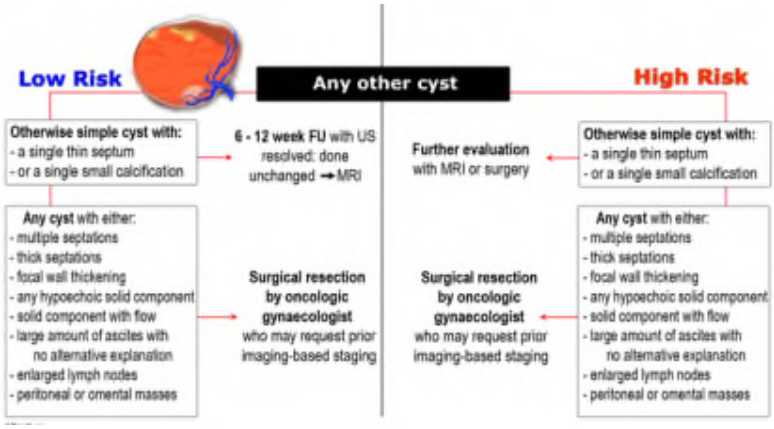
WORK UP: ENDOMETRIOMA



WORK UP: MATURE CYSTIC TERATOMA



WORK UP: ANY OTHER CYST



Other potential findings on Office US

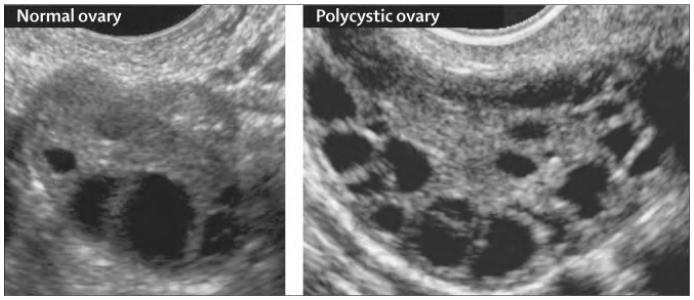
Polycystic Ovaries

Diminished Ovarian Reserve

Hyperstimulated Ovaries

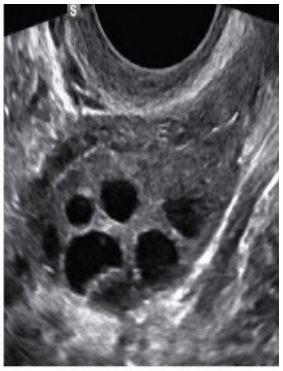
Intrauterine Device

Polycystic Ovary



Polycystic Ovary vs Normal


Transvaginal ultrasound picture of polycystic ovary


Transvaginal ultrasound picture of normal ovary

Classic Polycystic Ovary

By definition:
Either ***12 or more follicles*** measuring 2–9 mm in diameter, or increased ovarian volume (>10 cm^3).

Diminished Ovarian Reserve

- Diminished ovarian reserve (DOR) is a condition in which the ovary loses its normal reproductive potential, compromising fertility
- The condition may result from disease or injury, but most commonly occurs as a result of normal aging
- DOR is present in 10-30% of patients presenting to doctors with infertility

De Vos M, Devroey P, Fauser BCJM. Primary ovarian insufficiency. Lancet Lond Engl. 2010;376(9744):911–921. doi: 10.1016/S0140-6736(10)60355-8.

Diminished Ovarian Reserve

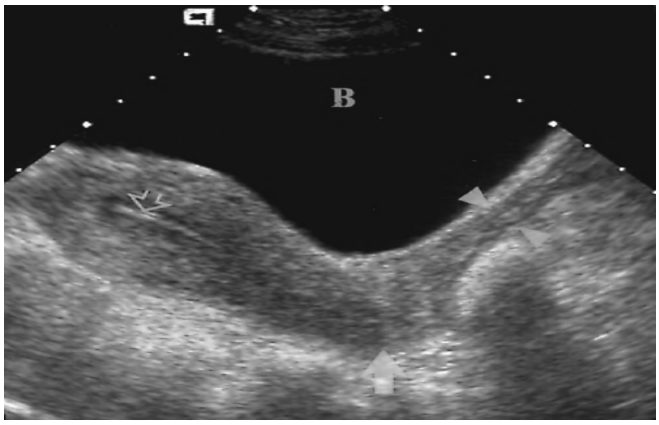
Hyperstimulated Ovaries

Ovarian Hyperstimulation

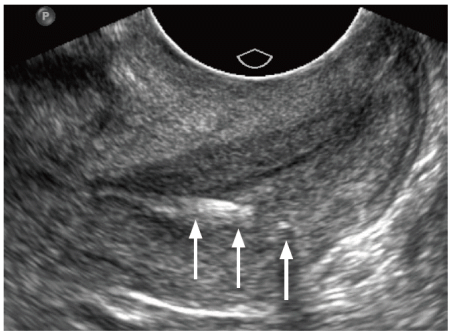
- Ovarian hyperstimulation syndrome (OHSS) is a medical condition affecting the ovaries of some women who take fertility medication to stimulate egg growth
- Too much hormone medication in your system can lead to ovarian hyperstimulation syndrome OHSS
- Ovaries become swollen and painful
- Most cases are mild, but rarely the condition is severe and can lead to serious illness or death
- Small number of women may develop severe OHSS, which can cause rapid weight gain, abdominal pain, vomiting and shortness of breath
- Less often, OHSS happens during fertility treatments using medications you take by mouth, such as clomiphene (Clomid, Serophene)
- Occasionally OHSS occurs spontaneously, not related to fertility treatments

Kasum M. New insights in mechanisms for development of ovarian hyperstimulation syndrome. Coll Antropol. 2010;34 (3): 1139-43.

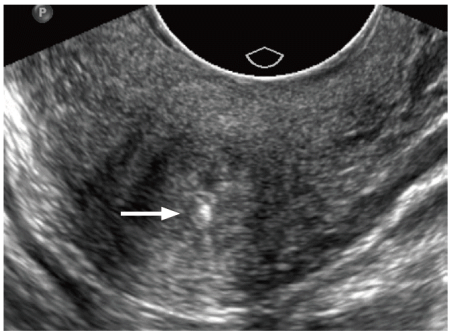
INTRAUTERINE DEVICES



INTRAUTERINE DEVICES

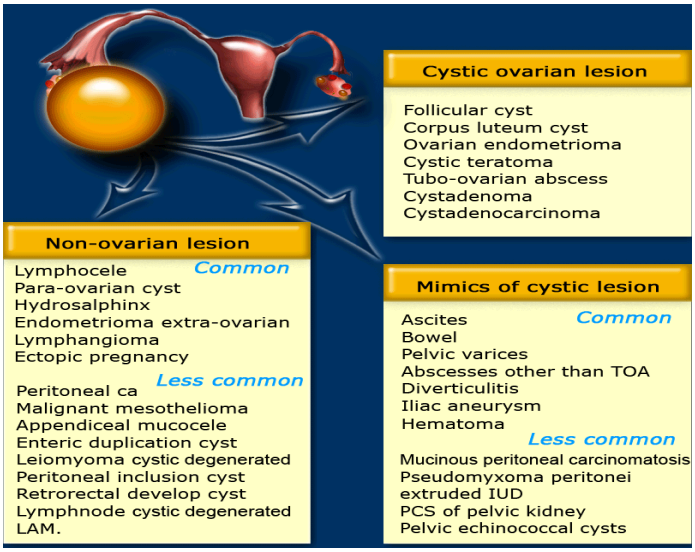


A



B

Not every cystic finding is from the ovary

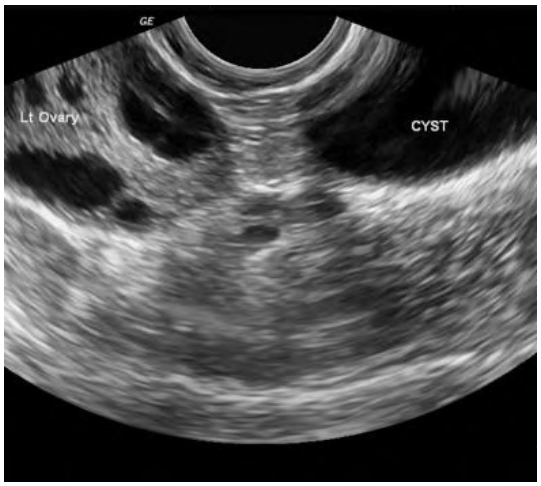


Paraovarian Cyst

Paraovarian Cyst

Ultrasound Characteristics:

- Typically thin-walled and smoothly marginated
- Most often appear as unilocular 'simple' cysts (in ~66%) and rarely as multilocular (~4%)
- A soft tissue nodule in the cyst may indicate development of a neoplasm (rare)

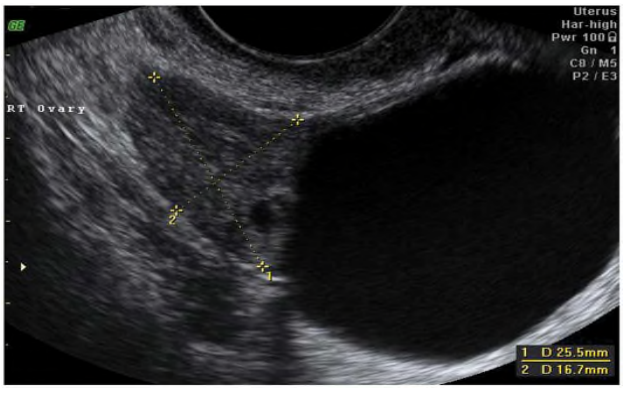


Paraovarian Cyst

- Fluid-filled mass that develops in the adnexa of the uterus
- Paraovarian cysts (POCs) are remnants of Wolffian duct in mesosalpinx that do not arise from the ovary
- They account for ~10-20% of adnexal masses
- They typically occur in women around the ages of 20-40 years old, but are commonly underdiagnosed in adolescence.
- Most paratubal cysts cause no symptoms at all
- Large cysts can cause pelvic pain or torsion

Athey PA, Cooper NB. Sonographic features of parovarian cysts. AJR Am J Roentgenol. 1985;144 (1): 83-6

Paraovarian Cyst



Paraovarian Cyst Complications

- Hemorrhage
- Rupture of the fallopian tube
- Ovarian torsion

Alpern MB, Sandler MA, Madrazo BL. Sonographic features of parovarian cysts and their complications. AJR Am J Roentgenol. 1984;143 (1): 157-60.

Paraovarian Cyst Treatment

- Large or symptomatic cysts often undergo surgical resection
- Smaller asymptomatic ones are treated conservatively
- For simple paratubal/paraovarian cysts with no suspicious features on ultrasound, follow-up recommendations are the same as for ovarian cysts
- Follow-up is recommended for cysts that are:
  - 5 to 7 cm in a woman of reproductive age
  - 1 to 7 cm in a postmenopausal woman
- **Irrespective of age, cysts larger than 7 cm warrant further evaluation (with MRI) or surgical review**

Levine D, Brown DL, Andreotti RF et-al. Management of asymptomatic ovarian and other adnexal cysts imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement. Radiology. 2010;256 (3): 943-54

Paraovarian Cyst and Fertility

- They do not affect the fertility of a woman in any way
- They are believed to originate from the remnants of embryonic development ducts
  - Studies are ongoing as to whether women with such cysts have an underlying subfertility
  - There are studies also regarding a possible association between the paratubal cysts in adolescents, and obesity and hyperandrogenism

Case Study:

- A 37-year-old woman presented for a pap smear. Patient denies problems. Bimanual exam reveals a voluminous ovarian mass. The personal history included menarche at 14 years old, regular periods and 2 pregnancies completed by cesarean. She denied having experienced weight loss, fever, chills, night sweats, urinary tract symptoms, or other gastrointestinal complaints.

Differential Diagnosis:

- Ovarian Cyst
- Ovarian Cancer
- Paraovaraian/Paratubal Cyst
- Pedunculated fibroid

Clinical Findings

- Weight of 55 kg and height of 160 cm
- During a deep abdominal palpation a smooth, round, rubbery mass, non-adherent to the surrounding tissues
- Vaginal bleeding was found
- Laboratory tests within normal limits
- CA 125 wnl

Ultrasound Findings

What's the Diagnosis?

Treatment

- Laparoscopic cystectomy

Hydrosalpinx

Hydrosalpinx

- Hydrosalpinx is a descriptive term and refers to a fluid filled dilatation of the fallopian tube
- A hydrosalpinx results from an accumulation of secretions when the tube is occluded at its distal end or both ends
- On rare occasions, transient distention of the fallopian tubes occurs because of retrograde passage of blood from the uterus without complete distal occlusion

Benjaminov O, Atri M. Sonography of the abnormal fallopian tube. AJR Am J Roentgenol 2004;183(3):737–742

Causes of Hydrosalpinx

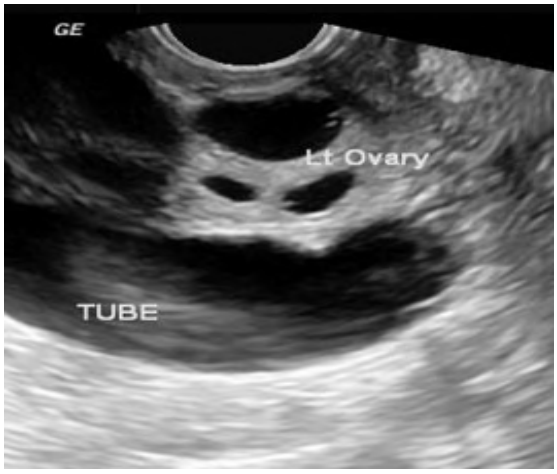
- Endometriosis
- Ovulation induction
- Pelvic inflammatory disease
- Post-hysterectomy
- Tubal ligation
- Tubal malignancy

Horrow MM, Rodgers SK, Naqvi S. Ultrasound of pelvic inflammatory disease. Ultrasound Clin 2007;2(2):297–309.

Hydrosalpinx

Ultrasound Characteristics:

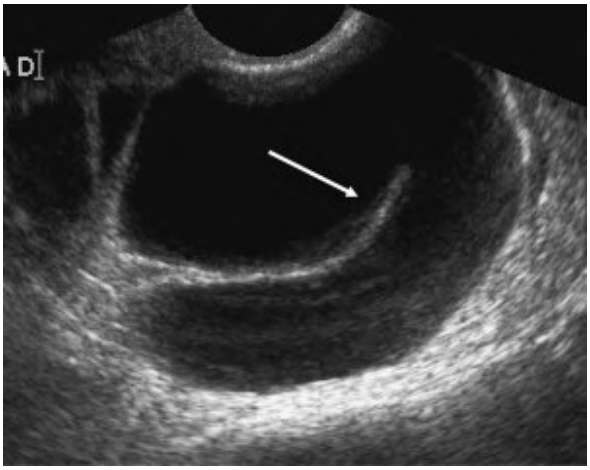
- Distinct from the uterus and ovary
- Thin- or thick-walled (in chronic cases)
- Elongated or folded, tubular, C-shaped, or S-shaped fluid-filled structure
- "Waist Sign" (indentations on opposite sides)
- "Cogwheel" appearance when imaged in cross section
- "Beads on a String" sign
- Sometimes the dilated fallopian tube may not show longitudinal folds
- A significantly scarred hydrosalpinx may present as a multi-locular cystic mass with multiple septa (often incomplete) creating multiple compartments



Levine D, Brown DL, Andreotti RF, et al. Management of asymptomatic ovarian and other adnexal cysts imaged at US Society of Radiologists in Ultrasound consensus conference statement. Ultrasound Q. 2010;26(3):121–131.

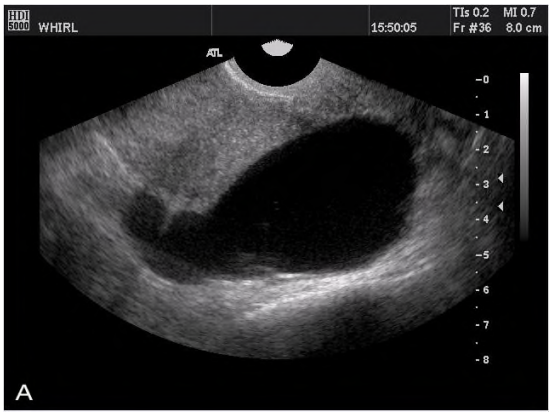
Hydrosalpinx

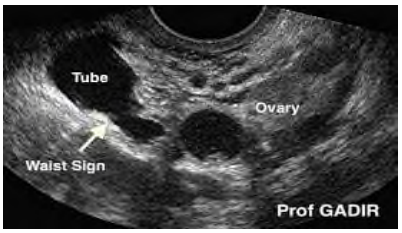
Fold over



Hydrosalpinx

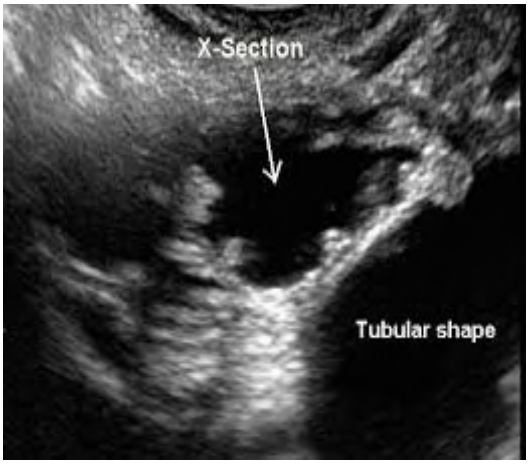
Waist Sign





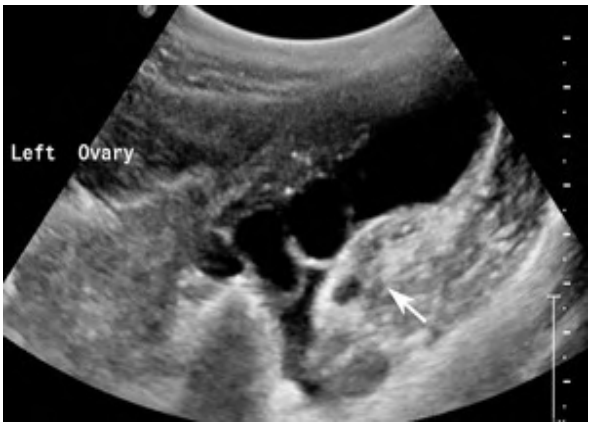
Hydrosalpinx

"Cogwheel" Appearance



Hydrosalpinx

"Beads on a String"



Hydrosalpinx and Fertility

- The average expected IVF success rate is lower compared to that expected in a similar patient without a hydrosalpinx
- If there are bilateral hydrosalpinges, studies have shown that the expected IVF success rate is lower than with a hydro on one side
- In general, studies suggest that the chances for live birth are reduced about 25% with a hydro present

Management of hydrosalpinx before IVF: A literature review. S. D'Arpe, S. Franceschetti, J. Caccetta, D. Pietrangeli, L. Muzii & P. B. Panici. Journal of Obstetrics and Gynaecology Vol. 35 , Iss. 6,2015

Why Does Hydrosalpinx Lower IVF Success?

- Toxins in the hydro fluid could have a negative influence on the embryos
- Reduced implantation potential by altering the receptivity of the uterine lining
- Reduced implantation by altering uterine contractility patterns
- A mechanical flushing effect on the embryos by fluid from the tubes

Zeyneloglu HB, Arici A, Olive DL. Adverse effects of hydrosalpinx on pregnancy rates after in vitro fertilization–embryo transfer. Fertil Steril 1998;70:492–9

Hydrosalpinx Treatment

- Remove the hydrosalpinx by laparoscopic surgical excision
- Ligate or clip them prior to IVF
- Open the end of the tube (to allow for drainage) and leave them in place (not usually recommended)
- ESSURE (hysteroscopic tubal occlusion)

Bin Xu, Qiong Zhang, Jing Zhao, Yonggang Wang, Dabao Xu, Yanping Li. (2017) Pregnancy outcome of in vitro fertilization after Essure and laparoscopic management of hydrosalpinx: a systematic review and meta-analysis. Fertility and Sterility 108:1, pages 84-95.e5.

Case Study: Hydrosalpinx

A 25 y/o woman presents with a history of chronic dull pain in the lower abdomen for the past 3 months. Patient is a G0P0. Patient reports trying to conceive for 2 years without success. She has a past history of pelvic inflammatory disease, for which she was treated.

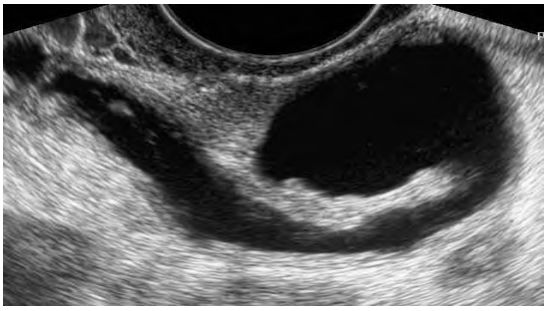
Differential Diagnosis: Hydrosalpinx

- Endometriosis
- Ovarian Cyst
- Hydrosalpinx

Clinical Findings: Hydrosalpinx

- Bimanual exam: slight left lower pelvic tenderness with palpation
- Temperature 98.6

Ultrasound Findings: hydrosalpinx



What's the Diagnosis?

Treatment

- Salpingectomy

Case Study

A 52 y/o patient presents to the clinic with right sided pelvic pain x 3 months with an increase in intensity. Pt is not sexually active. Pt denies abnormal discharge. Patient denies urinary symptoms. Regular bowel movements. Patient has a surgical history of partial hysterectomy 1 year ago.

Differential Diagnosis

- Ovarian cyst
- Ovarian cancer
- Hydrosalpinx
- Appendicitis

Clinical Findings

- Temperature wnl
- Last pap 1 year ago wnl, no history of abnormal paps
- Urine analysis wnl
- Bimanual exam reveals right sided tenderness

Ultrasound Findings

What's the Diagnosis?

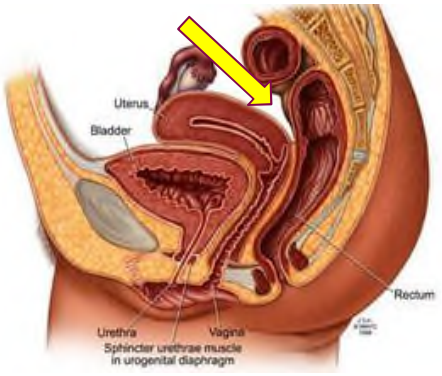
Treatment

- Laparoscopy
- Postsurgical findings confirmed the diagnosis of right-sided hydrosalpinx and pelvic adhesions.

Culdesac Fluid "Free Fluid"

Cul-De-Sac Fluid Accumulation

- Also known as the pouch of Douglas or rectouterine pouch, is an extension of the postero-inferior reflection of the peritoneal fold between the uterus (anteriorly) and rectum (posteriorly).
- It is the most inferior and dependent aspect of the peritoneal cavity and therefore the first location where free fluid accumulates.



Nyberg DA, Laing FC, Jeffrey RB. Sonographic detection of subtle pelvic fluid collections. AJR Am J Roentgenol. 1984;143 (2): 261-3

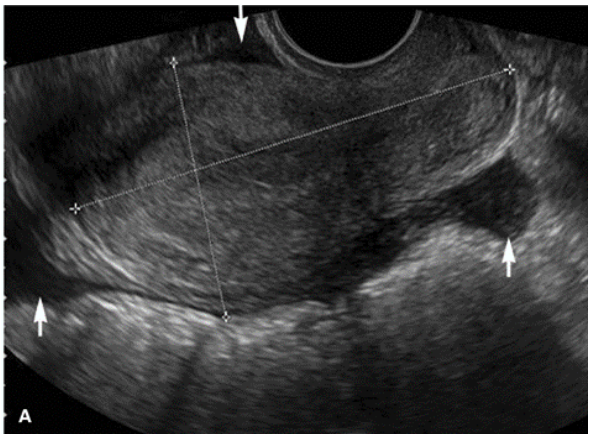
Causes of Culdesac Fluid Accumulation

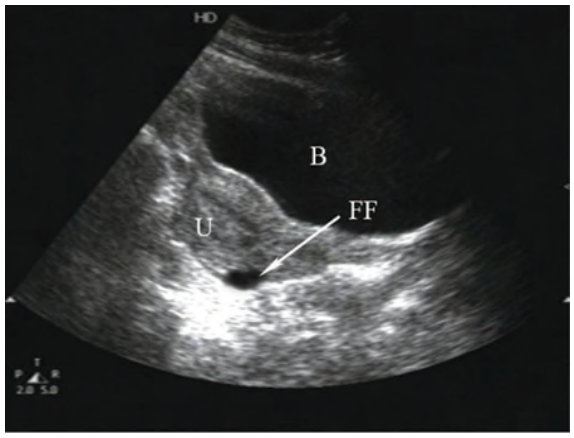
Physiologic	Pathologic
Ruptured Follicle / Cyst	Ruptured ectopic
Retrograde menstruation	Pelvic Inflammatory disease
Ovarian permeability to due estrogen influence	Tubo-ovarian abcess / hematoma
	Hydatiform mole
	Ovarian neoplasm

Nyberg DA, Laing FC, Jeffrey RB. Sonographic detection of subtle pelvic fluid collections. AJR Am J Roentgenol. 1984;143 (2): 261-3

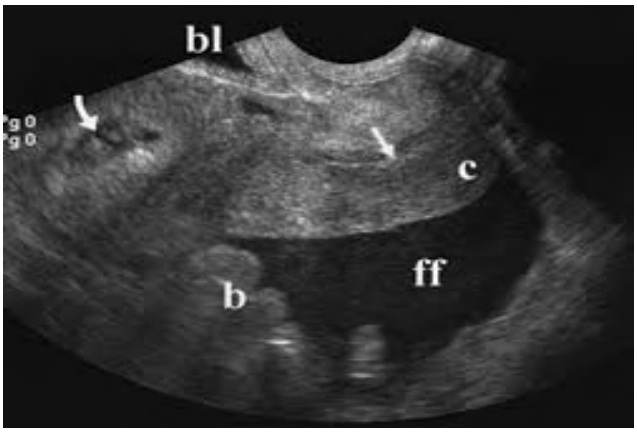
Nyberg DA, Laing FC, Jeffrey RB. Sonographic detection of subtle pelvic fluid collections. AJR Am J Roentgenol. 1984;143 (2): 261-3

Small Amount of Cul-Da-Sac Fluid

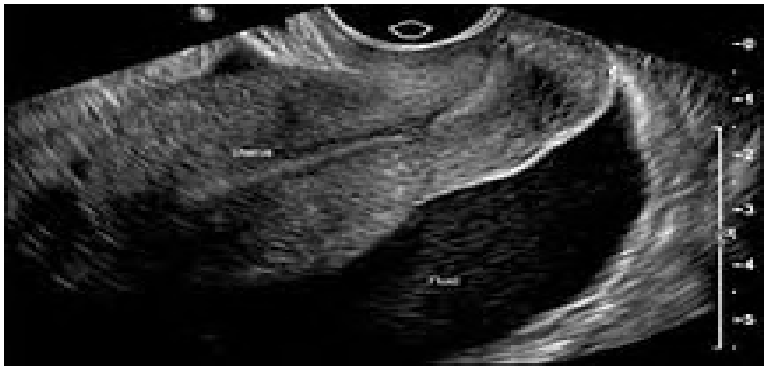




Large amount of culdesac fluid



Hemoperitoneum



RECESS – 15 min

Early Pregnancy Evaluation

Early Pregnancy Evaluation

Why is it so important?

Common presentation

Risk of morbidity

Risk of mortality

It is important to the patient

Pelvic or Abdominal Pain and Uterine Bleeding or Spotting

15% of all pregnancies

Possibilities

Viable Intrauterine Pregnancy

Failed or Failing Intrauterine Pregnancy (abortion)

Ectopic Pregnancy

Pregnancy of Unknown Viability

Pregnancy of Unknown Location (PUL)

Spontaneous Abortion

Sporadic Miscarriage occurs in 1:4 women who become pregnant (25 out of 100 pregnant women)

Subclinical pregnancy loss is thought to be about 60% of all pregnancies

Incidence of clinically recognizable miscarriage in the general population has been consistently reported between 12-15%

Primigravida women and women with a history of live births have the lowest incidence of miscarriage at 4-5 %

Evaluation and Management of Early Pregnancy Loss. Stephanson M, Kutteh W. Clinical Obstetrics and Gynecology, 2007; Volume 50, Number 1, 132–145.
Reagan L, Rai R. Epidemiology and the medical causes of miscarriage. B Clinical Obstetrics and Gynaecology, 2000; Vol. 14, No. 5, pp. 839-854.

ECTOPIC PREGNANCY

1-2% of pregnancies in the US
(1-2 out of 100 pregnant women)

A leading cause of maternal morbidity*

Accounts for 6% of pregnancy related deaths in the US**

Mortality data from 2007 shows that deaths from EP have declined significantly to a 5 year US national average of 0.50 per 100,000 live births

21 deaths from EP annually

This is a decrease of 56.6% from rates in 1980-1984

African-American women 6.5x increased risk

Women over 35yo 3.5x increased risk

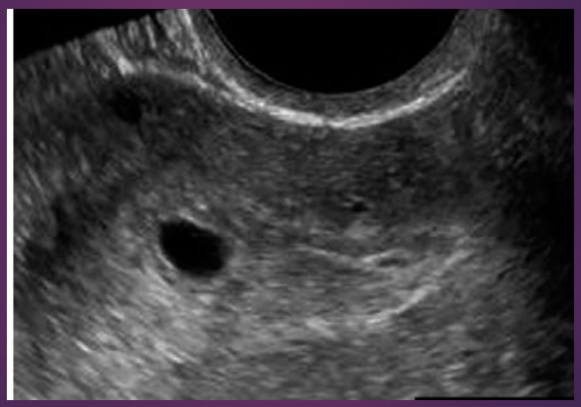
**Hoover KW, Tao G, Kent CK. Trends in the diagnosis and treatment of ectopic pregnancy in the United States. Obstet Gynecol. 2010; 115:495–502.*
***Creanga AA, Shapiro-Mendoza CK, Bish CL, Zane S, Berg CJ, Callaghan WM. Trends in ectopic pregnancy mortality in the united states, 1980–2007. Obstet Gynecol. 2011; 117:837–43.*

Sequence of Ultrasonographic Progress in Early Pregnancy

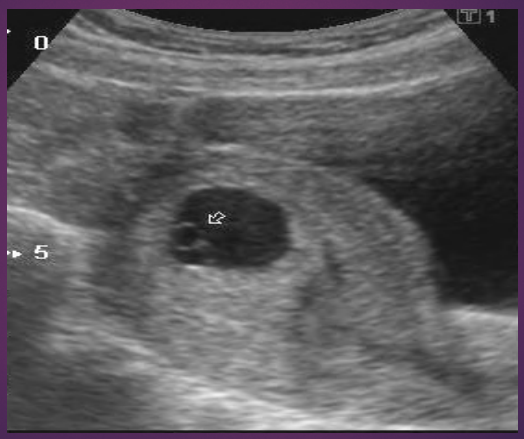
5 weeks	+GS:	small cystic fluid collection with rounded edges and no visible contents, located in the central echogenic portion of the uterus.
5 ½ weeks	+YS:	3-5mm circular structure inside the gestational sac.
6 weeks	+FP:	fetal pole (embryo) first seen adjacent to the yolk sac with a pulse.

Society of Radiologists in Ultrasound Multispecialty Consensus Conference on Early First Trimester Diagnosis of Miscarriage and Exclusion of a Viable Intrauterine Pregnancy, October 2012.

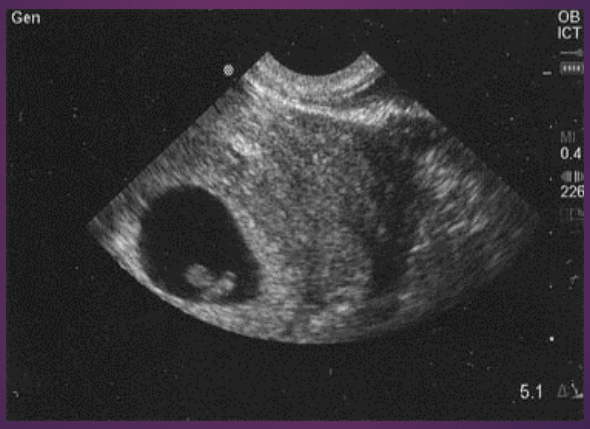
5 weeks: intrauterine gestational sac



5 ½ weeks: intrauterine gestational sac with a yolk sac



6 weeks: Intrauterine GS with YS and fetal pole +FCA



Guidelines for Transvaginal Ultrasonographic Diagnosis of Pregnancy Failure in a Woman with an Intrauterine Pregnancy of Uncertain Viability.*

Findings Diagnostic of Pregnancy Failure

Crown–rump length of ≥7 mm and no heartbeat

Mean gestational sac diameter of ≥25 mm and no embryo

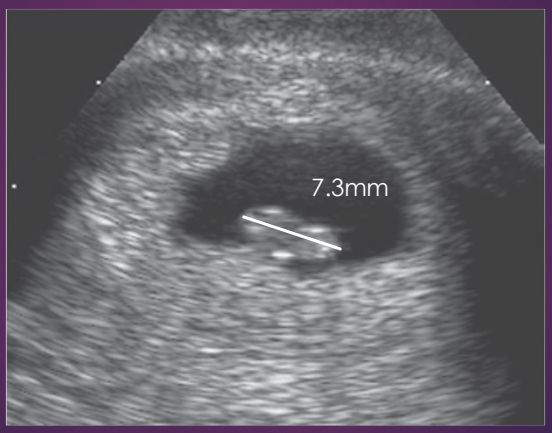
Absence of embryo with heartbeat ≥2 weeks after a scan that showed a gestational sac without a yolk sac†

Absence of embryo with heartbeat ≥11 days after a scan that showed a gestational sac with a yolk sac†

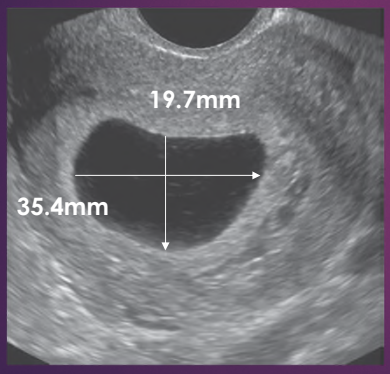
** Criteria are from the* ***Society of Radiologists in Ultrasound Multispecialty Consensus Conference on Early First Trimester Diagnosis of Miscarriage and Exclusion of a Viable Intrauterine Pregnancy, October 2012.***

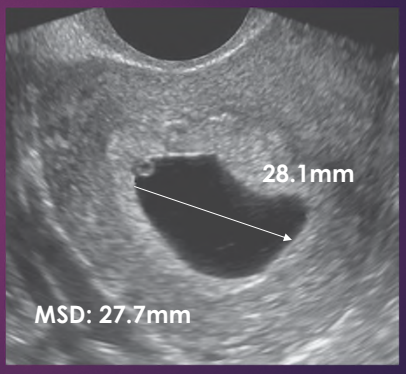
† When there are findings suspicious for pregnancy failure, follow-up ultrasonography at 7 to 10 days to assess the pregnancy for viability is generally appropriate.

CRL >7mm without FCA

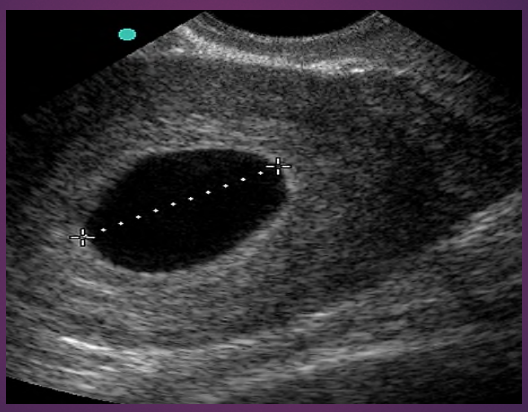


Mean Sac Diameter: measured as the average of the sagittal, transverse, and anteroposterior diameters of the sac greater than 25mm

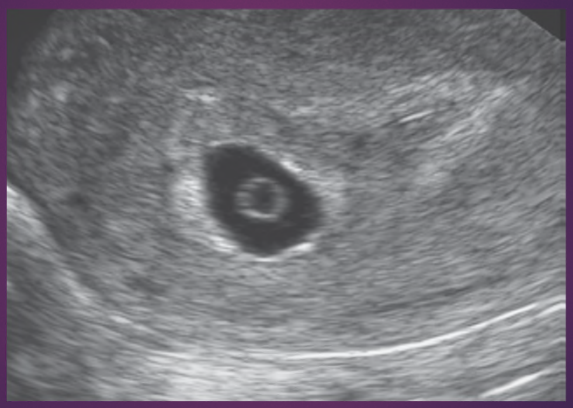




Empty Gestational Sac with no embryo with a heartbeat in 14 days



Absence of embryo with +FCA 11 days after a +YS



Pregnancy of Uncertain Viability or Pregnancy of Unknown Location (PUL)

Not a diagnosis

It is a stage in transition towards a diagnosis

It is fair to say PUL as long as we understand it is not a final diagnosis

Quant bHCG

Threshold of ≥3000mIU with TVUS

A single measure is a point in time
Two measures give you direction

48 hour rise:
99% viable IUPs increase by 53%
21% of EPs increase by 53%

Barnhart KT, Sammel MD, Rinaudo PF, Zhou L, Hummel AC, Guo W. Symptomatic patients with an early viable intrauterine pregnancy: HCG curves redefined. Obstet Gynecol 2004;104:50–5.

Seeber BE, Sammel MD, Guo W, Zhou L, Hummel A, Barnhart KT. Application of redefined human chorionic gonadotropin curves for the diagnosis of women at risk for ectopic pregnancy. Fertil Steril 2006;86:454–9.

Quantitative bhCG
In conjunction with TransVaginal Ultrasound

- Can be used to assure viability or non viability
- Most useful when TVUS is non diagnostic, or with PUL
- Has allowed earlier and more accurate diagnosis of pregnancy complications
- Has led to interruptions of likely viable intrauterine pregnancies
- Has led to mistaken use of Methotrexate and subsequent iatrogenic complications

Methotrexate

Medical termination of ectopic pregnancies with methotrexate in the US*

11% in 2002

35% in 2007

Surgical intervention rate for ectopic pregnancy*

73.9% in 2002

64.9% in 2007

Methotrexate, a folic acid antagonist, is a major human teratogen

Category X

Methotrexate Embryopathy**

**Hoover KW, Tao G, Kent CK. Trends in the diagnosis and treatment of ectopic pregnancy in the United States. Obstet Gynecol 2010; 115:495-502.*

***Chapa JB, Hibbard JU, Weber EM, Abramowicz JS, Verp MS. Prental diagnosis of methotrexate embryopathy. Obstet and Gynecol 2003;101:1104-7.*

Table 3. Diagnostic and Management Guidelines Related to the Possibility of a Viable Intrauterine Pregnancy in a Woman with a Pregnancy of Unknown Location.*

Finding	Key Points
No intrauterine fluid collection and normal (or near-normal) adnexa on ultrasonography†	A single measurement of hCG, regardless of its value, does not reliably distinguish between ectopic and intrauterine pregnancy (viable or nonviable) If a single hCG measurement is **<3000mIU/ml**, presumptive treatment for ectopic pregnancy with the use of methotrexate or other pharmacologic or surgical means should not be undertaken, in order to avoid the risk of interrupting a viable intrauterine pregnancy. If a single hCG measurement is ≥3000 mIU/mL, a viable intrauterine pregnancy is possible but unlikely. However, the most likely diagnosis is a nonviable intrauterine pregnancy, so it is generally appropriate to obtain at least one follow-up hCG measurement and follow-up ultrasonogram before undertaking treatment for ectopic pregnancy.
Ultrasonography not yet Performed	The hCG levels in women with ectopic pregnancies are highly variable, often <1000 mIU/ml, and the hCG level does not predict the likelihood of ectopic pregnancy rupture. Thus, when the clinical findings are suspicious for ectopic pregnancy, transvaginal ultrasonography is indicated even when the hCG level is low.

** Criteria are from the Society of Radiologists in **Ultrasound Multispecialty Consensus Conference on Early First Trimester Diagnosis of Miscarriage and Exclusion of a Viable Intrauterine Pregnancy, October 2012.***
† Near-normal (i.e., inconsequential) adnexal findings include corpus luteum, a small amount of free pelvic fluid, and paratubal cyst.

Still Unsure?

You still have a pregnancy of unknown location

You have assured a non-viable pregnancy

You are still concerned for ectopic…

Endometrial evacuation for diagnosis

+Villi, then also achieved treatment

-Villi, then treat for ectopic

Conclusions

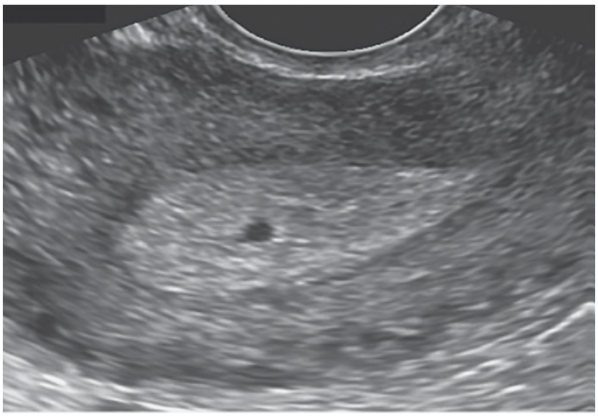
- Abdominal pain and bleeding is a common presentation in early pregnancy.
- A non viable intrauterine pregnancy is significantly more common than an ectopic pregnancy.
- Correctly diagnosing an early pregnancy problem is important to prevent significant morbidity and mortality.
- Pelvic ultrasound is "first line" in evaluation of early pregnancy problems. **There *are* defined criteria for diagnosis of a non viable early pregnancy.**
- A single qhCG is one point in time. **Quatitative hCG threshold is >3000mIU, for diagnosing an intrauterine pregnancy by TVUS**. Serial 48 hour qhCG levels gives direction and aids diagnosis.
- Pelvic Ultrasound in conjunction with qhCG levels have become a mainstay in the diagnosis and management of early pregnancy problems. It has markedly reduced the morbidity and mortality associated with ectopic pregnancy.
- Misuse, misinterpretation, or insufficient follow up, can lead to inadvertent misdiagnosis or inappropriate diagnosis and treatment of early pregnancy problems.
- There are variable options for the treatment of a missed abortion.

Case 1: Bleeding and cramping in early pregnancy

38yo G3P1 presents to your office with pelvic pain and spotting

- History of one CS and one TAB
- She suspected she was pregnant. She is not using birth control
- Her menstrual period is 2 weeks later than expected, but that is not terribly unusual for her.
- VSS. Her exam is benign. She has no active bleeding and her cervical os is closed
- She is ambivalent about the pregnancy

Office TVUS: 6 weeks by LMP



What is your next step?

Case 1: Bleeding and cramping in early pregnancy

- Serial HCG:

  1200mIU on day of presentation

  1500mIU in 48 hours
- Called and informed. Still asymptomatic. Follow up appointment made for 48 hours. Asked to repeat hCG prior to appointment (expected HCG 3000 mIU). Didn't do prior to appointment.
- In office. Well. VSS. Very mild cramping. Mild spotting.
- Office TVUS with minimal change: small fluid collection in the endometrial cavity. No YS. No FP. No adnexal masses. No free fluid.
- Now a desired pregnancy.
- Plan? Repeat qhCG in 48 hours

Case 1: Bleeding and cramping in early pregnancy

- Follow up qhCG:
  1700 mIU (previously 1200 then 1500)
- Called with results: Spotting stopped
  Mild cramping
  Anxiety high. Desired pregnancy
- Diagnosis?
  Non viable pregnancy of unknown location
- Plan?
  Endometrial sampling

Case 1: Bleeding and cramping in early pregnancy

- Manual Vacuum Aspiration done:
  Negative for villi
- Diagnosis?
  Ectopic Pregnancy
- Treatment?
  Methotrexate, single dose
- Appropriate drop in hCG. Followed with weekly bHCG to zero

Case: Bleeding and cramping in early pregnancy

23yo G1P0 presenting with diffuse pelvic pain and mild spotting

- Did not know she was pregnant. This is not a desired pregnancy.
  Is unsure about her last menstrual period
  Bleeding is on and off, variably heavy
- VSS. Abdominal exam is benign. Mild tenderness on pelvic exam.
  Cervical os is closed and pin point. No blood is noted. No abnormal discharge.
  Cervical cultures attained
- What is your next step?
  Transvaginal ultrasound

Case: Bleeding and cramping in early pregnancy

Office TVUS: Thickened EMS at 1.73cm. No gestational sac. Ovarian cyst with low level echoes: "reticular pattern of internal echoes". No free fluid

What is your next step?

Case: Bleeding and cramping in early pregnancy

- **Serial HCG:**

  490 mIU on day of presentation ----→ 540 mIU in 48 hours
- Called and informed. Still with cramping and variable bleeding. Follow up appointment made for the next day. Asked to repeat hCG prior to appointment. Did not do it.
- In office. Very mild cramping. Mild spotting. VSS. Distractible to pain. Dark blood in vault.

  Bedside TVUS with EMS 2.8cm, slightly thicker. No GS. No YS. No FP. Stable ovarian cyst with reticular layering of internal echoes. No free fluid.
- Still an undesired pregnancy. She would like immediate treatment. She has heard of Methotrexate.
- Diagnosis? Non viable pregnancy of unknown location
- Plan?

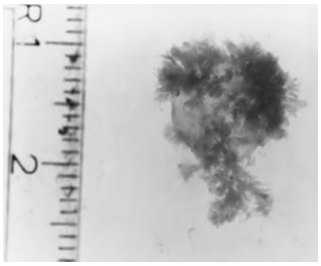
  Repeat qhCG or Endometrial Sampling

Case: Bleeding and cramping in early pregnancy

- Cervical cultures negative
- Manual Vacuum Aspiration done:
- Diagnosis?

  Non viable IUP / Missed abortion
- Treatment?

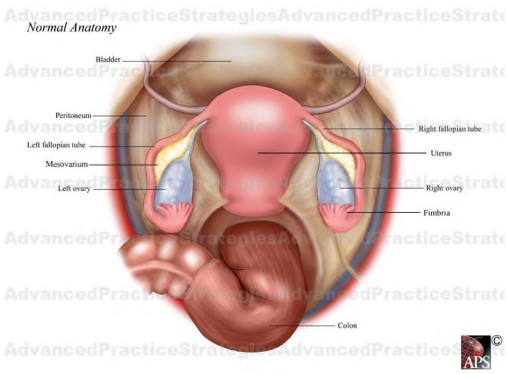
  Completed. IUD placed post MVA.

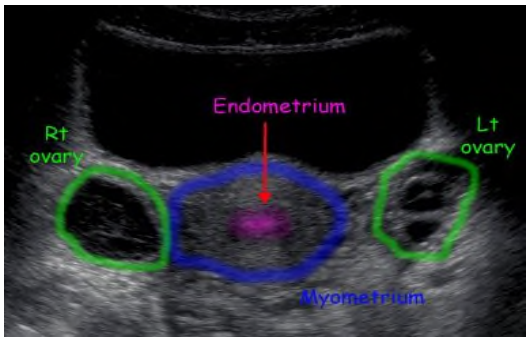


RECESS – 15 min

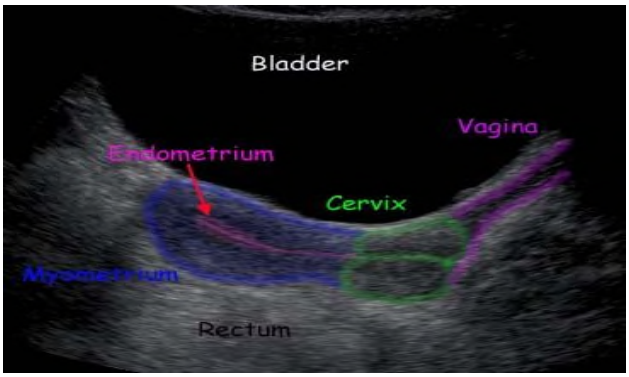
Uterine Imaging

Uterus Transabdominal View

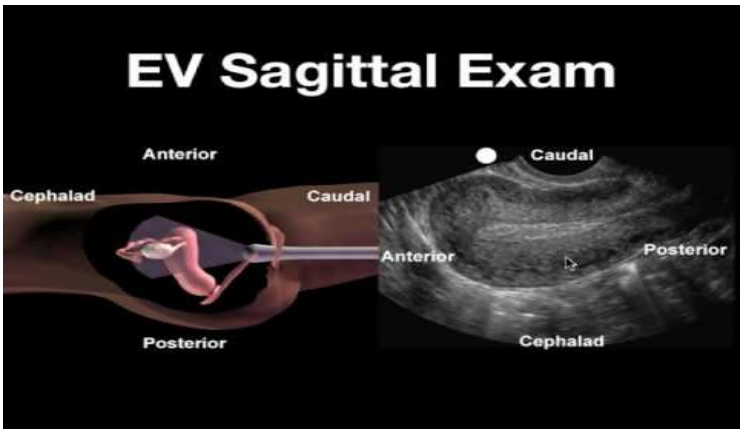




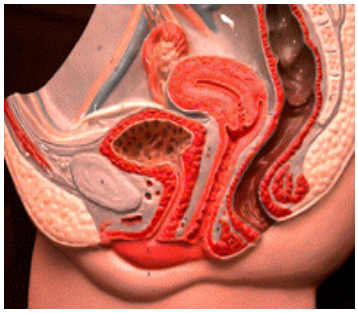
Uterus Sagittal Image



TRANSVAGINAL SAGITTAL VIEW

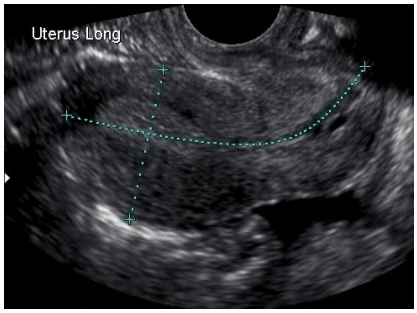


Uterus Sagittal Images



model

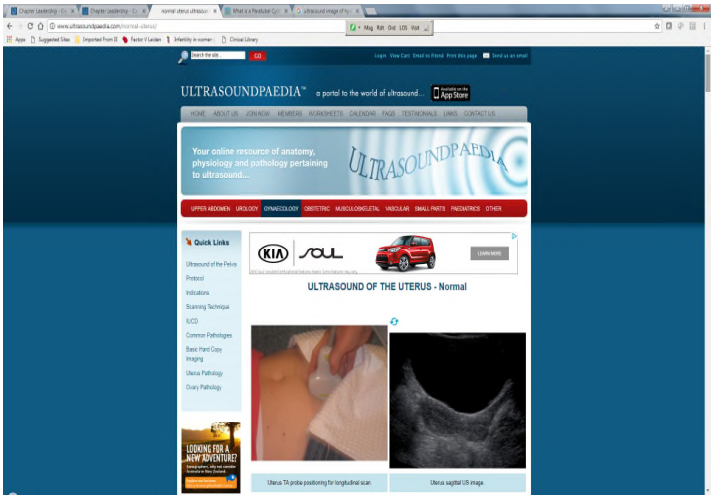
MRI



TVUS

Uterus Evaluation Techniques

http://www.ultrasoundpaedia.com/normal-uterus/

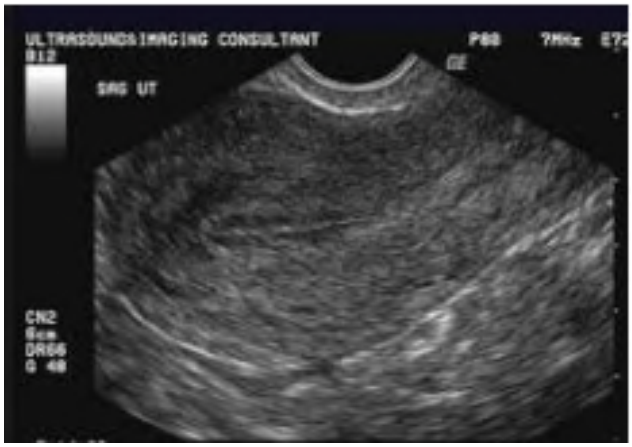


Normal Uterus

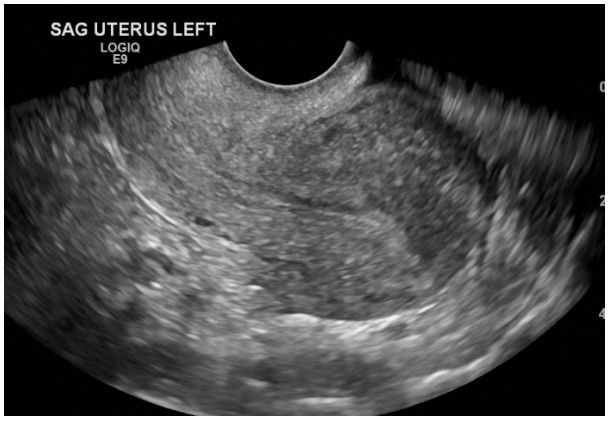
Normal Uterus

- Homogeneous myometrium
- Well defined borders
- Non-distorted endometrial lining
- Average size 7.6cm long by 4.5cm broad (~60gms)

Normal Uterus



Normal Uterus



Normal Uterus

Nabothian Cysts

Nabothian Cysts

- Also called ***mucinous retention cysts*** or ***epithelial cysts***
  - Common and benign
  - Considered a normal feature of the adult cervix
  - May be translucent or opaque, whitish to yellow
  - Range from a few millimeters to 3 to 4 cm in diameter
  - The transformation zone of the cervix (where columnar and squamous cells meet) is in a continuous process of repair, and squamous metaplasia and inflammation may block a gland orifice. The endocervical columnar cells continue to secrete but are covered by squamous epithelium, forming a mucinous retention cyst.
  - Nabothian cysts may also occur after childbirth or minor trauma
  - Generally asymptomatic and require no treatment

Nabothian Cysts

- Infrequently, a woman may experience fullness or pain from a substantially enlarged Nabothian Cyst
- Nabothian cyst and may be treated by electrocautery ablation or excision

Radiology description

- Anechoic well defined cystic lesions near the endocervical canal

Nabothian Cysts

Fibroid Uterus

Leiomyomas = Myomas = Fibroids

- Tumors of the uterine muscle. They are "abnormal" growths of the myometrial muscle.
- Very common: ~70-80% of the population.
- Some fibroids are not symptomatic at all. Some are very symptomatic. The associated symptoms very much have to do with its location and effects on surrounding structures.
- There is a lot of research regarding the genetic predisposition towards fibroids, as well as the morbidity associated with them.

FIBROID SYMPTOMS

PAIN PRESSURE BLEEDING

Symptom presentation depends on myoma position within the uterus.

- Pain may present as ***dysmenorrhea*** and may be caused by fibroids in any location, but most often by *intramural fibroids*.
- Pressure may present as ***bulk symptoms***, ***abdominal pressure***, ***bladder pressure***, ***rectal pressure*** and is most often caused by large fibroids *serosal fibroids or pedunculated fibroids*
- ***Bleeding*** is usually in the form of menorrhagia (heavy menses), but can include persistent, intermenstrual bleeding or even hemorrhage and are most often caused by *submucosal fibroids*.

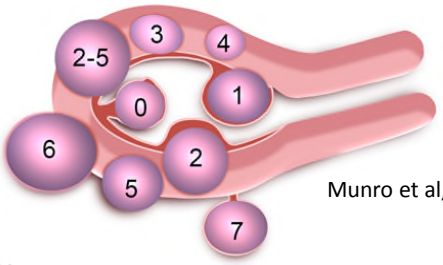
Fibroid Classifications

Traditional	FIGO Staging	Description
Intracavitary	Type 0	pedunculated into uterine cavity
Submucosal	Type 1 Type 2	>50% in the cavity ≤50% in the cavity
Intramural	Type 3 Type 4	Contact with endometrium Entirely in the myometrium
Subserosal	Type 5 Type 6	≥50% intramural <50% intramural
Pedunculated	Type 7	Pedunculated outside corpus
Other	Type 9	Cervical / parasitic

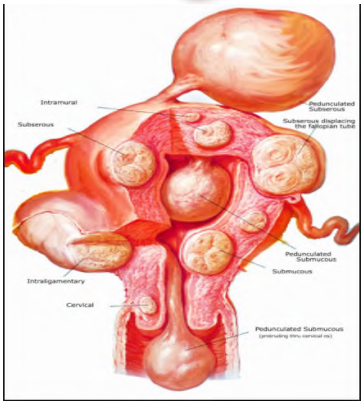
FIBROID CLASSIFICATIONS

Traditional	FIGO Staging	Description
Intracavitary	Type 0	pedunculated into uterine cavity
Submucosal	Type 1 Type 2	>50% in the cavity ≤50% in the cavity
Intramural	Type 3 Type 4	Contact with endometrium entirely in the myometrium
Subserosal	Type 5 Type 6	≥50% intramural <50% intramural
Pedunculated	Type 7	Pedunculated outside corpus
Other	Type 9	Cervical / parasitic

Munro, M et al,. Journal of Minimally Invasive Gynecology, Vol 19, No 2, March/April 201



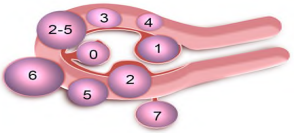
Munro et al, 2012

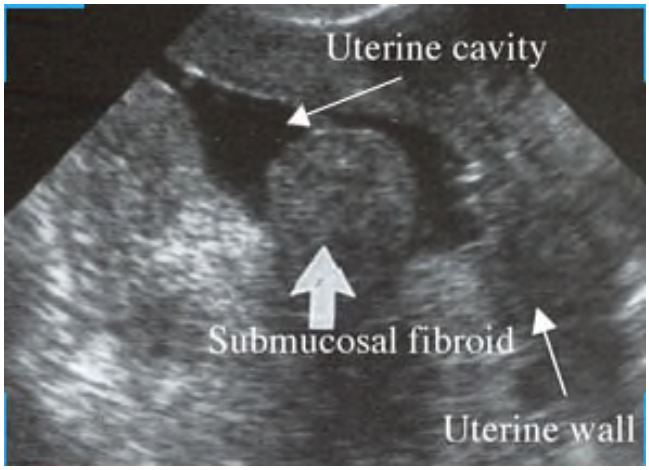


SUBMUCOSAL FIBROIDS

TYPE 0-1-2

- Estimated to represent 5–10% of all leiomyomas, although this may be an underestimate due to diagnostic difficulties.
- These myomata are rarely discovered during bimanual examination.

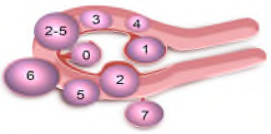




SUBMUCOSAL FIBROIDS

TYPE 0-1-2

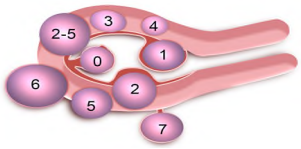
- May cause ***menorrhagia*** and ***infertility*** due to distortion of the endometrium.



SUBMUCOSAL FIBROIDS

TYPE 0-1-2

- A pedunculated submucosal myoma is at risk for ***torsion or expulsion*** with or without ***hemorrhage*** through the cervical os.
- Infection and ***necrosis*** can occur because blood supply is often insufficient.



Case: Submucous Fibroid

45yo G2P2 presenting with a history of dysmenorrhea and very heavy menstrual cycles. Getting heavier.

Feels weak. Sometimes light headed. No SOB or CP.

Married, single sex partner

LMP monthly, 8-9 days, heavy, crampy.

VSS P 105, regular

Gen: pale, tired. Non-toxic

Vaginal: no lesions, no abnormal discharge. Dark blood in vault. No active bleeding.

BME: uterus 10 weeks size, mobile, non-tender.

Bedside TVUS done:

Uterus with mild heterogeneity. Endometrial echo distorted by anterior submucous fibroid.

Normal ovaries bilaterally. No FF

Urine pregnancy test neg
Hgb 6.9
Plts 276
Endometrial biopsy done

Scheduled for an SIS (saline infusion sonogram)

Case: Submucosal Fibroid

SIS done. Difficult due to high pressure.

2.4cm Type 1 submucous fibroid delineated

Referred for treatment options

Case: Submucosal Fibroid

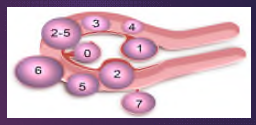
Patient offered options:

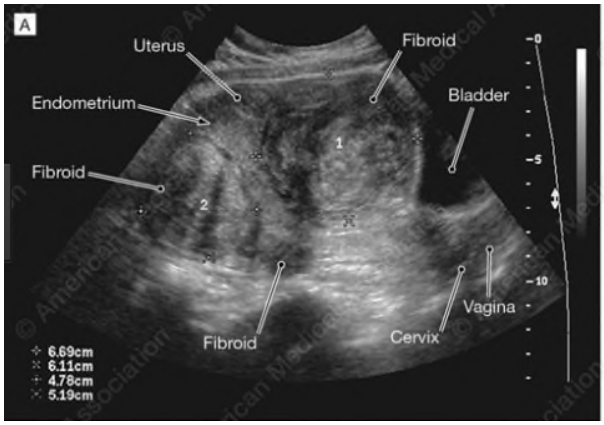
- Hysteroscopic resection
- Vaginal myomectomy
- Hysterectomy

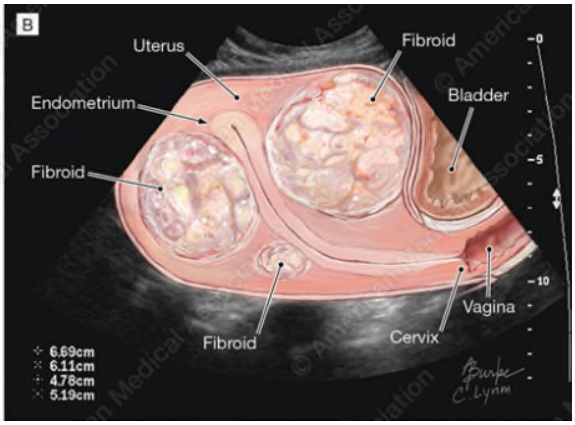
Possible blood transfusion

Iron load

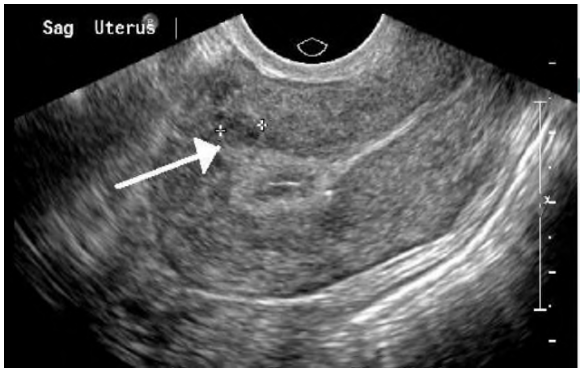
Intramural Fibroids: Types 3-4

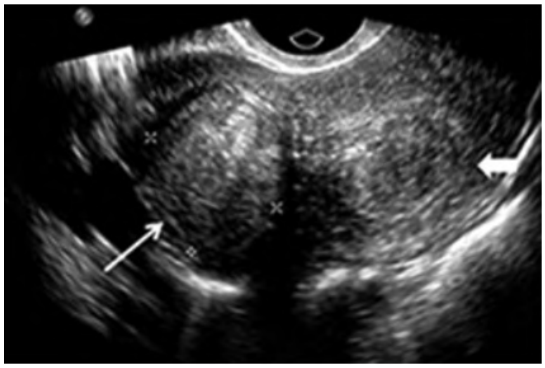




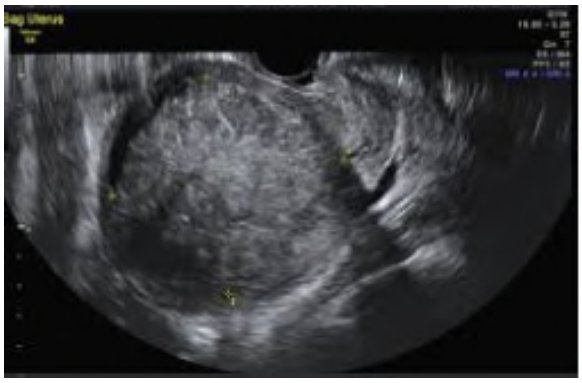


Intramural Fibroids: Type 3-4





Intramural Fibroids



Case: Intramural Fibroid

36yo G1P0 presenting with complaints of increasing abdominal girth. Has lost about 20lbs and has noticed this bulk in her pelvis and into her abdomen. She has been losing weight n preparation for trying to get pregnant.

Monogamous, male partner h/o first trimester SAB, 6yrs ago

LMP: monthly, regular, 3-4 days. Sometimes crampy.

VSS

Gen: well, appropriate

Abdomen: Uterus palpable to around 16cm. Mobile, non tender

Vaginal: normal, no lesion, no abnormal discharge. No bleeding

BME: Uterus 16-17weeks, lobular, mobile in pelvis. Non tender.

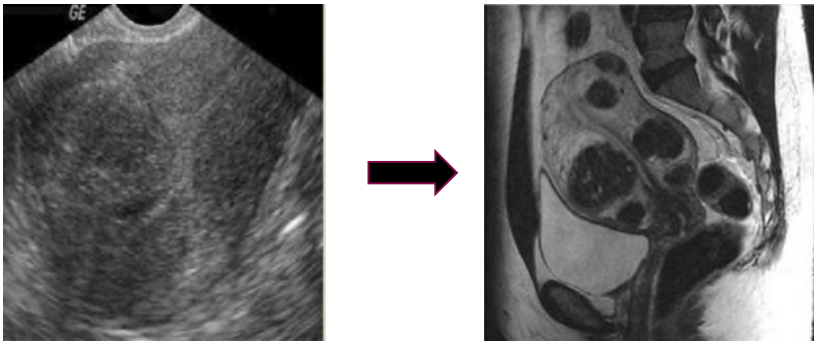
TVUS done but no good visualization not so good due to size. Endometrial echo thin and homogeneous.

Abdomen sono: heterogenous uterus filling the pelvis.

Urine pregnancy test negative
Hgb: 12.5
Plts: 239

MRI ordered
Referral sent to Gen Gynecology

Case: Intramural Fibroid



MRI confirms multiple intramural fibroids, types 3-4.

Case: Intramural Fibroid

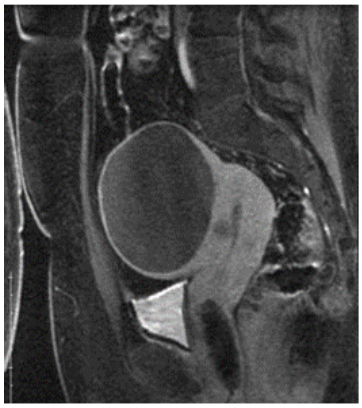
Patient offered options based on desired fertility. Uterine preservation:

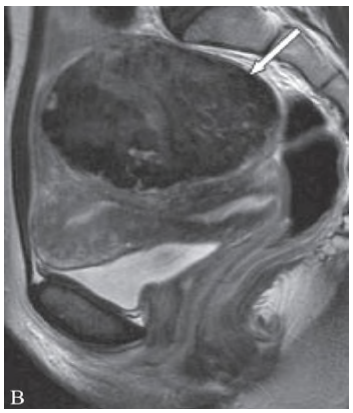
- Depot Lupron
- Iron load
- Myomectomy, Laparoscopic vs Abdominal

If did not desire future fertility:

- Uterine Artery Embolization
- Hysterectomy, Laparoscopic

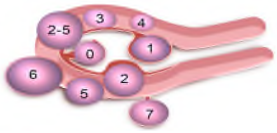
Fibroids and MRI

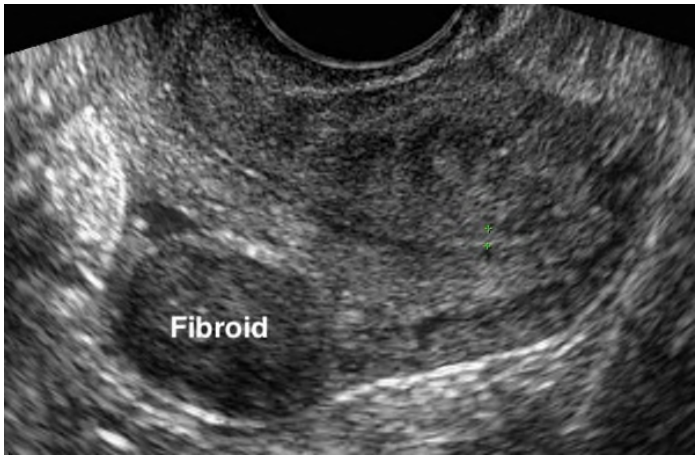




Subserosal Fibroids Types 5-6

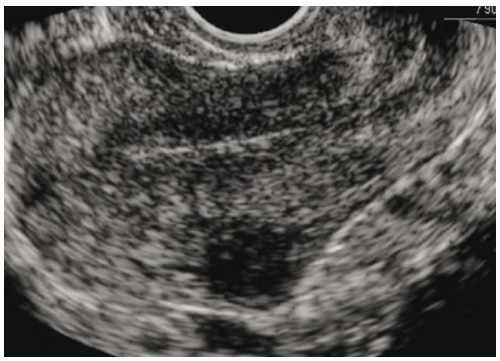
- Subserosal myomata are located just beneath the covering peritoneum of the uterine corpus.
- Subserosal myomata may become pedunculated, grow into the peritoneal cavity, and cause local ***pressure*** on the bladder and bowel.

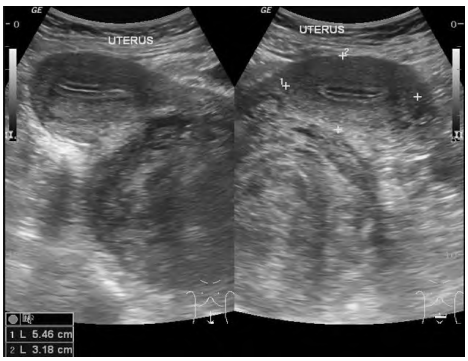




1 – Kotdawala, P et al. J Midlife Health. 2013 Jan-Mar; 4(1): 16–21.

Subserosal fibroids, Types 5-6





Case: Subserosal Fibroid

42yo G5P5 female presenting for a routine gynecologic exam. Menstrual history is normal. She has no complaints.

SVD x 5
Married, male, monogamous
Uses condoms for contraception

VSS

Gen: well

Abdomen: sott, non tender

Vaginal: normal, no lesions.

BME: Uterus with posterior component, mobile, non tender.

Pap/HPV done

MMG ordered

Routine screens ordered:
CBC, Hgb A1c. TSH, Cr, Lipids

Bedside sono done

Case: Subserosal fibroid

Posterior subserosal fibroid confirmed, type 5.

Patient asymptomatic.

Counseled as to prevalence of fibroids in the general population (~70%)

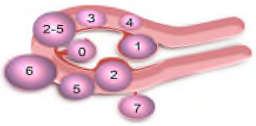
No interventions recommended.

LNG IUS discussed as an option for contraception.

Pedunculated Fibroids

Type 7

- Pedunculated subserosal myomata, are at risk for ***torsion***, ***infarction*** and ***necrosis***.
- Subserosal myomata that extend into the peritoneal cavity may be described as parasitic.



Case: Pedunculated Fibroid

42yo G3P2 presents with worsening pelvic pain. Has been coming and going, but now getting worse. At times severe. No abnormal vaginal discharge. No abnormal bleeding. No GI or GU symptoms.

Monogamous, male partner

LMP: monthly, regular, moderate flow

s/p BTL

VSS, Temp 100.2

Gen: tired, uncomfortable

Abdomen: soft, diffuse mild tenderness. Mild rebound. Guarding present.

Vagina: no lesions, no discharge

BME: uterus small, very tender, CMT present No masses palpable

Cervical cultures are attained

Could not get a good ultrasound at bedside due to pain/discomfort.

The gynecologist on call is informed, she is sent to the ED for further evaluation.

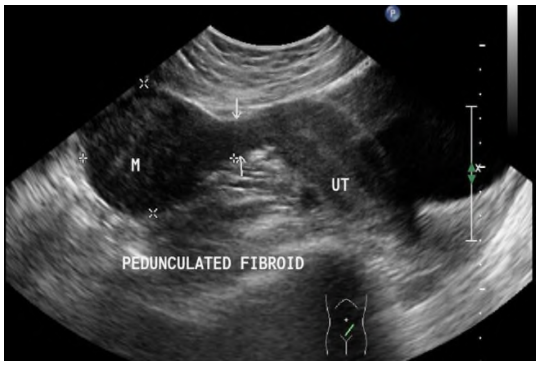
WBC: 14.2

Plts: 334

UA: neg LE / neg Nitrates

Case: Pedunculated fibroid

The patient was medicated and an US was attained in Radiology: Pedunculated fibroid is noted. Otherwise normal uterus and ovaries



Diagnosis: Fibroid Degeneration vs Fibroid Torsion

Taken to the OR for diagnostic LS and myomectomy

Fibroid Degeneration

The arterial supply to the myomata is less than that of normal myometrium, and a myoma may degenerate when it outgrows it's own blood supply.

- These changes can be seen by US and MRI.
- May cause pain, discharge, bleeding, fever, necrosis, infection.

- **Cystic degeneration**
- **Myxoid degeneration**
- **Fatty degeneration**
- **Red degeneration**
- **Calcific degeneration**