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:
REQUIRED:

OVARIIES/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 CINEs through uterus REQUIRED on all 1st trimester examination, further detailed below:
(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
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 = 2\textsuperscript{nd} trimester US: do biometry as per 2\textsuperscript{nd}/3\textsuperscript{rd} trimester US protocol
  - Biometry: at least 2 measurements of each
    - Use average if all adequate, otherwise choose best
→ 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
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  
   o If CRL >=84mm → add biometry (and provide separate AUA)  
   o Provide MSD & associated dates if CRL <12w, but MSD not used for dating

3. + FP & LMP/dates >=14w0d → biometry  
   o 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:**
**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**:
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:
- 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.
<table>
<thead>
<tr>
<th>Gestational Age Range*</th>
<th>Method of Measurement</th>
<th>Discrepancy Between Ultrasound Dating and LMP Dating That Supports Redating</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 13 6/7 wk</td>
<td>CRL</td>
<td>More than 5 d</td>
</tr>
<tr>
<td>• ≤ 8 6/7 wk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 9 0/7 wk to 13 6/7 wk</td>
<td></td>
<td>More than 7 d</td>
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<tr>
<td>14 0/7 wk to 15 6/7 wk</td>
<td>BPD, HC, AC, FL</td>
<td>More than 7 d</td>
</tr>
<tr>
<td>16 0/7 wk to 21 6/7 wk</td>
<td>BPD, HC, AC, FL</td>
<td>More than 10 d</td>
</tr>
<tr>
<td>22 0/7 wk to 27 6/7 wk</td>
<td>BPD, HC, AC, FL</td>
<td>More than 14 d</td>
</tr>
<tr>
<td>≥ 28 0/7 wk and beyond</td>
<td>BPD, HC, AC, FL</td>
<td>More than 21 d</td>
</tr>
</tbody>
</table>

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.