Ultrasound – OB First Trimester Evaluation

PURPOSE:
To evaluate the uterus (myometrium and endometrium), adnexa (ovaries and fallopian tubes), cul-de-sac, and early pregnancy.

SCOPE:
Applies to all studies performed in:

- UT Southwestern Zale-Lipshy University Hospital, William P. Clements Jr. University Hospital, and all University Hospital-based Clinics Imaging Services (UTSW)
- Parkland Health and Hospital System Department of Radiology (PHHS)

INDICATIONS:

- Confirm presence of an intrauterine pregnancy (IUP), single versus multiple gestation, confirm cardiac activity, and estimate gestational age
- Signs or symptoms (pain, bleeding, etc) referred to the pelvis
- Evaluate for suspected ectopic pregnancy
- Evaluate for suspected gestational trophoblastic disease
- Evaluate for uterine or adnexal masses
- Assess for early fetal anomalies
- If UPT is negative or HCG is 0.0, then use protocol "US Transabdominal & Transvaginal."
- If recent delivery, c-section, D&C, or document abortion/early pregnancy loss (EPL), change order to US Pelvis and use protocol "US Transabdominal & Transvaginal."

CONTRAINDICATIONS:

- No absolute contraindications
- **Transvaginal approach should not be performed on a patient who has refused the exam.**
- **A chaperone is required for male sonographers. Chaperone's name should be documented in tech notes.**

EQUIPMENT:
Curvilinear transducer with a frequency of 2-9 MHz or greater that allows for appropriate penetration and resolution depending on patient's body habitus for transabdominal approach.
Endovaginal transducer with a frequency of 5 MHz or greater for transvaginal approach. Probe cover.

PATIENT PREPARATION:

- Review any prior imaging, making note of abnormalities requiring further evaluation.
- For transabdominal approach, bladder should be distended with urine
- For transvaginal approach:
    - Obtain verbal consent from patient*
    - Obtain chaperone (requirement for all male sonographers)
    - The bladder should be empty
- PREGNANCY STATUS:
    - **Negative pregnancy test results:**
        - **For outside results: We will only accept negative UPT or serum HCG results formally documented in Epic or in Care Everywhere (outside facility).**
            - **We will NOT accept pregnancy test results from home pregnancy tests, or verbal recollection of test results from an outside facility.**
        - **A negative UPT must be within 24 hours.**
            - If previous UPT is negative, then another UPT after 24 hours (especially in the setting of very early pregnancy) is required.
        - **A negative serum HCG must be within 48 hours.**
        - If UPT is negative or HCG is 0.0, then use protocol "US Transabdominal & Transvaginal."
    - **Positive urine pregnancy test (UPT)** should be documented in EPIC (we do not accept home UPT results).
    - **For previously documented intrauterine pregnancy, AND no change in pregnancy status during current gestation*:**
        - **No additional UPT needed**
            - ***Documented intrauterine pregnancy by ultrasound without interval delivery or confirmed abortion/early pregnancy loss**
                - The prior sonogram can be from Radiology, MFM, or outside institution (with images and results available).
        - **Positive HCG should be repeated (no time limit)**, so that we may follow temporal trends (and obtain UTSW-specific baseline, if applicable).
            - We will allow the serum HCG to have been drawn but not yet resulted for us to commence with the pelvic US study in this specific situation.
    - If patient is recently status-post c-section, D&C, or documented early pregnancy loss (EPL), and no suspicion for new pregnancy, change order to "US Pelvis" and follow "US Transabdominal & Transvaginal."
        - In this situation, clinical concern is often Retained Products of Conception (RPOC), endometritis, or other acute post-partum conditions.
    - For any clinical scenarios the sonographer is unsure about, please consult the radiologist.

EXAMINATION:

GENERAL GUIDELINES:

- ***Minors who are confirmed to be pregnant are considered medically emancipated for their health and privacy, and the health of the embryo/fetus. Parental consent is not required.**
- A complete examination includes evaluation of the entire uterus (myometrium and endometrium), adnexa (ovaries and fallopian tubes), cul-de-sac, and structures associated with early pregnancy.
- **A transvaginal scan should be performed if** patient is being evaluated for pain and transabdominal evaluation does not identify all of the following: both ovaries (with venous AND arterial vascularity), IUP, and cardiac motion,

EXAM INITIATION:

- Introduce yourself to the patient
- Verify patient identity using patient name and DOB
- Explain test
- **Obtain patient history including symptoms and last menstrual period (LMP).** Enter and store data page.
  - For women of child-bearing potential presenting to the Emergency Department, record urine pregnancy test (UPT) or serum HCG results if no previous pregnancy has been documented
  - If the current exam falls within the EDC, then no repeat UPT is necessary. See *Patient Preparation -> Pregnancy Status* section above for details.
- Place patient in supine and/or lithotomy position.
- For transvaginal exam, apply endovaginal probe cover.

TECHNICAL CONSIDERATIONS:

- Review prior imaging and note abnormalities requiring follow-up.
- Use **transabdominal** views for structures not well seen transvaginally (e.g., fundal fibroids, high ovaries, large adnexal masses). Do not duplicate cines and measurements in both TA and TV if they do not provide additional information.
- Endovaginal transducer may be introduced by patient, sonographer, or physician.
- **Uterus:**
  - Measure length (fundus to external os of cervix) on long axis. In a flexed uterus, segmental measurements may be needed.; AP depth measured perpendicular on long view; width measured on transverse.
  - Evaluate myometrium and cervix for contour change, echogenicity, masses, and cysts.
  - Document/measure fibroids (the largest plus those contacting the endometrium).
  - Coronal 3D views are required for IUD evaluation and useful for congenital uterine anomalies.
  - Reconstruct coronal 3D acquisitions and send to PACS.
- **Endometrium:**
  - Measure on the midline longitudinal image including anterior and posterior basal endometrium and excluding adjacent hypoechoic myometrium and endometrial fluid.

  - Assess for uniformity, focal abnormality, fluid/masses, and IUD presence/location.
- **Ovaries/Adnexa:**
  - Measure ovaries in 3 dimensions (2 orthogonal planes).
  - When ovaries not identified, survey adnexa, cul-de-sac, and fundal region.
    - Document masses, dilated tubes, or free fluid in these areas.
    - Normal fallopian tubes are not commonly identified.
    - Differentiate mass from bowel loops.
  - If ovaries not visualized, obtain "Adnexa" images including ipsilateral iliac vessels.
- **Focal abnormalities:** document size in 3 dimensions, with color Doppler, and relationship to adjacent structures.
- **Tenderness** during exam should be noted.
- **First-trimester pregnancy:**
  - Document gestational sac location within assess early fetal anatomy appropriate for 1st trimester
    - Yolk sac, amnion, embryo/fetus, subchorionic bleed, and open/closed cervix (especially in setting of pain/bleeding).
  - Assess early fetal anatomy appropriate for 1st trimester, subchorionic bleed, and open/closed cervix (especially in setting of pain/bleeding).
  - Document multiple gestations (number, location, yolk sacs).
  - Measure MSD if no embryo/fetus
  - Measure CRL if embryo/fetus present. Obtain the average of three measurements. Use magnification view of the gestational sac occupying the majority of the image.
    - 14 weeks, 0 days: use BPD, HC, AC, FL for dating and change order to "US UTERUS PREGNANT >14 WEEKS"
  - **Delete MSD if CRL obtained (avoid duplicate dating).**
- **Considerations for ectopic pregnancy**
  - If no definite IUP: evaluate for ectopic pregnancy
    - ± yolk sac/embryo/fetus/FHR
    - Ectopic pregnancy may be seen as adnexal mass with thick tubal ring and "ring of fire" on color Doppler
    - In absence of yolk sac/embryo/fetus, intrauterine fluid collection could represent endometrial cavitary fluid associated with ectopic pregnancy.
    - If adnexal mass demonstrates pulsatile flow, measure and compare rate (presumed FHR) to maternal heart rate sampled at external iliac artery
    - Consider heterotopic/non-tubal ectopic pregnancy
- **Doppler:**
  - **Document fetal cardiac motion with cine and M-mode only**; measure FHR by M-mode tracing.
  - Avoid Color/Power/Spectral Doppler unless CRL >10 mm with absent motion due to theoretical thermal damage and cavitation. Cine clips and M-mode should be sufficient for documenting cardiac motion, which is generally detected when CRL > 5 mm.
  - You may try color or power Doppler if CRL is >10mm and no cardiac motion is detected transvaginally.
  - **Do NOT use Doppler on the embryo/fetus when CRL <10mm**, even if cardiac motion absent. A short-term follow-up will be offered instead.

DOCUMENTATION:

OB First Trimester Evaluation can be completed with a transabdominal exam alone if an intrauterine pregnancy with cardiac motion can be confirmed. Both ovaries must be identified and documented (including color Doppler flow and spectral waveforms) if the indication for the examination is pain. Supplement inadequate transabdominal imaging with transvaginal images as below. Contact Radiologist/Resident for any questions regarding adequacy of transabdominal-only exam.

- Transabdominal +/- transvaginal approach – Measurements should only be obtained transabdominally OR transvaginally, not both
  - Uterus and Cervix
    - Longitudinal images:
      - Cervix and cul de sac
      - Right of midline, midline, and left of midline
      - Midline with length and AP measurement
      - Endometrial thickness measurement midline **only if no IUP visualized** (annotate LMP if not stored on data page)
    - Transverse images:
      - Cervix and cul-de-sac
      - Lower uterine segment
      - Mid body with transverse measurement
      - Fundus
    - Cine sweep, transverse (superior to inferior) and longitudinal (right to left) through uterus
  - Ovaries, Right and Left
    - Longitudinal and transverse images through each ovary
      - **or** "adnexa" if ovary is not visualized
      - Include a grayscale image with the ipsilateral iliac vessels
      - Must include minimum of 2 grayscale images of ovary in each plane
    - Representative image without and with measurements in 3 orthogonal planes, if ovary is well visualized
      - Long: Length with AP measurement perpendicular to Length
      - Trans: Width
    - Doppler
      - Representative color Doppler images
      - **Arterial and venous spectral Doppler waveforms if indication is pain, or suspicion for torsion**
    - Cine sweep, transverse (superior to inferior) and longitudinal (medial to lateral) of each ovary

- Gestational sac
  - Representative images including amnion and yolk sac if seen
  - Transverse, Long, and AP measurement for MSD (if no embryo seen)
    - If embryo seen, do not include MSD measurement in calc package for EGA
  - Embryo with CRL* measurement, if present
    - Obtain three measurements to ensure accuracy
    - *Only for fetus age > 13 weeks 6 days or less.
    - If 14 weeks 0 days, obtain BPD, HC, AC, and FL for dating and change order to "US UTERUS PREGNANT >14 WEEKS"
  - Confirm cardiac activity
    - Document cardiac motion with stationary cine loop
    - Measurement of FHR with M-mode
    - In general, **Spectral, Color and Power Doppler should NOT be used.** If no cardiac motion is detected **transvaginally** when **CRL ≥ 10 mm**, **only then may you try color or power Doppler.**
  - Size and extent of any peri-gestational, subchorionic collection.
    - Include color/power/micro Doppler of collection avoiding color over the gestational sac.
- Cul-de-sac
  - If not included above.
- Data page(s)

PROCESSING:

- Review examination data. Ensure accurate calculation of EGA (**based on CRL only, if embryo/fetus present; otherwise MSD**).
- Export all images to PACS. Include OB report page.
- Document relevant history (including bHCG level, if applicable) and any study limitations
- UTSW: Confirm data in Imorgon

REFERENCES:

ACR-ACOG-AIUM-SMFM-SRU Practice Guideline (Revised 2023)

Rodgers, S. K., Horrow, M. M., Doubilet, P. M., et al. (2024). A lexicon for first-trimester US: Society of Radiologists in Ultrasound consensus conference recommendations. *Radiology*, *doi: 10.1148/radiol.240122*. https://doi.org/10.1148/radiol.240122

REVISION HISTORY:

STATUS	NAME & TITLE	DATE	BRIEF SUMMARY
Submission	David T. Fetzer, MD, Medical Director	**11-09-2015**	Submitted
Approval	David T. Fetzer, MD, Medical Director	**11-09-2015**	Approved
Review	Theresa Huang, MD	**10/30/2018**	Reviewed
Revisions		**01-24-2016**	Added need to obtain UPT or bHCG prior to exam
		06-06-2016	Clarified use of Doppler (Color, Spectral) on the embryo
		06-19-2017	Clarified use of CRL to determine EGA, only use MSD if embryo/fetus not present.
		11-19-2017	Clarified use of color and power Doppler, cutoff for FHT by CRL for fetal demise
		02-13-2019	Clarified when and when to use CRL as opposed to BPD/HC/AC/FL for dating
		5-4-2019	Updated details regarding when, when not to obtain UPT/bHCG
		03-24-2021	Updated verbiage regarding no MSD measurement in calc package when CRL measurement is taken.
		6-9-2021	Clarified requirements for TV based on quality of TA images
	Skye Smola, RDMS, RVT	**09-27-2023**	Ovarian Doppler waveforms only for indications of pain or suspicion for torsion
	David Fetzer, MD; Skye Smola RDMS, RVT	**09-26-2025**	Clarified requirements for pregnancy tests; updated revision history chart, re-organized *Technical Considerations,* replaced all instances of "fetal pole" and "pseudogestational sac" with updated SRU consensus lexicon for 1st trimester OB