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OB First Trimester Ultrasound Protocol

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Special Note: 1st Trimester OB US in the ED & B-hCG orders

Please attempt to confirm positive beta-hCG (at least urine) before doing a 1st trimester US. When a 1st trimester US order is received from the ED, ensure a beta-hCG has been ordered. If there is time pressure from the ED/schedule to complete the examination prior to a positive result, it can be done with a pending beta-hCG

CINE **clips should be labeled:**

-MIDLINE structures: “right to left” when longitudinal and “superior to inferior” or “fundus to cervix” when transverse
-RIGHT/LEFT structures: “lateral to medial” when longitudinal and “superior to inferior” when transverse
each should be 1 sweep, NOT back and forth

Some terms used:

MSD = mean sac diameter
FP = fetal pole
CRL = crown-rump length
FHR = fetal heart rate
IUP = gestational sac + yolk sac (+/- embryo)

IMPORTANT NOTE regarding 1st trimester US: ***AVOID*** *Doppler (color, spectral, power) when possible*

→ WHY limitations on Doppler in the 1st trimester?

-There is a potential risk of harm to a developing embryo from the increased heat associated with Doppler ultrasound (especially spectral and power)

→ WHEN to use Doppler *(this is detailed further below), very brief summary:*

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REQUIRED:

OVARIES/ADNEXA:

➔ ED patient, all: color; spectral only certain indication/appearance (i.e., torsion)
➔ Outpatient rule out torsion: color + spectral (document both venous and arterial flow)

➔ Abnormal ovaries/adnexa - any adnexal mass or ovarian mass *not clearly* corpus luteum: color; spectral only for certain indication/appearance

ENDOMETRIUM:

➔ ONLY if abnormal endometrial findings **without** IUP or potential for IUP (i.e., gestational trophoblastic disease, retained products of conception): color; if present, add spectral

OPTIONAL:
➔ Suspected fetal demise (no HR) + CRL **> =** 7mm

TECHNIQUE: TA & TV vs. TA or TV only

ED patient: TA + TV for all unless contraindicated or patient declines

OUTPATIENT based on CRL dating:
1. **CRL < = 8.6 weeks**: TA+ TV *or* TV only (if so ordered)

2. **CRL 9 – 11 weeks**: Start with TA
   → *Add* TV:
      1. If there is a >= 5 day discrepancy between LMP and CRL
      2. If patient or physician is uncertain of LMP

   TA only will be OK if good views *and* < 5 day discrepancy between LMP and CRL

3. **CRL = > 11.1 weeks**: TA only OK if good views and measurements adequate, even if >= 5 day discrepancy between LMP and CRL or unknown LMP
   → Can add TV if this would improve accuracy (technologist discretion)

IUP or POSSIBLE IUP: GENERAL

Endometrial Contents: Gestational sac, yolk sac, fetal pole

Summary of *CINE*s through uterus REQUIRED on all 1st trimester examination, *further detailed below:*

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(1) Overview of gestational sac/uterus: Single sweep (longitudinal or transverse) through uterus (best TA or TV) to demonstrate gestational sac morphology and position

(2) Fetal Cardiac activity: short clip demonstrating presence of cardiac motion

GESTATIONAL SAC

-Presence, location, appearance and number of gestational sac(s)

-If there are multiple gestations, document amnionicity and chorionicity

-Sac to be measured (MSD) when:

(1) No FP or FP uncertain

(2) CRL < 12 weeks

NOTE: At 11.1 to 12 weeks, MSD can be omitted *if it is difficult to obtain*

-Document and measure subchorionic hemorrhage(s), if present;

→ Comment on location in relation to gestational sac

→ Comment if bleed encompasses < or >= 50% of gestational sac

-Comment on location of developing placenta, if it is seen (should be seen by 10 weeks)

-May say “too early to visualize” if it is not well seen (depending on gestational age)

YOLK SAC

-Document and measure yolk sac

-Report if no yolk sac is seen, if yolk sac is enlarged, or if yolk sac is misshapen or otherwise abnormal

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FETAL POLE

-Document and measure embryo/fetus

BRIEF SUMMARY:

- LMP/dates <= 13w6d → CRL
  - If CRL >=84mm → add biometry (and provide separate AUA)

- LMP/dates >=14w0d → biometry
  - If Biometry <=13w6d → add CRL (and provide separate AUA)

FURTHER DETAILS:

-At LMP/provided dating <= 13 weeks 6 days: measure CRL

→ Embryo should be magnified and in neutral position

-Use **average of 3** discrete measures if all adequate, otherwise choose best

→Provide AUA based on CRL

BUT IF CRL >= 84 mm, **ADD** biometry (BPD + HC + AC + FL)

→Biometry: at least 2 measurements of each

-Use average if all adequate, otherwise choose best

→ Provide 2 *separate* AUA: *Do NOT average CRL and Biometry*

(1) AUA for CRL

(2) AUA for Biometry

-At LMP/provided dating >= 14 weeks 0 days = 2nd trimester US: do biometry as per 2nd/3rd trimester US protocol

→Biometry: at least 2 measurements of each

-Use average if all adequate, otherwise choose best

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→Provide AUA based on biometry

BUT IF Biometry <= 13 weeks 6 days, **ADD** CRL

→ Provide 2 *separate* AUA: *Do NOT average CRL and Biometry*

(1) AUA for CRL

(2) AUA for Biometry

-Cardiac activity, both M-mode and *CINE* for all:

(1) M-mode image(s): at least 1

→If fetal HR <120, >160 bpm, provide at least 2 M-mode tracings to confirm persistence

→ On worksheet, document both HR measures and average

(2) *CINE* video clip of beating heart/flutter

-Anatomy*, if visible*: Document bladder, stomach, extremities

-CRL >= 11 weeks: Add magnified midline true sagittal image of the fetus in neutral position

DOPPLER on the endometrium (color, spectral, power): most examinations should NOT have Doppler on the endometrium (or its contents), *more specifically*:

→ NO DOPPLER for definite IUP or potential for IUP, including the following:

-No sac and *otherwise normal* endometrium

-Possible gestational sac (empty or otherwise)

-Well-formed gestational sac (empty or otherwise)

SPECIAL NOTES:

(1) REQUIRED USE OF DOPPLER

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→ Retained products of conception, gestational trophoblastic disease, and other endometrial mass/abnormality **without definite IUP or potential for IUP (as above) – TV imaging:**

-*CINE* greyscale longitudinal and transverse, even if no abnormality identified at time of examination

-Assess for color if endometrium is abnormal

→If color present:

(1) Add spectral

(2) *CINE* color (best plane)

(2) OPTIONAL USE OF DOPPLER

→ CRL **> = 7mm** + NO heartbeat: *per technologist discretion* to better demonstrate lack of blood flow (i.e., demise)

NOTE: if CRL < 7 mm + no FHR, ***do NOT use*** *Doppler*

Comments about early pregnancy dating and data to provide:

1. **No FP or FP uncertain**: MSD measured and associated date documented
   ***Estimated* US gestational age based on MSD – this is just an estimate, CRL will be used for dating when embryo visible

2. + FP & LMP/dates <= 13w6d → CRL
   - If CRL >=84mm → add biometry (and provide separate AUA)
   - Provide MSD & associated dates if CRL <12w, but MSD not used for dating

3. + FP & LMP/dates >=14w0d → biometry
   - If Biometry <=13w6d → add CRL (and provide separate AUA)

Additional Notes:

-Use “provided dates” or “LMP” or “clinical dates” when possible for expected dating

-Technologists should NOT re-date pregnancy based on other ultrasound(s) unless this dating is being used clinically

-See end of document for ACOG recommendations on pregnancy re-dating based on US – i.e., when OB would use US dates to *formally* re-date the pregnancy

Maternal Structures:

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Do not need to include kidneys unless there is specific indication in order

Uterus (other than gestational sac, yolk sac, fetal pole):

Measurement of size:

-If there is a gestational sac + yolk sac + fetal pole, uterine dimensions and volume do not need to be performed/recorded.

--> All must be present (if not, please measure, as below)

--> Checkbox on worksheet: "appropriate gravid enlargement" (if this is accurate)

-If 1 or multiple of above are *not* present (i.e., gestational sac + yolk sac without fetal pole; sac-like structure; questionable fetal pole; empty endometrium, etc.), uterine dimensions and volume should be performed and recorded.

--> When measuring:

→ Length in sagittal from fundus to lower uterine segment (include cervix)

→ AP in same sagittal view as length (perpendicular to length)

→ Width in transverse view

→ Provide volume measurement (mL)

→ *NOTE, if there is nothing in the endometrium, measure endometrial thickness*

Documentation of general appearance:

-Standard sagittal & transverse views

-Document fibroids; measure largest fibroid and any that may be affecting the gestational sac/endometrial canal

-Do not use Doppler (color, spectral, power) on fibroids

Ovaries and Adnexa:

SUMMARY of when to *CINE*:

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→ REQUIRED:

(1) No IUP and + b-HCG (i.e., possible ectopic): ***CINE*** both adnexa even if no obvious mass is identified, as below

-This includes empty "gestational sac-like structure"

(2) Ovarian/adnexal mass: ectopic or otherwise*, detailed below*

→ NOT required: IUP + *normal* ovaries/adnexa (including typical corpus luteum)

-No need to ***CINE*** ovaries with typical corpus luteum cyst

General

-Document and measure each ovary, document corpus luteum (if visible)

-Document adnexal regions (even if ovaries are both seen, need at least STILL images of both adnexa)

-If there is no IUP and + b-HCG, ***CINE*** both adnexal regions (even if no obvious mass is seen)

-This includes empty gestational sac-like structure

-Document any other ovarian or adnexal mass/cyst

-If mass is identified: provide ***CINE*** in multiple planes

-If the mass is near or not definitively separate from the ovary:

→***CINE*** to show mass moving separately from ovary, HOW to:

→TV: use probe to separate ovary from mass; if this is not helpful, use non-scanning hand to push on the abdomen to attempt to separate the ovary from the mass

Comment:

-If mass + ovary move together, it may be ovarian - likely corpus luteum

-If mass and ovary move separately, it is unlikely ovarian - concerning for ectopic

DOPPLER on ovaries/adnexa in pregnancy:

ED patients, all indications:

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-Ovaries and adnexa: color *only* for all patients

-Add spectral to document waveforms ONLY if:

1. Indication is “rule out torsion”
2. Appearance is worrisome for torsion

Outpatient:

-Normal ovaries and adnexa: no Doppler of any kind

-Abnormal ovaries/adnexa or lesion that is not clearly the corpus luteum: color *only*

-Add spectral to document waveforms ONLY if:

1. Indication is “rule out torsion”
2. Appearance is worrisome for torsion

Cul-de-Sac:

-Evaluate for fluid; if present, document amount and if simple or complex

-ED patient or outpatient for “rule out ectopic” and no IUP: evaluate for fluid in Morrison’s pouch (even if no pelvic fluid)

-ED patient or outpatient with > = moderate pelvic free fluid and no IUP: evaluate for fluid in Morrison’s pouch

When to notify the radiologist before letting patient go (ED, inpatient or outpatient):

(1) Suspected demise

(2) Evidence of ectopic: either adnexal mass OR complex free fluid

(3) Any other required items on the “Sonographer to Radiologist Communication of Ultrasound Findings” document.

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Table 1. Guidelines for Redating Based on Ultrasonography

Gestational Age Range*	Method of Measurement	Discrepancy Between Ultrasound Dating and LMP Dating That Supports Redating
≤ 13 6/7 wk	CRL	
• ≤ 8 6/7 wk		More than 5 d
• 9 0/7 wk to 13 6/7 wk		More than 7 d
14 0/7 wk to 15 6/7 wk	BPD, HC, AC, FL	More than 7 d
16 0/7 wk to 21 6/7 wk	BPD, HC, AC, FL	More than 10 d
22 0/7 wk to 27 6/7 wk	BPD, HC, AC, FL	More than 14 d
†28 0/7 wk and beyond	BPD, HC, AC, FL	More than 21 d

Abbreviations: AC, abdominal circumference; BPD, biparietal diameter; CRL, crown–rump length; FL, femur length; HC, head circumference; LMP, last menstrual period.

*Based on LMP

†Because of the risk of redating a small fetus that may be growth restricted, management decisions based on third-trimester ultrasonography alone are especially problematic and need to be guided by careful consideration of the entire clinical picture and close surveillance.

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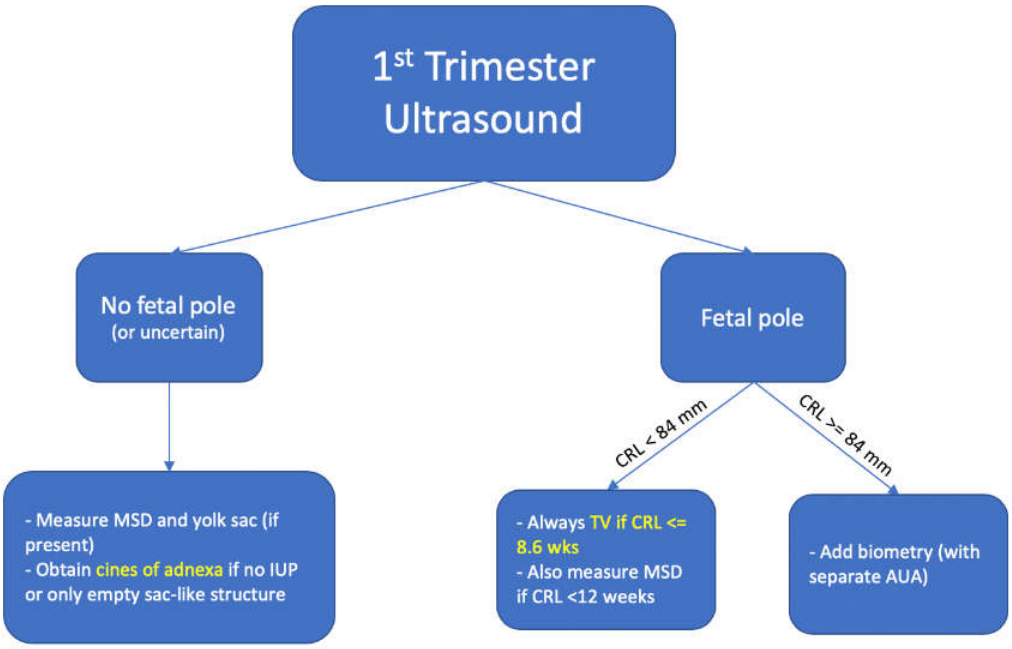
First Trimester Ultrasound Flow Chart



Required of all studies:
- Cine sweep through the uterus
- Cine and M-mode of fetal cardiac activity (if fetal pole present)
- Measurement of subchorionic hemorrhage (if present)

Notes on Doppler:
- Endometrial cavity: Doppler should NOT be used if there is an IUP or potential for an IUP (including an empty cavity), except optionally if there is a FP with CRL >= 7 mm without cardiac motion (diagnostic of fetal demise)
- Ovaries/adnexa: Doppler should be used on the adnexa in all ED patients, in outpatient rule out torsion cases (with spectral), or if there is an ovarian/adnexal mass