Use of Ultrasound in the Provision of Abortion

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Overview

- Uses and indications of ultrasound in the provision of abortion
- Basic principles of pelvic sonography
- Ultrasonographic correlations in normal and abnormal early embryonic development, including ectopic pregnancy
- Uses and limitations of sonography in the provision of 1st trimester abortions
- Uses and limitations of ultrasound in post MAB management

First trimester US allows:

- Confirmation of IUP
- Confirmation embryonic life
- Determination of gestational age
- Determination of singleton or multiple gestations
- Essential component in managing 1st trimester vaginal bleeding and ectopic pregnancy

Applications of Ultrasound in the Provision of Abortion

- Determination of gestational age
- Determination of multiple pregnancies
- Confirmation of uterine position
- Assessment of ectopic pregnancies
- Assessment of uterine malformations or tumors that may interfere with the abortion procedure
- Direct ultrasound guidance
  - 2nd trimester procedures
  - Difficult procedures (Uterine malformations, obstructive lesions, failed prior attempts)
- Managing post procedure complications
- Establishing placental location and abnormal placentation (accreta) in 2nd trimester procedures

Is ultrasound always necessary in the provision of abortion?

- No
- Ultrasound scanning is not necessary for the provision of early abortion (RCOG 2000). Where it is available, ultrasound can aid the detection of ectopic pregnancies beyond about 6 weeks of pregnancy. Some providers find the technology helpful before or during abortion procedures at later stages of pregnancy

Safe Abortion: Technical and Policy Guidance for Health Systems. WHO 2003

Ultrasound and Medical Abortion

- Standard in US medical abortion trials
- Usage varies in international studies and settings
- Should be available for specific indications
- Useful, but not mandatory, with FDA-approved regimen
- More accurate dating
- Can monitor progress of Med AB
- Detection of early pregnancy abnormalities
- Useful in conjunction with hCG testing to diagnose ectopic pregnancy

PPGG

Indications for Sonography for Medical Abortion

- ***Pre-abortion:***
- 1. Gestational age > 8 weeks
- 2. Size/dates discrepancy
- 3. Uncertain LMP (or no menses - after delivery, abortion, stopping depo, etc)
- 4. Adnexal mass or pain
- 5. LMP at the end of a pack of oral contraceptives
- 6. Provider uncertainty with exam
- 7. History of previous ectopic pregnancy
- ***Post-abortion:***
- 1. History not consistent with successful medical abortion (no bleeding, no cramping)
- 2. Woman still feels pregnant
- 3. HCG not declining
- 4. Provider uncertainty with history

Courtesy Dr. Suzan Goodman, MD, MPH

Abortion Surveillance --- United States, 2003

- 61% were performed at ≤8 weeks' gestation
- 88% at <13 weeks.
- Steady increases have occurred in the percentage of abortions performed at ≤6 weeks' gestation (26%)
- 4.1% at 16--20 weeks
- 1.4% at ≥21 weeks.

MMWR November 24, 2006 / 55(SS11);1-32

Basic principles of pelvic sonography

Guidelines for 1st trimester ultrasound Basic Principles

- Begin by scanning transabdominally. If TAUS fails to provide all the necessary info, TVUS should be done. Never omit doing TAUS, as large pelvic/adnexal masses may be missed.
- The converse is not true, you may not need to do a TVUS if all the diagnostic information was obtained by TAUS.

Guidelines for 1st trimester ultrasound Basic Principles

Transabdominal ultrasound can be use solely or in conjunction with TV US beyond 7- 8 weeks gestation

A full bladder enhances visualization of the uterus and adnexa before 12 weeks gestation. Beyond 12-14 weeks it is not necessary

During transvaginal US a full bladder displaces the uterus and is not advantageous.

Guidelines for 1st trimester ultrasound Basic Principles

- Begin by evaluation for presence or absence of gestational sac in the uterus
- For positive identification of an IUP, the gestational sac (GS) must be seen in relation to the cervix. This is best seen in a sagittal view.
- Absence of GS needs to be correlated with serum HCG level (> 2000 highly suggests ectopic pregnancy)

Guidelines for 1st trimester ultrasound Basic Principles

- Use the mean GS diameter for calculation of GA when embryo/CRL is not seen

- GA is best determined by measurement of CRL up to 12 weeks of GA

Determination of Gestational Age mean gestational sac diameter

- Several formulas exist for estimating gestational age based on sac measurement
- Ultrasound machines have built-in software to calculate gestational age based on these measurements
- MGS diameter is less than 10 mm, many machines read as “out of range”.

- MGS diameter (mm) + 30 = gestational age (days)

- For example, MGS 7 mm, then 7 + 30 = 37 days or 5 weeks and 2 days

US correlation of embryonic development

- Gestational sac can be seen as early as 4 weeks and 1-3 days (2-3 mm sac)

- Yolk sac can be seen as early as mean GS size of 8mm, but no later than GS 20 mm
- The embryo can be seen as early as 5 to 6 weeks GA, which corresponds to a embryonic size of 1-2 mm. This correlates with a mean GS diameter of 5-12 mm. The absence of a identifiable embryo with a MGS of > 18- 20 mm is usually consistent with a failed IUP

Guidelines for 1st trimester US

- Fetal number should be always reported
  - Only sacs that contain embryonic structures should be reported as multiples (incomplete fusion of the amnion and chorion and sometimes intrachorionic hemorrhage may be mistaken for an additional GS.
  - Adequately assess chorionicity (best seen before 12 weeks. Difficult after 20 weeks).

Ultrasonographic correlations in normal and abnormal early embryonic development

- Presence or absence of fetal heart activity should be reported
- With a CRL of ≥ 5 mm fetal heart motion should be clearly appreciated.
- If CRL is < than 5 mm, a f/u US is necessary for confirmation of fetal viability
- The embryo grows 1 mm per day (CRL) in the first trimester

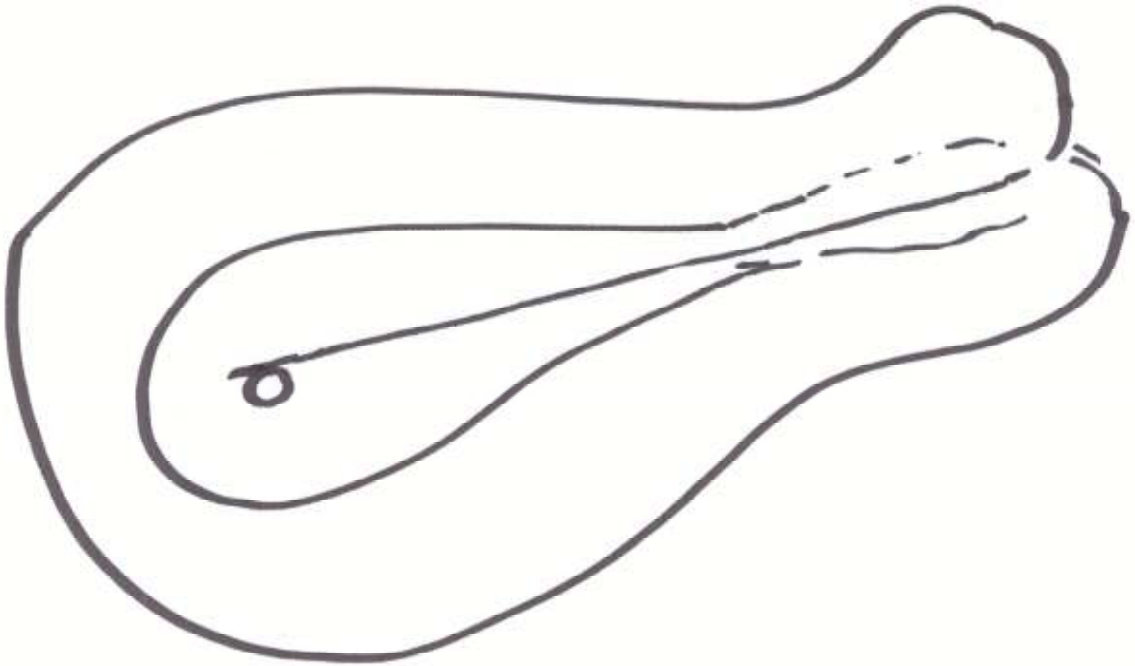
Guidelines for 1st trimester US

- Evaluation of the uterus, adnexa and cul-de-sac should be noted
  - Any abnormalities in the uterus (for example fibroids) and adnexa should be reported
  - Normal ovaries maybe difficult to visualize after 12-14 weeks
  - If fluid is seen in the cul-de-sac, evaluation of Morrison's pouch may be important in order to semi quantify the amount of free fluid.

Early gestational sac or pseudo sac?

- The intradecidual sign
  - Does not displace or deform the central cavity complex
  - Echogenic rim should be at last 2 mm thick

Intradecidual sign



- Double decidual sign
  - Useful before yolk sac or embryo can be seen
  - Always present when MGS diameter is >10 mm
  - 2 echogenic lines: smooth chorion & decidua capsularis and decidua parietalis separated by an hypoechoic line that represents the virtual uterine cavity

Double Decidual Sign

Ultrasound / β -HCG Correlations

- **Discrimination zone: β-HCG > 2000**
  - If no IUP, ectopic pregnancy likely.
  - DDx includes incomplete abortion or abnormal IUP

β-HCG doubling time

- **Normal IUP** : 66% rise in 48 hours
  - 15% of normal IUP have abnormal rise
- **Ectopics**: 17% have a normal rise

Symptomatic patients with an early viable intrauterine pregnancy: HCG curves redefined

- The slowest or minimal rise for a normal viable intrauterine pregnancy was 24% at 1 day and 53% at 2 days

***Obstetrics & Gynecology* 2004;104:50-55**

Ultrasonographic correlations in normal and abnormal early embryonic development

- If embryo or yolk sac cannot be identified, the presence of an IUP cannot be confirmed 100%
- A small fluid collection may give a similar appearance (pseudo GS) which can be seen in ectopic pregnancies.
- Pseudo sacs don’t have intradecidual sign (double decidual ring) and are located within the uterine cavity (early IUPs are slightly extrinsic), and have a “tear drop” shape

Gestational sac vs. Pseudo sac

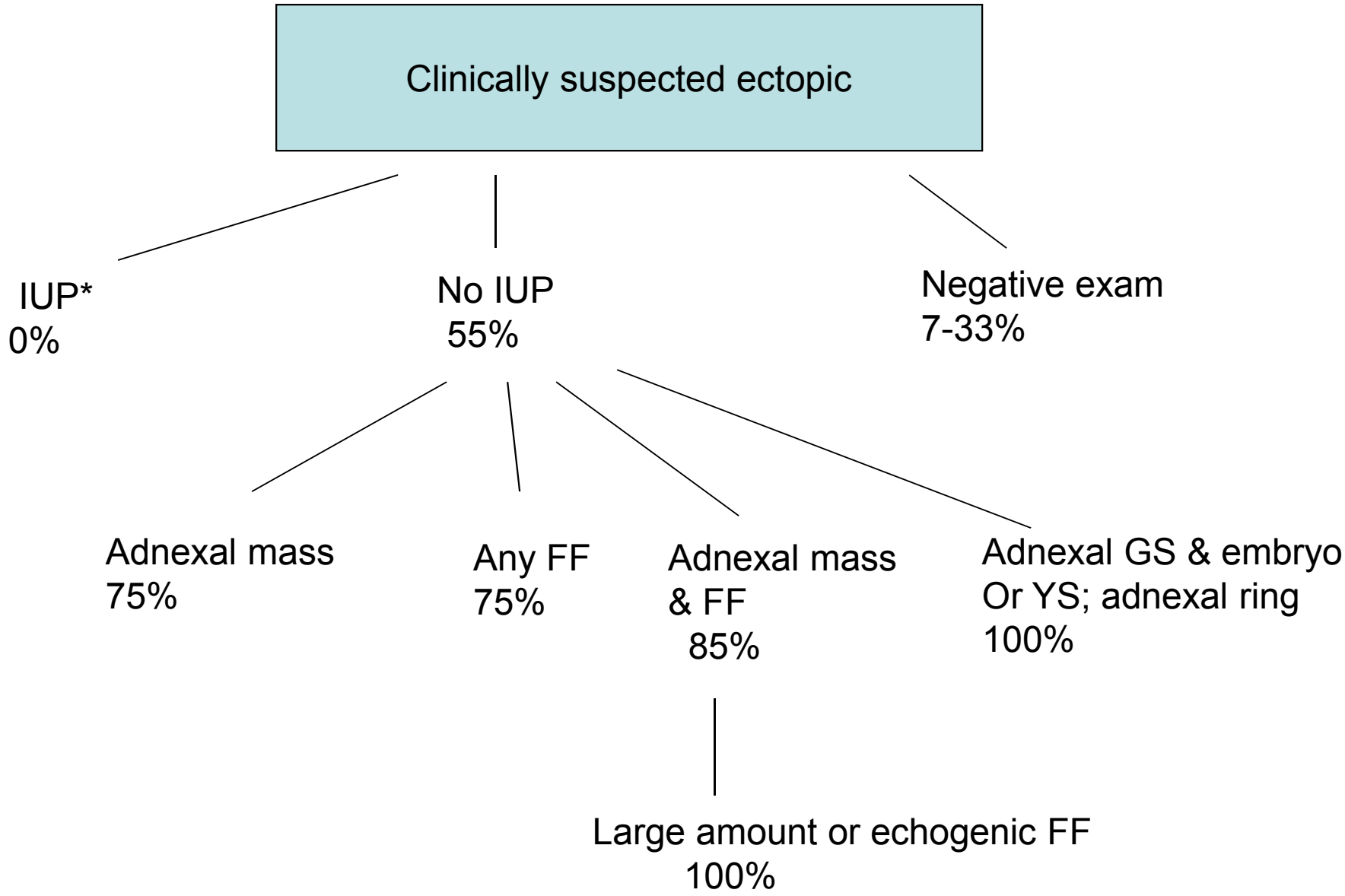
Ectopic pregnancy
Symptoms

- 90% lower abdominal pain (1/3 unilateral)
- 50-80% abnormal vaginal bleeding
- 60-70% amenorrhea

- Classic triad (pain, amenorrhea, VB) present in less than 50%of patients!

Ectopic Pregnancy Symptoms

- Most ectopics present between 6-7 weeks from LMP…..before they are ASYMPTOMATIC

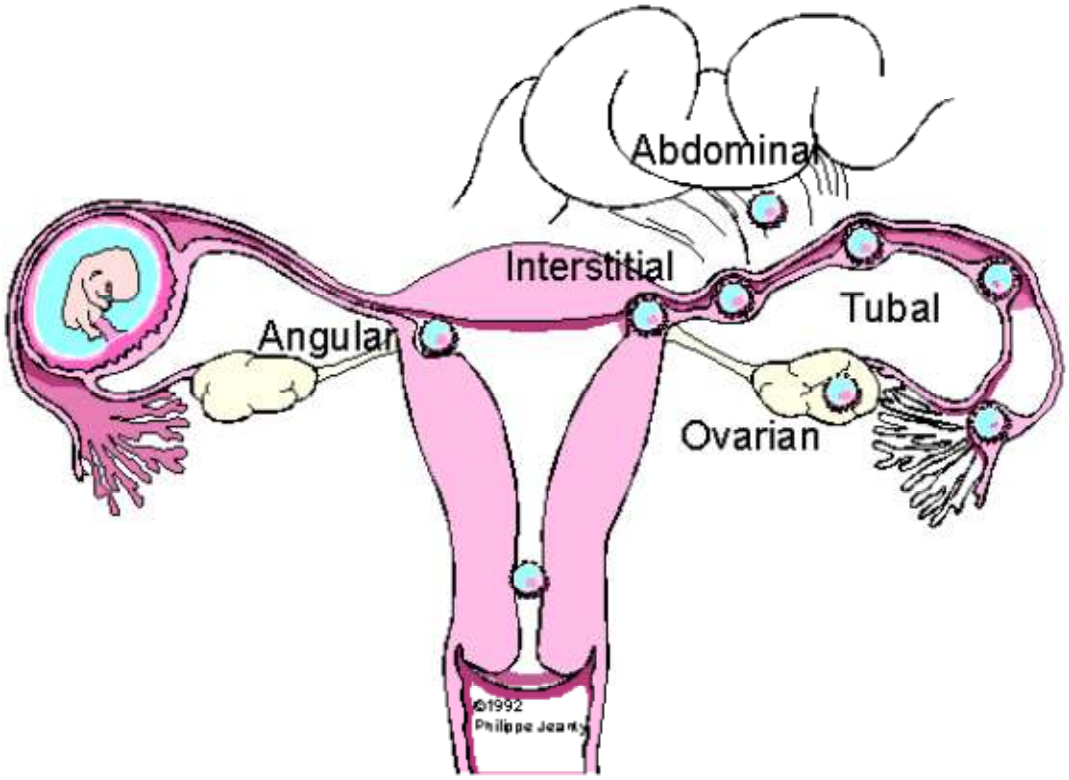


* Rare heterotopic pregnancy

Ectopic pregnancy- Unusual locations

- The great majority of ectopic pregnancies occur in the fallopian tubes.
- Ectopic pregnancies in other locations such as the cervix, the uterine cornua, or abdominal cavity can be associated with a very high maternal morbidity if not recognized and treated appropriately.

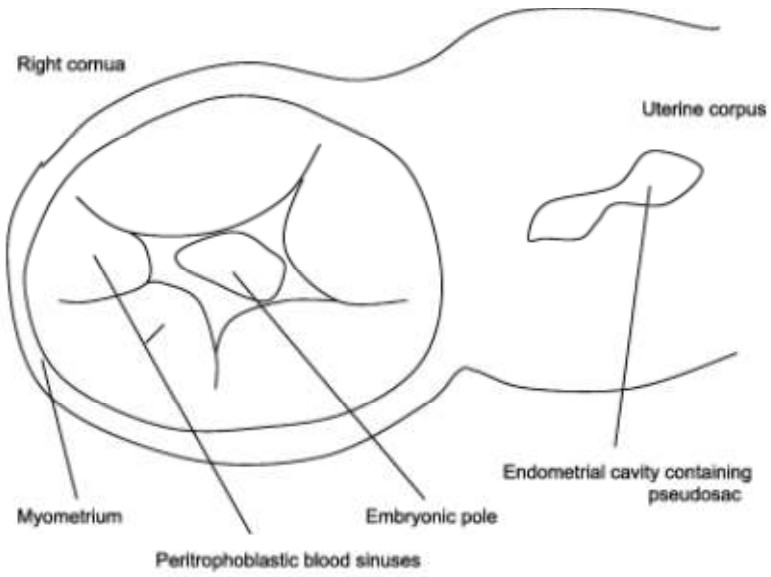
Classification of ectopic pregnancies



Interstitial (Cornual) Pregnancy

- 1-6% of all ectopic pregnancies
- Historically associated with late diagnosis, often with catastrophic complications such as uterine rupture and need for hysterectomy
- **ULTRASOUND DIAGNOSIS:**
- Regular endometrial stripe with no gestational sac
- products of conception located outside the endometrial echo, surrounded by a contiguous rim of myometrium, within the interstitial area

***Obstetrics & Gynecology* 2004;103:47-50**


Right cornua
Uterine corpus
Endometrial cavity containing pseudosac
Myometrium
Embryonic pole
Peritrophoblastic blood sinuses


St George's
Hospital- TB
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+DIST.
27.0mm
DIST.
25.5mm
+DIST.
2.3mm
DIST.
13.9mm
MEASURE
Data Clear
DIST.
GS
CRL
BPD
Tokyo U Robinso Hadlock
Next Page

Uses and limitations of ultrasound in post medical abortion (MAB) management

Uses and limitations of ultrasound in post MAB management

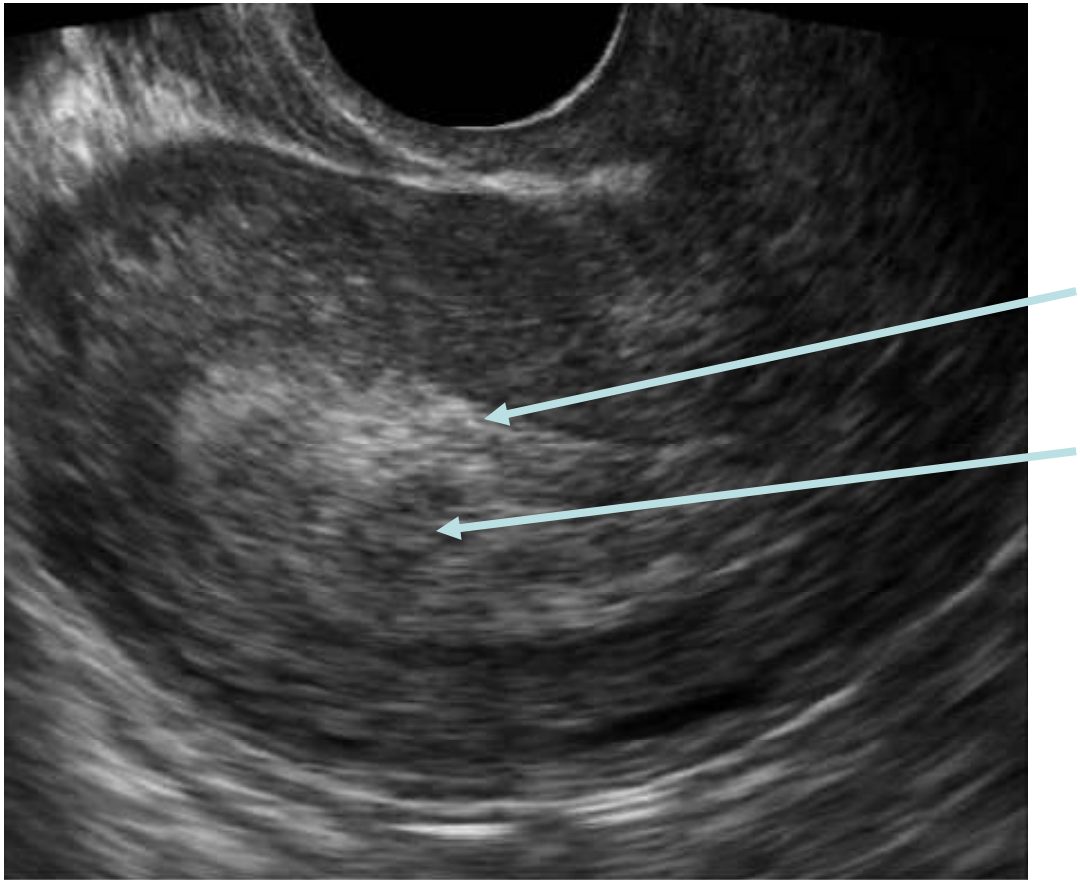
The pre-dominant questions are….

- Is the patient still pregnant?
- How is the patient doing?
  - Clinical picture

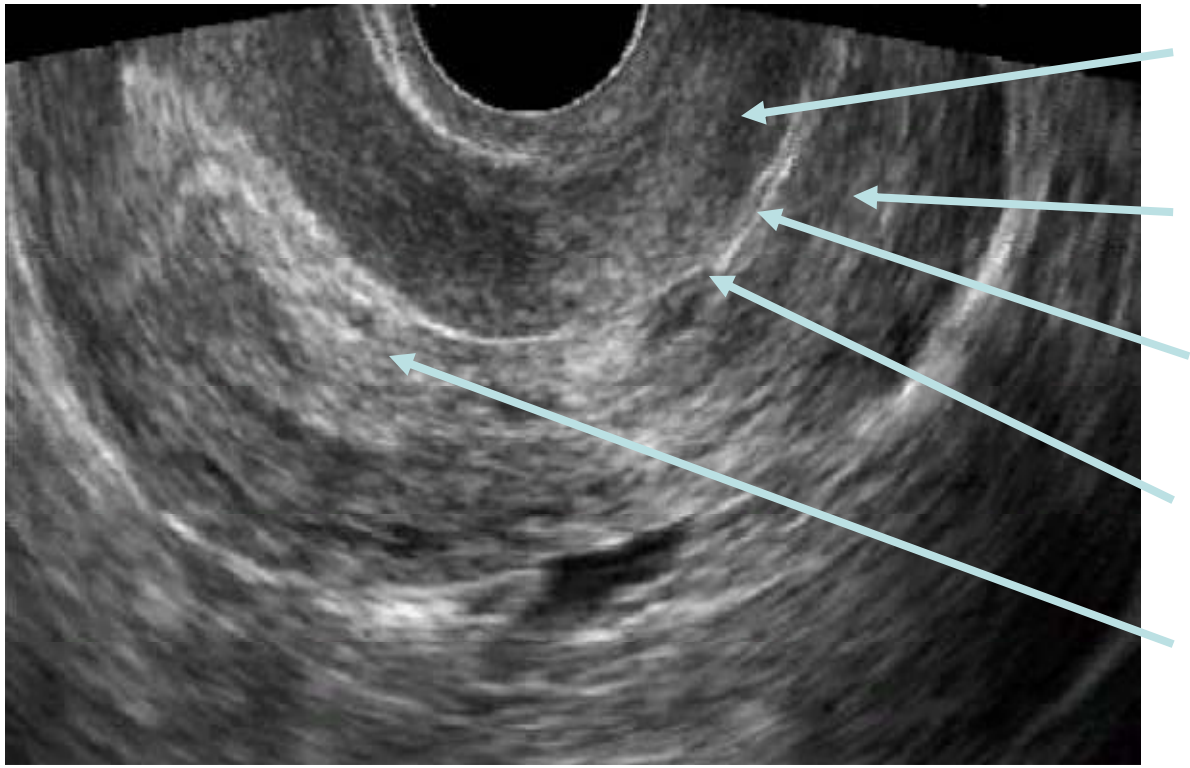
Mary Fjerstad, NP, PPFA/CAPS

Several studies have failed to demonstrate a relationship between endometrial thickness and clinical outcome (i.e., need for aspiration, predictor of subsequent hemorrhage, etc.)

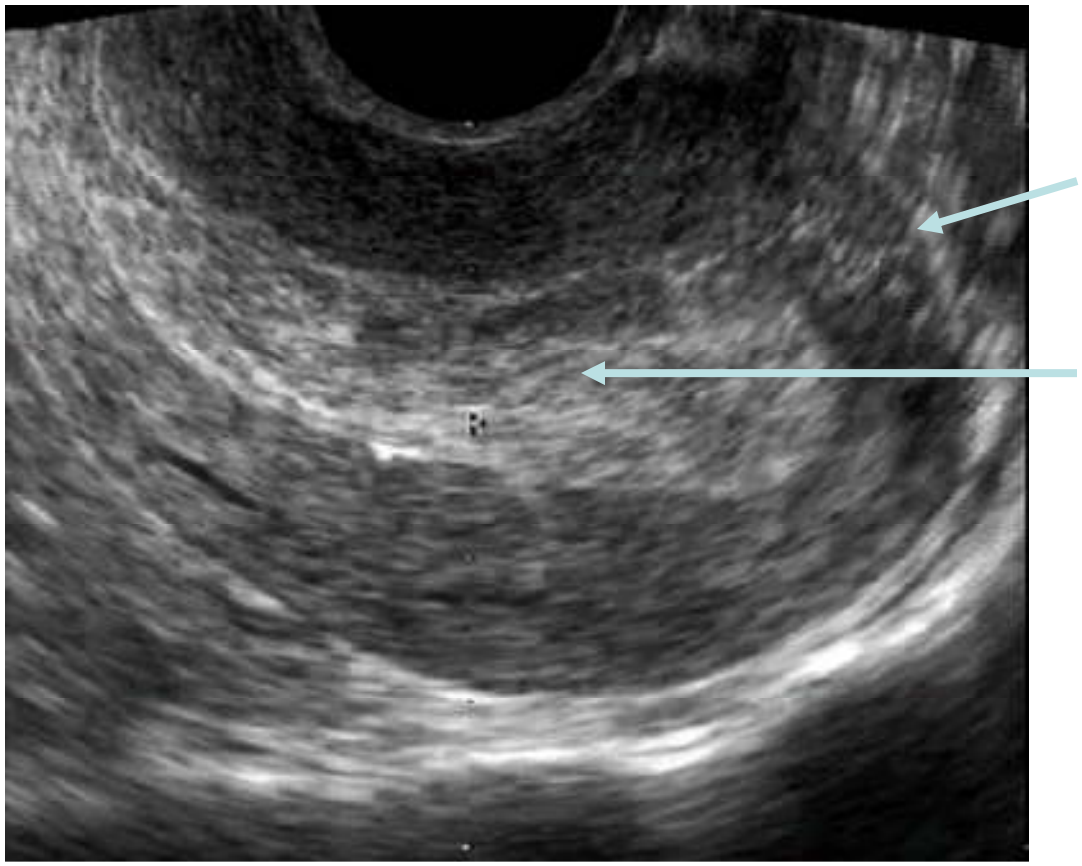
Post-Abortion Ultrasound: Absent Gestational Sac



Post-Abortion Ultrasound: Absent Gestational Sac



Post-Abortion Ultrasound: Absent Gestational Sac



Ultrasound Evaluation of the Endometrium After Medical Termination of Pregnancy

- Prospective descriptive study of patients undergoing MAB
- Ultrasound examination between days 7-13post MAB were available for 525 of 684 patients
- Endometrial thickness and the presence of gestational sac, fluid interface, or complex echoes on postprocedure ultrasonogram were recorded. Repeat doses of medication, surgical intervention, and complications were noted.
- Success was defined as an abortion completed after a single course of medical therapy

***Obstetrics & Gynecology* 2004;103:871-875**

Ultrasound Evaluation of the Endometrium After Medical Termination of Pregnancy

Table 2. Endometrial Stripe for All Patients, Successes, and Failures

	All patients (n = 437)	Successes (n = 419)	Failures (n = 18)	*P*
Endometrial stripe (mm)	4.10 ± 1.80 (0.67–13.4)	4.01 ± 1.75 (0.67–13.4)	6.15 ± 1.95 (3.35–10.0)	< .001

Data are presented as mean ± standard deviation (range).

***Obstetrics & Gynecology* 2004;103:871-875**

Ultrasound Evaluation of the Endometrium After Medical Termination of Pregnancy

Table 3. Ultrasound Findings for All Patients, Successes, and Failures

Ultrasound finding	All patients (n = 516)	Successes (n = 497)	Failures (n = 19)	Odds ratio	95% Confidence interval
Complex echoes	91 (17.6)	84 (16.9)	7 (36.8)	2.87	1.10, 7.50
Fluid interface	35 (6.80)	31 (6.20)	4 (21.1)	4.01	1.26, 12.8
Gestational sac	6 (1.20)	0 (0.0)	6 (100)	∞	

Data are presented as n (%).

***Obstetrics & Gynecology* 2004;103:871-875**

Ultrasound Evaluation of the Endometrium After Medical Termination of Pregnancy

***Obstetrics & Gynecology* 2004;103:871-875**

- Endometrial thickness after administration of a single dose of mifepristone and misoprostol for medical termination should not dictate clinical intervention. The decision to treat should be based on the presence of a persistent gestational sac or compelling clinical signs and symptoms.
- **LEVEL OF EVIDENCE:** II-3

19 year-old G1 day one day after misoprostol administration (three days after mifepristone administration) She reports light vaginal bleeding, no pain, fevers or chills

Dx: The absence of the gestational sac and the presence of intrauterine debris are typical of a complete abortion.

Ultrasound image courtesy of the National Abortion Federation

J Clin Ultrasound. 2007 Jan;35(1):42-7

- A 38-year-old woman had intermittent scant vaginal bleeding for 1 month after therapeutic abortion.
- The pathology report from the therapeutic abortion confirmed products of conception.
- The patient was referred for pelvic sonographic examination to exclude RPOC. She had positive pregnancy
- Serum beta-HCG level of 25 mIU/mL.

Second Trimester Ultrasound in the Provision of Abortion

Panel I: Documentation

Includes:

Fetal number (singleton, multiple)

fetal heart activity

presentation

cervix

placenta location

amniotic fluid volume.

Fetal heart rate (FHR)

- Real time observation is sufficient in most cases. The presence or absence of cardiac activity should **always** be reported**. M-mode** should be reserved for fetal demise, IUFD, or suspected FHR abnormalities. Measure the distance between 2 waves.

Lower uterine segment

- Sagital view of the cervix.
- Bladder should be empty or nearly empty
- This view serves to determine: **1) presentation, 2) r/o previa 3) cervical length**
- TVUS may be helpful in some cases of placenta previa where transabdominal ultrasound (TAUS) has not been definitive in establishing the diagnosis**.**

Amniotic fluid (AF)

- **Sagital image**
  - Amniotic fluid index (AFI): the sum of largest vertical pocket in each quadrant
    - olygo < 5 cm, poly >24cm
  - Manning: single largest vertical pocket.
    - oligo< 2 cm, poly >8 cm
    - **Use this method in twins**
  - Subjective assessment of AF has also been shown to be a reliable method but requires more operator experience
  - Avoid presence of cord in selected pockets (use color Doppler when in doubt.

Amniotic fluid (2)

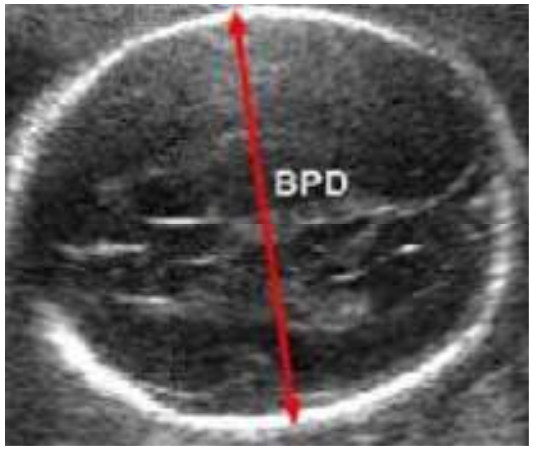
- **longitudinal image** of largest vertical pocket. You just rotate the transducer in 90◦ to obtain this image. In this way you will avoid overestimation of “films” of AF that are tangent to the uterus.
- You **cannot use AFI** in assessing in twins. Use single largest pocket method. You must see the dividing membrane in your image. Subjective assessment (and hence more operator experience) is particularly important in multiples.

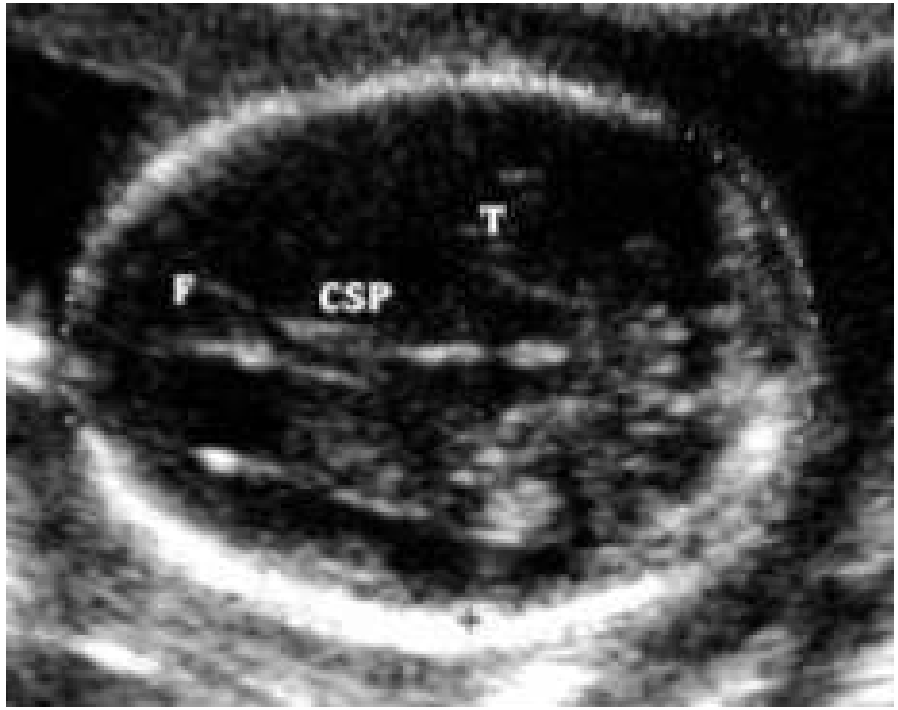
Panel II: fetal biometry

- Obtain 2 different measurements for each parameter.
- Use the average of the 2 measurements unless one of the pictures is clearly better than the other.
- Blow up your image as big as you can get it in the screen

Biometry Head

- The BPD can be measured from >12 weeks on
- BPD is the single **best** parameter for determining GA after 12 wks.
-

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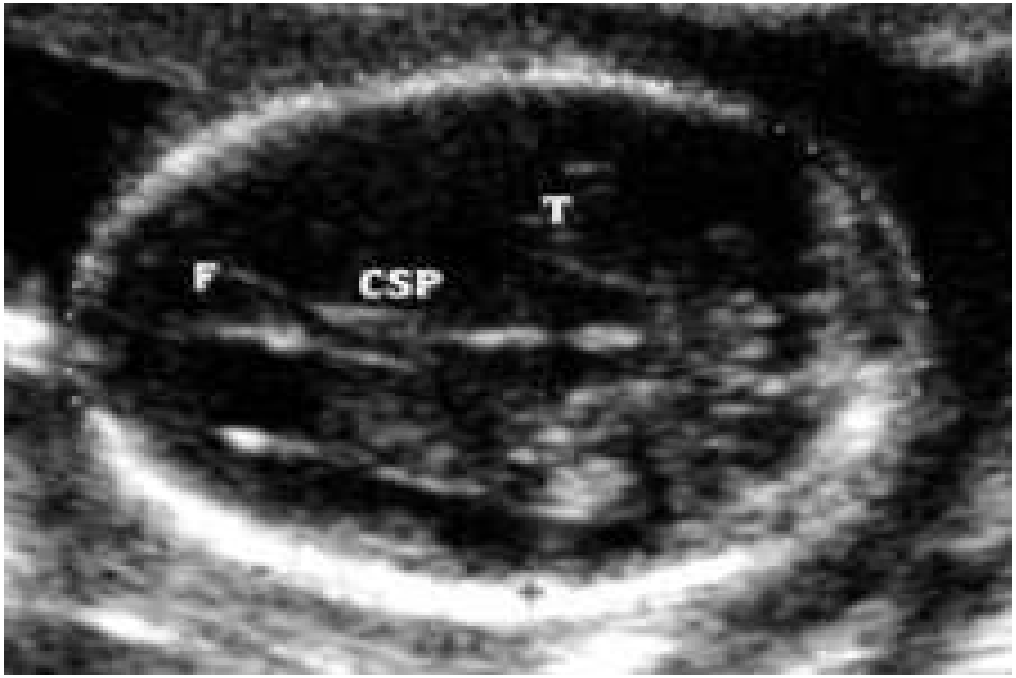
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The Biparietal diameter (BPD)
In this case 70.4 mm = 27 weeks

Biometry Head

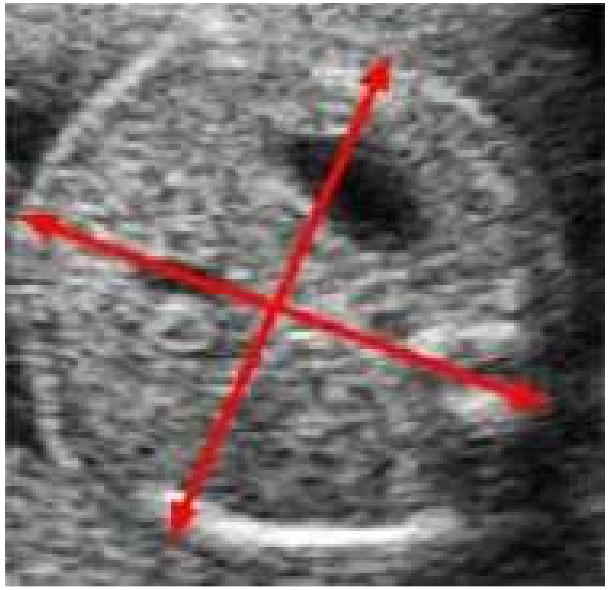
- How to get “the perfect BPD”?
  - Midline Falx
  - Both thalami on each side of the falx
  - Cavum septum pellucidum
- Caliper placement
  - BPD: outer to inner
  - HC: outer to outer (use the ellipse for HC if this option is available)

Biometry Abdomen

Landmarks:

- Stomach should be in the left mid 1/3 of the abdomen
- Left portal vein that is equidistant from lateral sides

Lungs , kidneys or heart should *NOT* be in the picture!



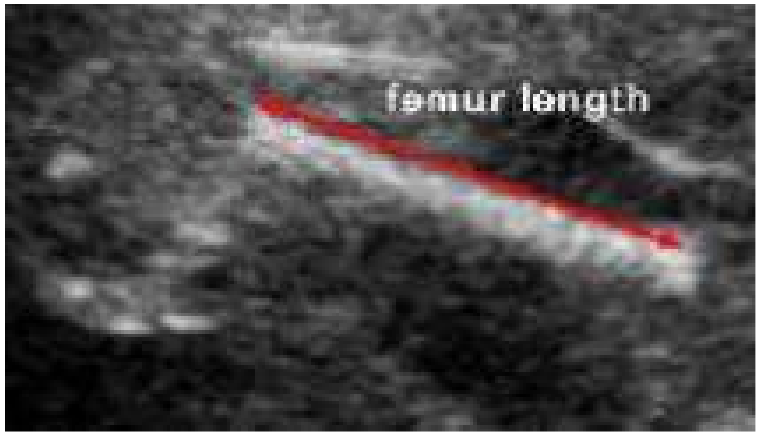

V
SP
ST

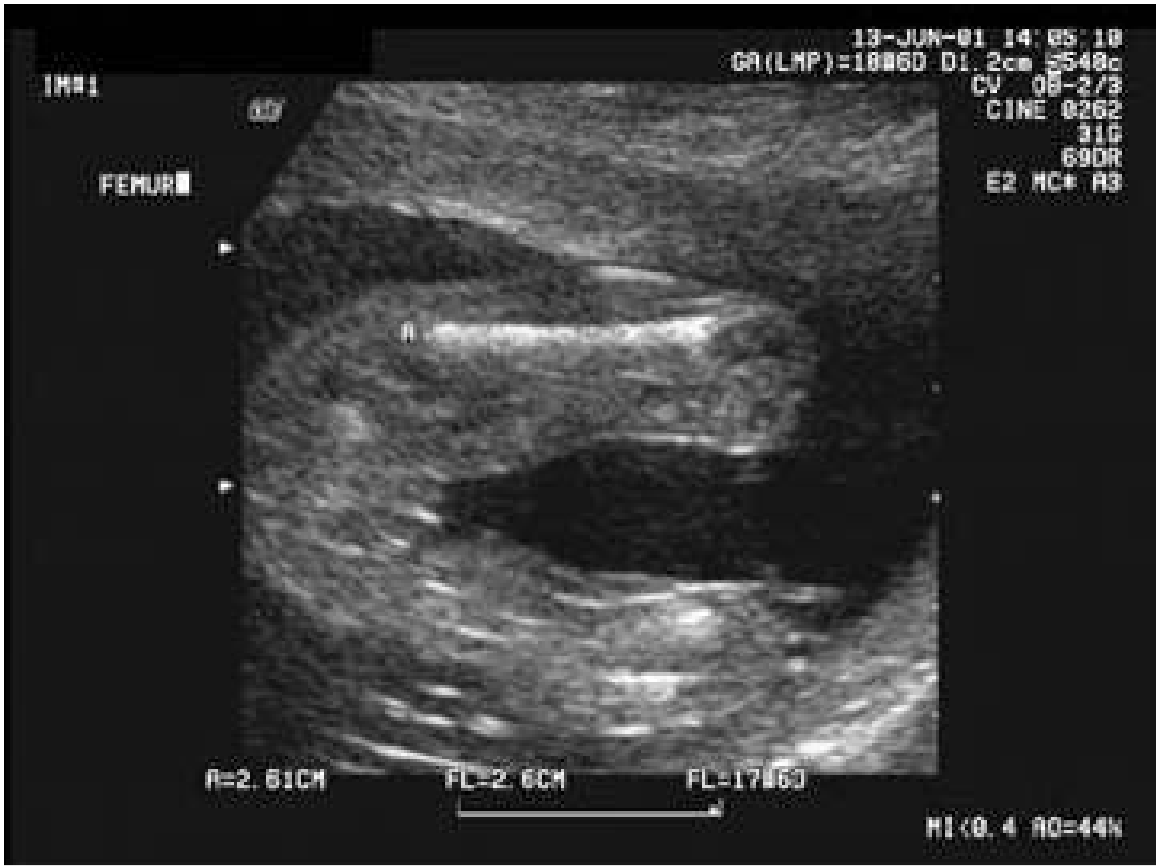
Biometry: Abdomen.

- AP and transverse diameters perpendicular to each other. Or use the ellipse mode.
- Should be nice and round, with fat pad clearly visible. You may want to increase the contrast (Gain) of your picture so you can see the fat pad more clearly.
- Don’t place the transducer right over the spine. If the spine is up, go from the side.

Biometry: Femur

- The femur should be laying close to a horizontal plane (US beam perpendicular to bone).
- Measure the femur that is up.

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FEMUR
CV Q0-2/3
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A=2.61CM
FL=2.6CM
MI<0.4 AO=44%

Placental location

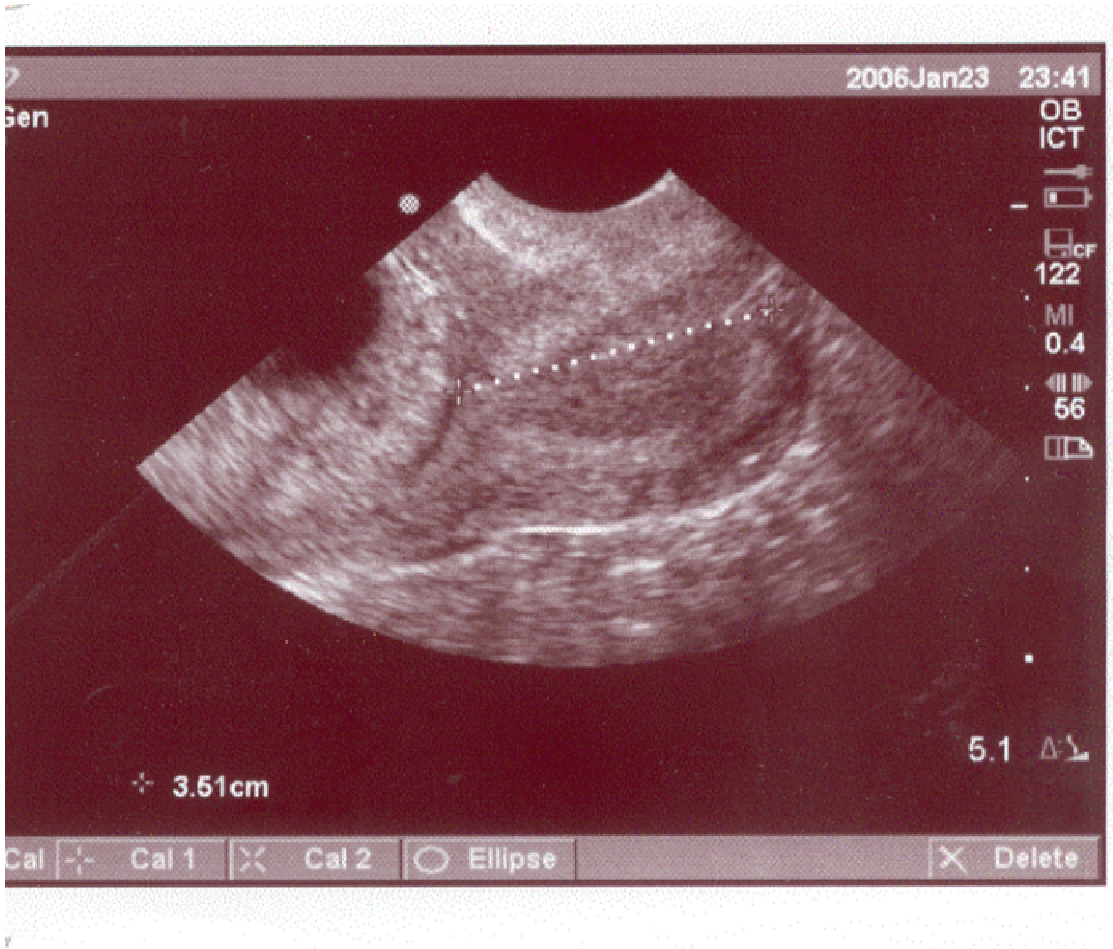
- **Sagital image**.
- You cannot exclude placenta previa unless the cervix was properly visualized

Placenta Accreta

- Has increased dramatically over the last three decades (10th fold increase in 3 decades)
- Observed in 9.3% of women with placenta previa or in 1 of 533 deliveries.
- UCSD Study: 453 women with placenta previa, previous cesarean delivery and low-lying anterior placenta, or previous myomectomy
- 39 had placenta accreta confirmed by pathological examination
- US accurately predicted placenta accreta in 30 of 39
- correctly ruled out placenta accreta in 398 of 414 (sensitivity 0.77, specificity 0.96)

***Obstetrics & Gynecology* 2006;108:573-581**

12 week IUP, posterior placenta previa?



Placenta Accreta

- *US DIAGNOSIS:*
- 1) loss of the hypoechoic retroplacental myometrial zone-uterine interface
- 2) adjacent placental sonolucent spaces
- 3) increased vascularity proximate to the bladder wall by color Doppler

- The routine intraoperative use of ultrasonographic imaging to guide intrauterine forceps during uterine evacuation for second trimester elective abortion resulted in a significant reduction in uterine perforation, the rate declining from 1.4% to .2%.

J Ultrasound Med. 1989 Feb;8(2):71-5.

More cases…