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Performance of Gynecologic and Limited Obstetric Ultrasound Examinations

Therese Cooper, *Director of Accreditation*

July 19, 2023

Learning Objectives

- Gynecologic Ultrasound
 - Interpret imaging of normal anatomy in the nongravid female pelvis
 - Distinguish common abnormalities
- Obstetric Ultrasound
 - Overview of the ultrasound appearance of a normal intrauterine pregnancy and how to distinguish it from a pregnancy of unknown location or ectopic pregnancy
 - Discussion of ultrasound findings that indicate fetal viability, such as fetal cardiac activity and gestational sac size
 - Recognize a viable first trimester intrauterine pregnancy including and pregnancy of unknown locations as well as fetal dating
 - Evaluate fetal growth and recognize basic fetal anatomy relevant to biometric assessment
 - Identify fetal presentation, placental location, and cervical assessment
 - Assess parameters indicative of fetal well-being (Biophysical Profile)

Nongravid Female Pelvis

- Review Pre-course Materials
 - Interpret imaging of normal anatomy in the nongravid female pelvis
- Learning objective
 - Distinguish common abnormalities

Lecture series: <https://apps.aium.org/uls/lectures.htm>

Review Pre-course

- Summary of objectives

- Recognize appearance of the non gravid female genital tract, recognize appearance of the pelvis with respect to the menstrual cycle, and become aware of newer sonographic techniques and other modalities

- Takeaways

- Transabdominal (TA) = global view of the pelvis even without a full bladder and Transvaginal (TVS) = enhance the view of the pelvic structures but the field of view is limited
- Normal view of the pelvic structures including the vasculature
- TVS imaging method of choice for resolution of myometrium and endometrium.
- Uterine, endometrial, and ovarian measurements differ from premenopausal and postmenopausal patients
- Uterine 3-D reconstructions of the uterus is better than 2D. Why?

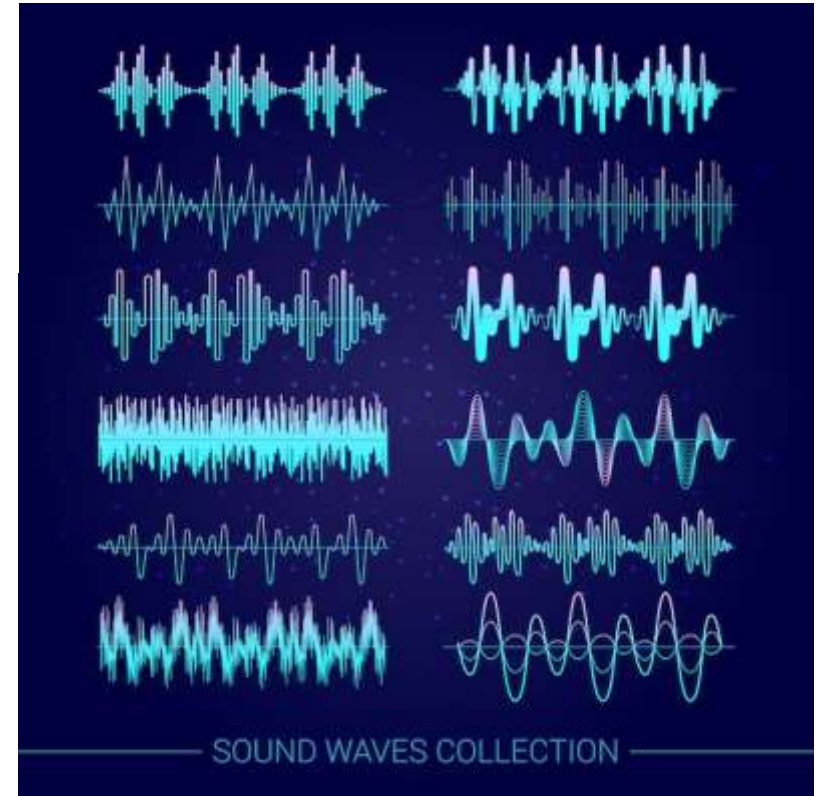
Sonography of the Normal Female Pelvis



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Medicine
Nashville, TN

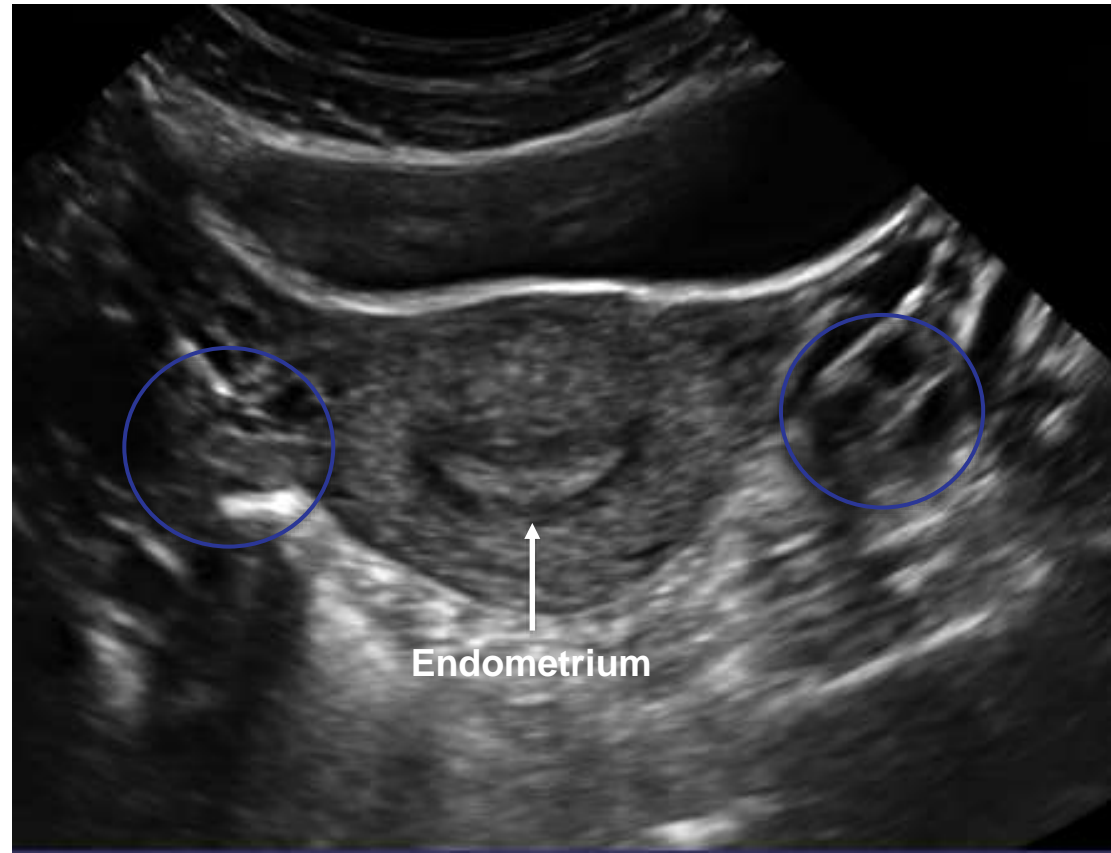
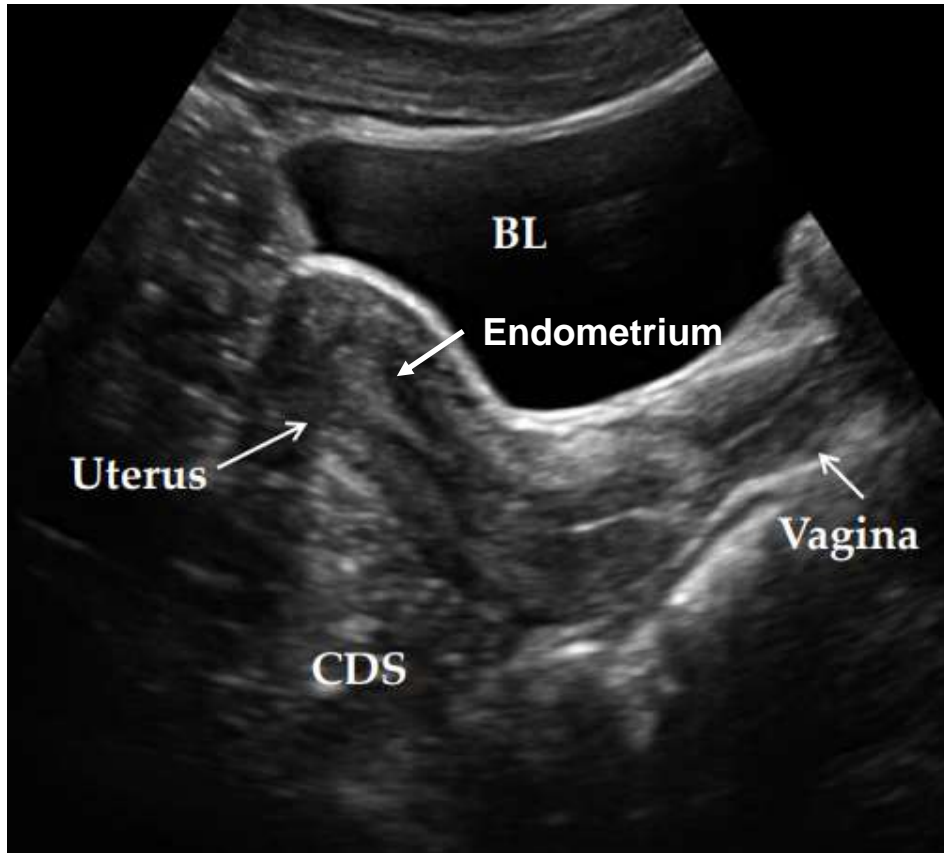
Physics the quick way

- Frequency
 - Frequency determines penetration and resolution
 - High frequency less penetration but better resolution
 - Low frequency deeper penetration but lower resolution
- Focal Zones
 - Moving focal zones to level of your attention to get better resolution
- Depth
 - Decreasing the depth using the ultrasound knobs will help you focus on the important structure you are assessing
 - Increasing the depth will help you get a bit more global view and see deeper in the abdomen



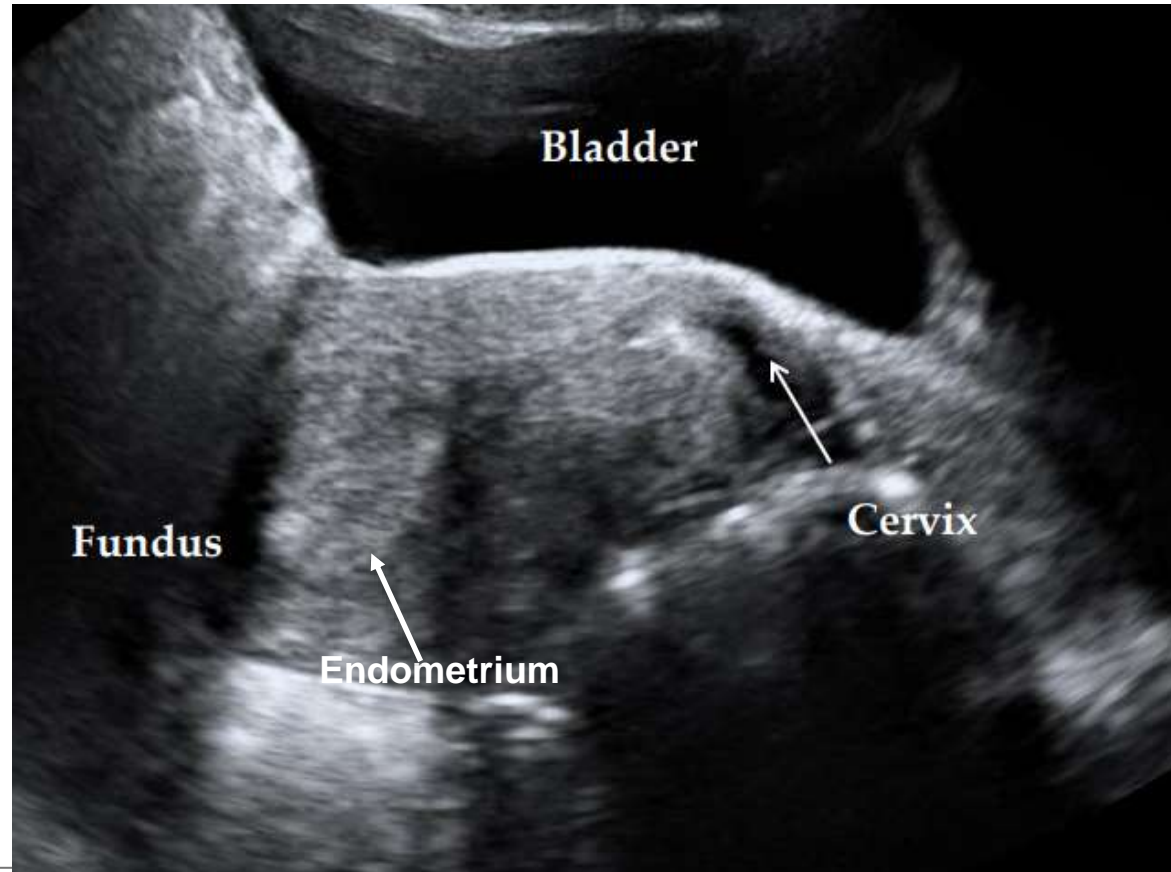
Nongravid Female Pelvis

- Transabdominal Uterus (position and the endometrium)



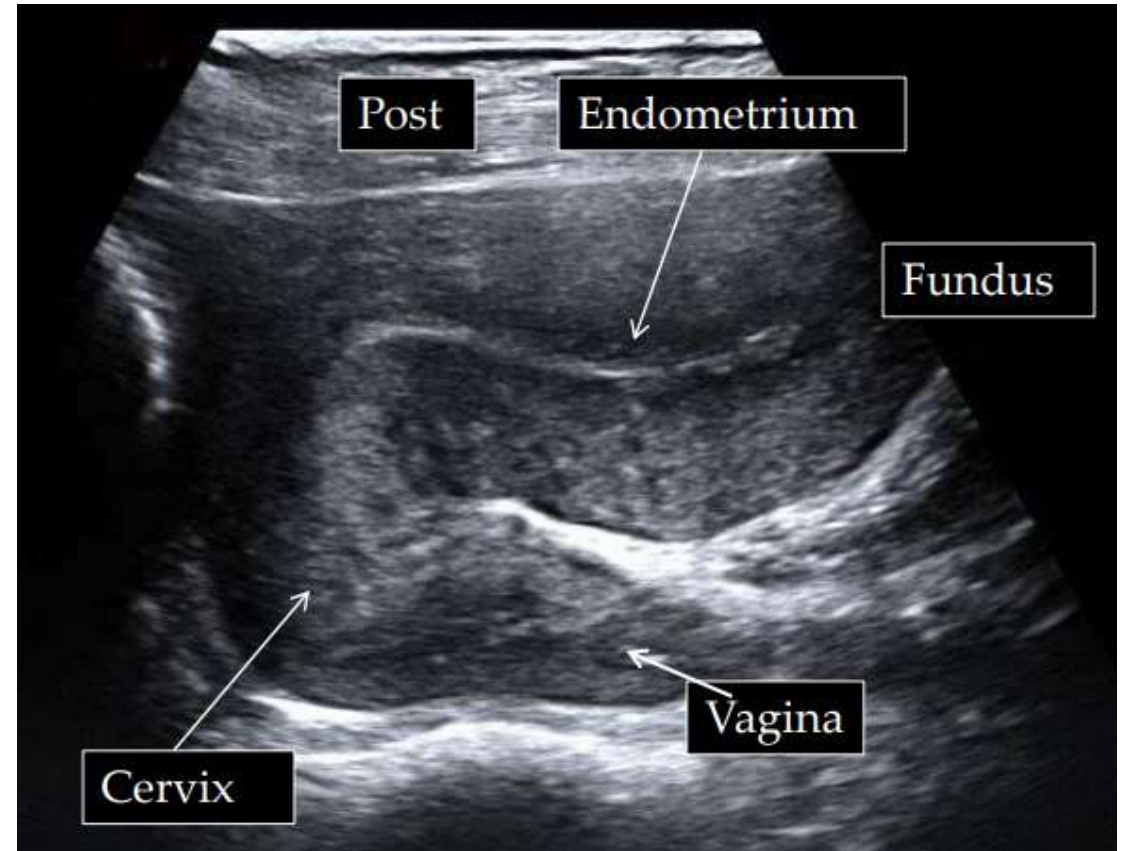
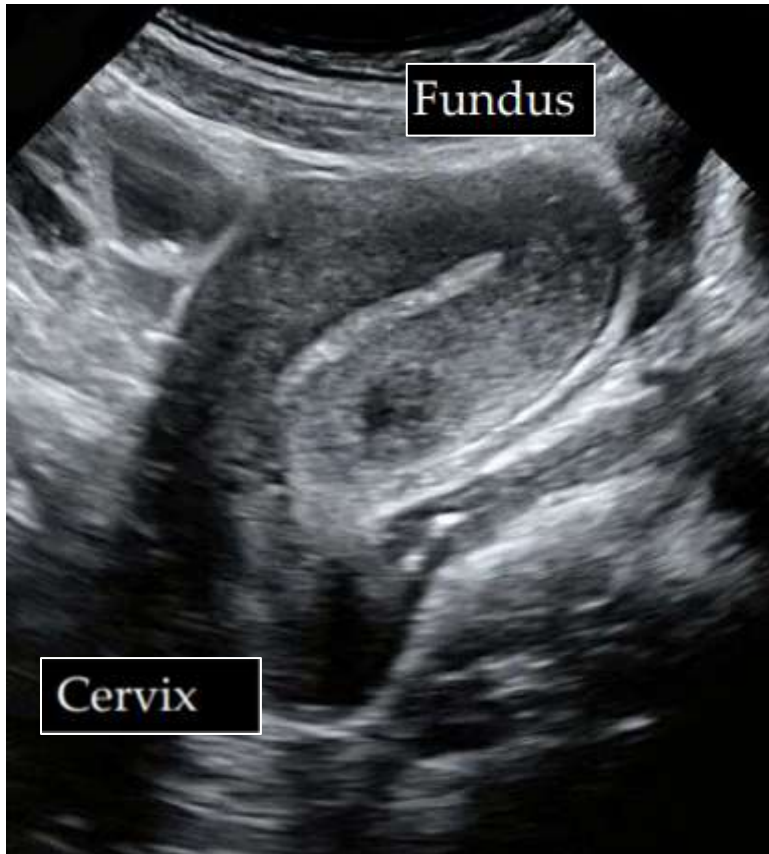
Nongravid Female Pelvis

- Transabdominal Uterus (position and the endometrium)



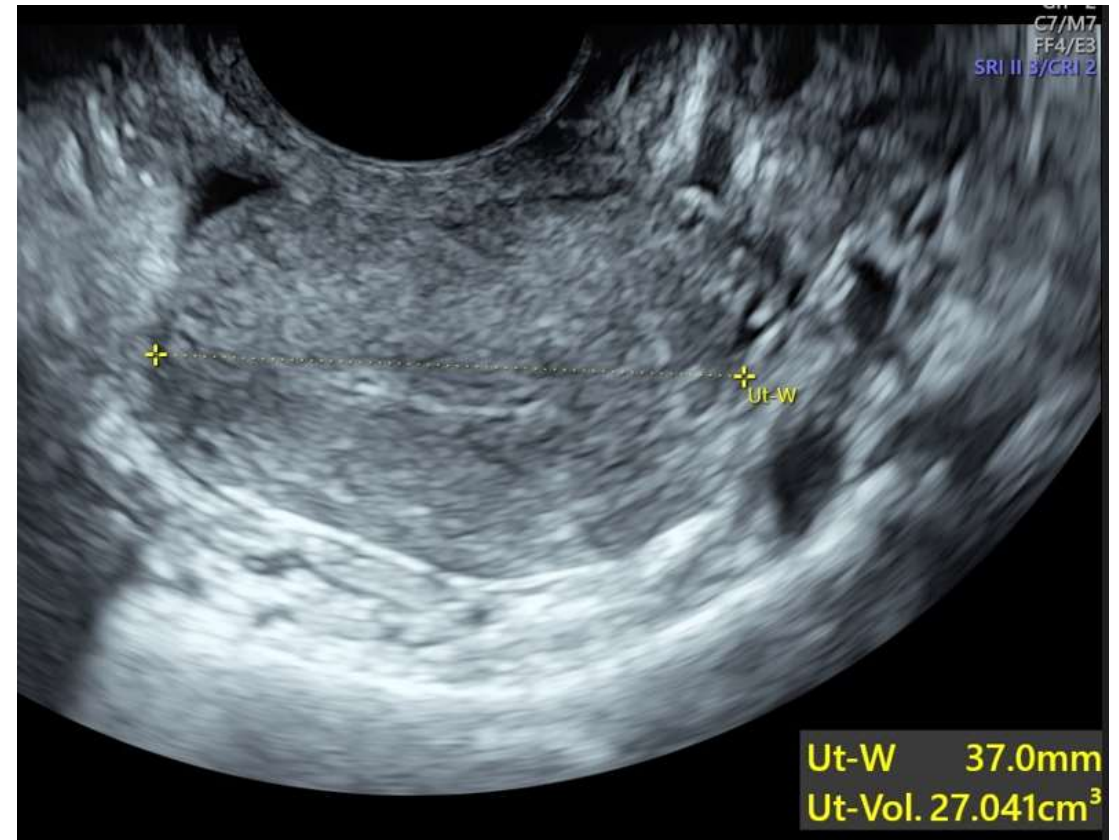
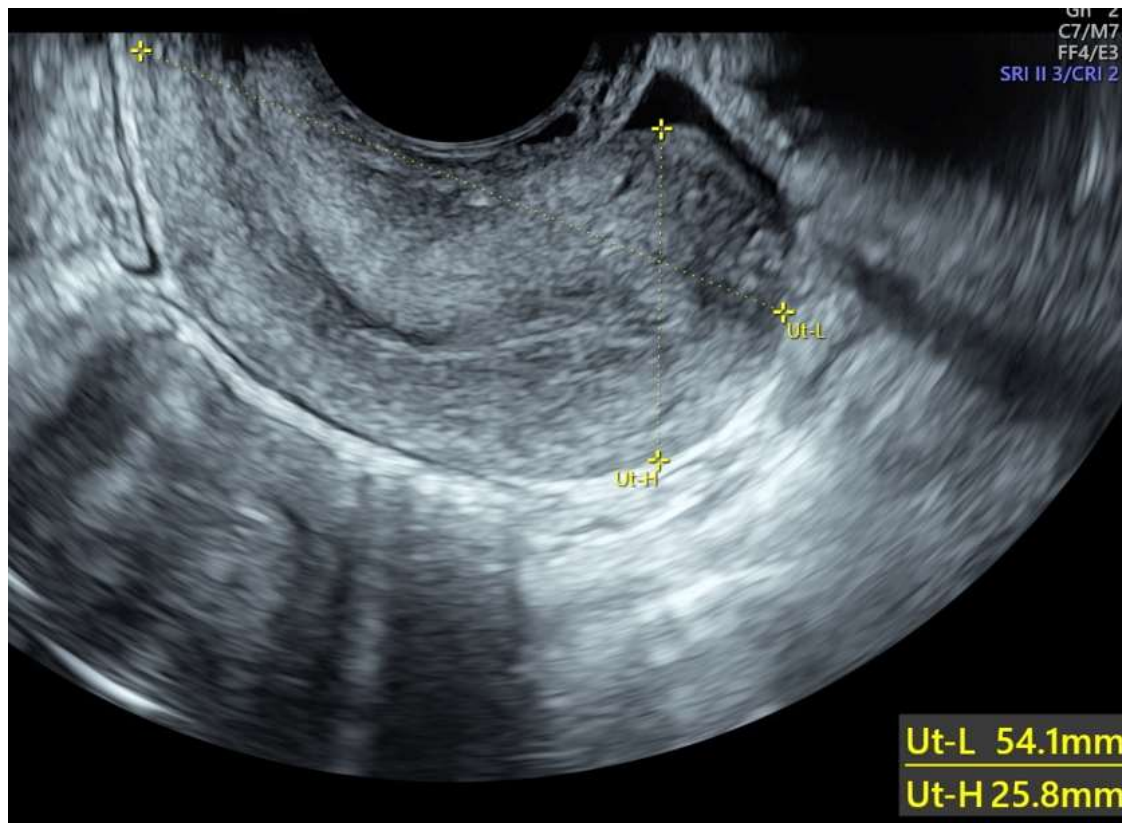
Nongravid Female Pelvis

- Transabdominal Uterus



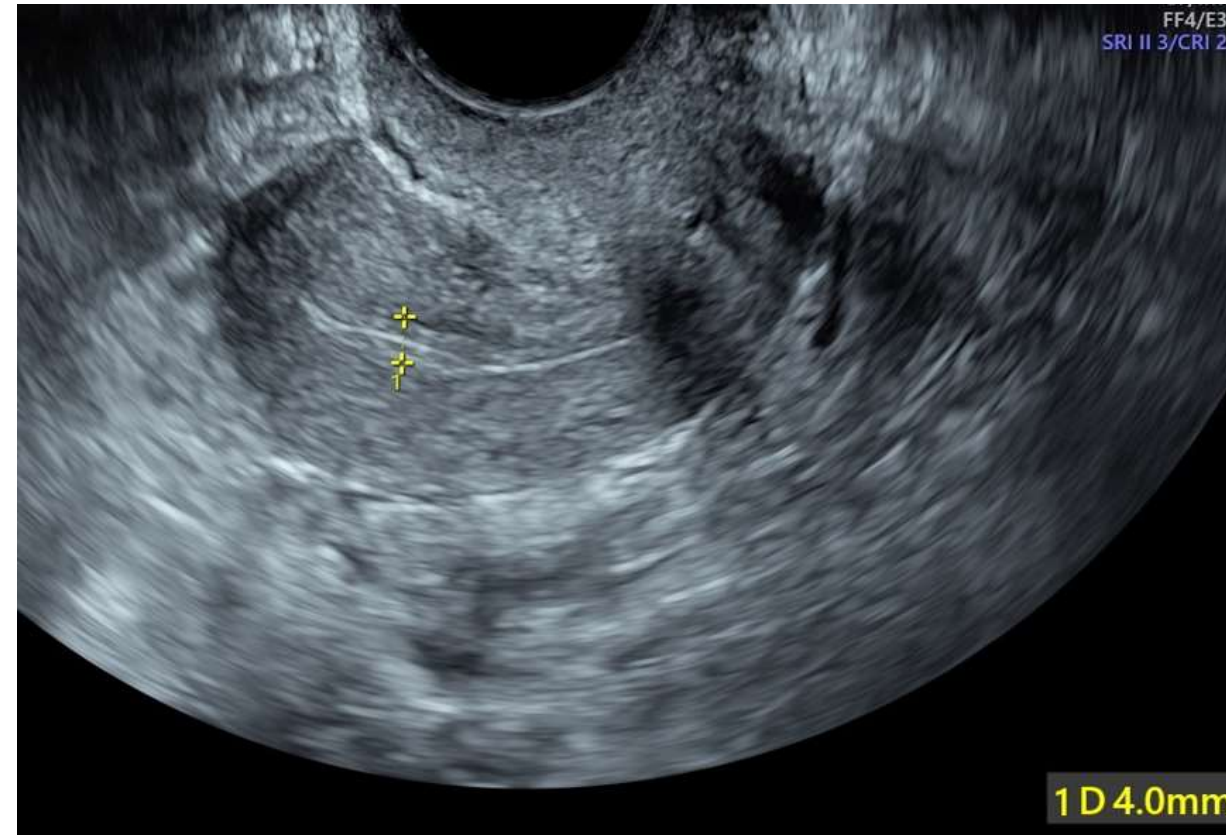
Nongravid Female Pelvis

- Transvaginal Uterus (measurements)



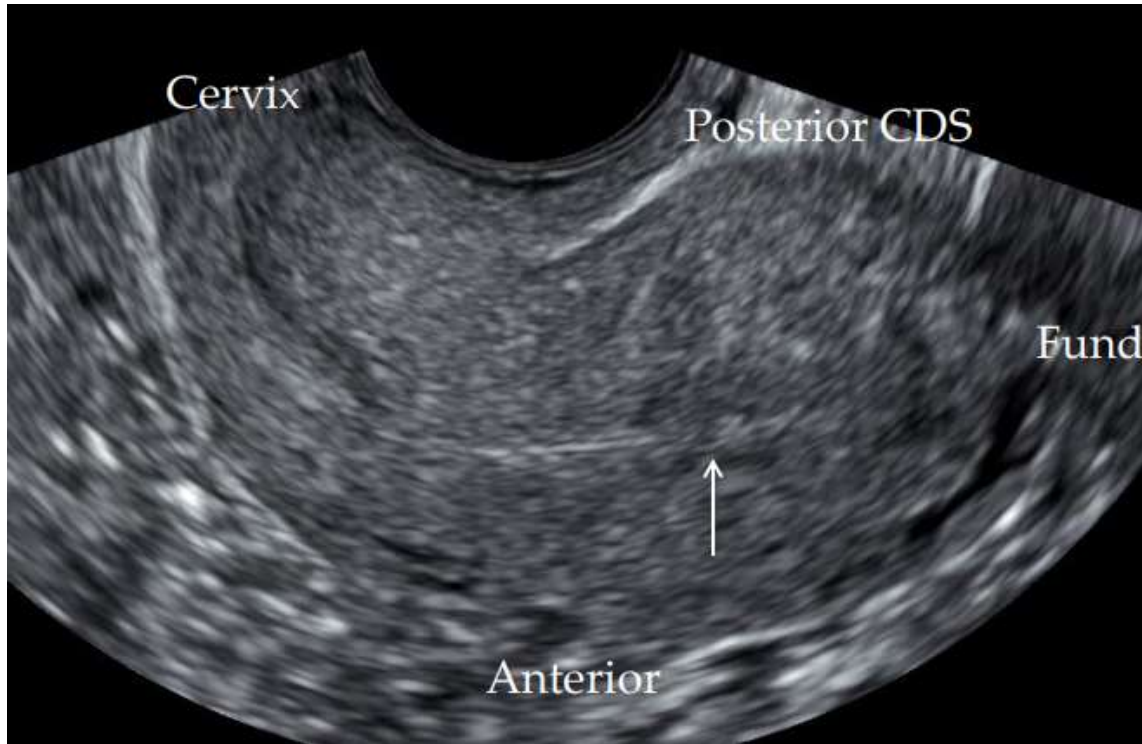
Nongravid Female Pelvis

- Transvaginal Uterus (positions)



Nongravid Female Pelvis

- Transvaginal Endometrium - Comparison



Nongravid Female Pelvis

- Post menopausal patient - endometrium and uterine



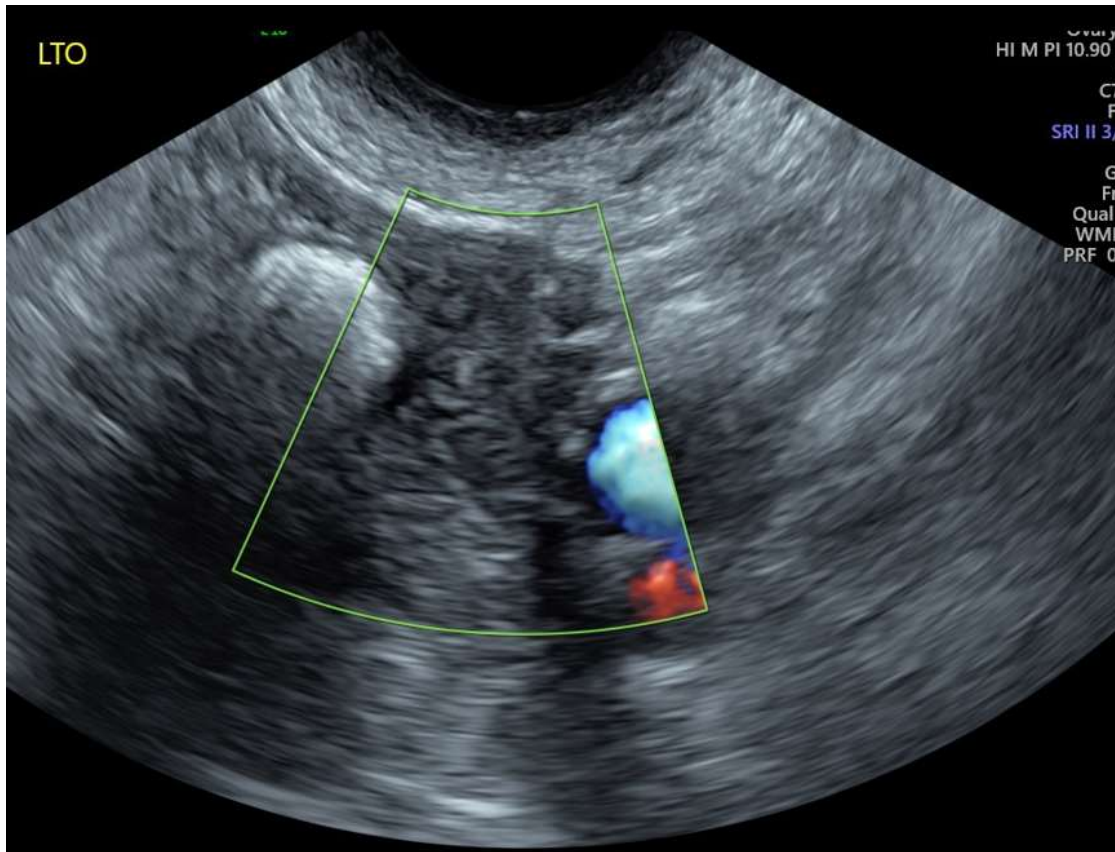
Nongravid Female Pelvis

- Measurement of the endometrium in a post menopausal patient



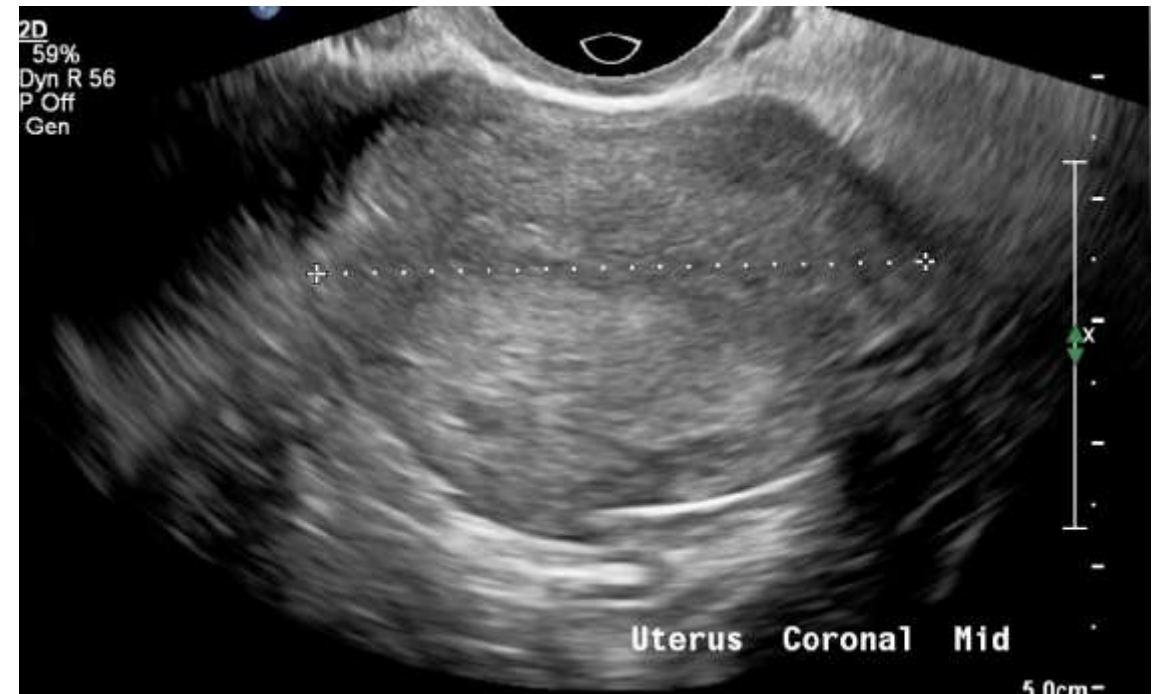
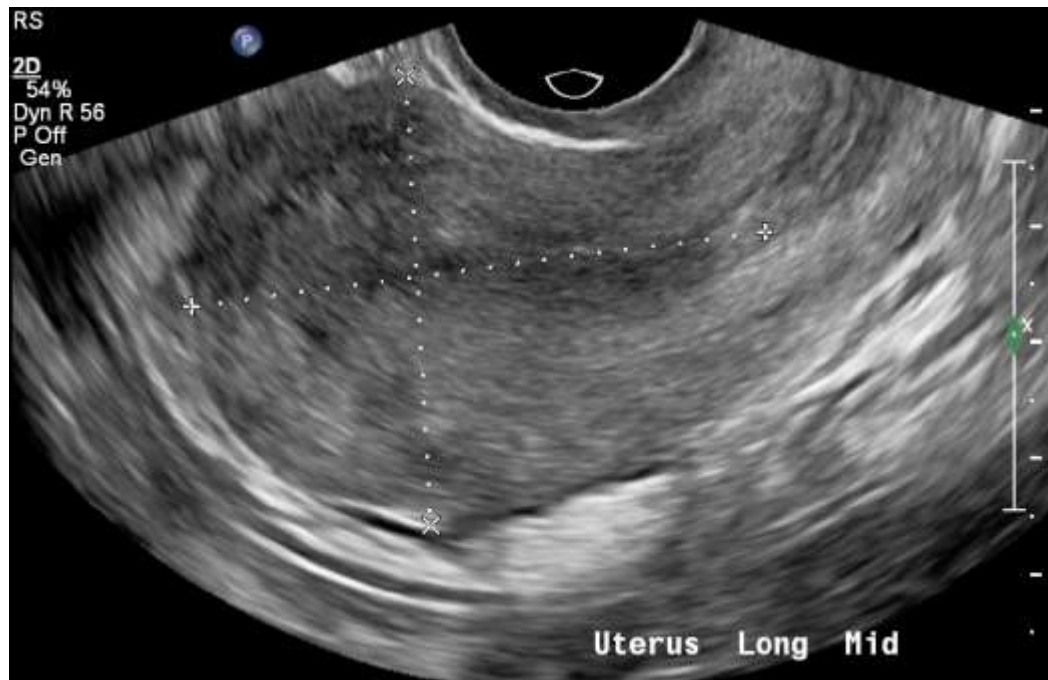
Nongravid Female Pelvis

- Transvaginal ovaries – comparison: post menopausal and menstruating patients



Nongravid Female Pelvis

- Measurements when measuring Volume

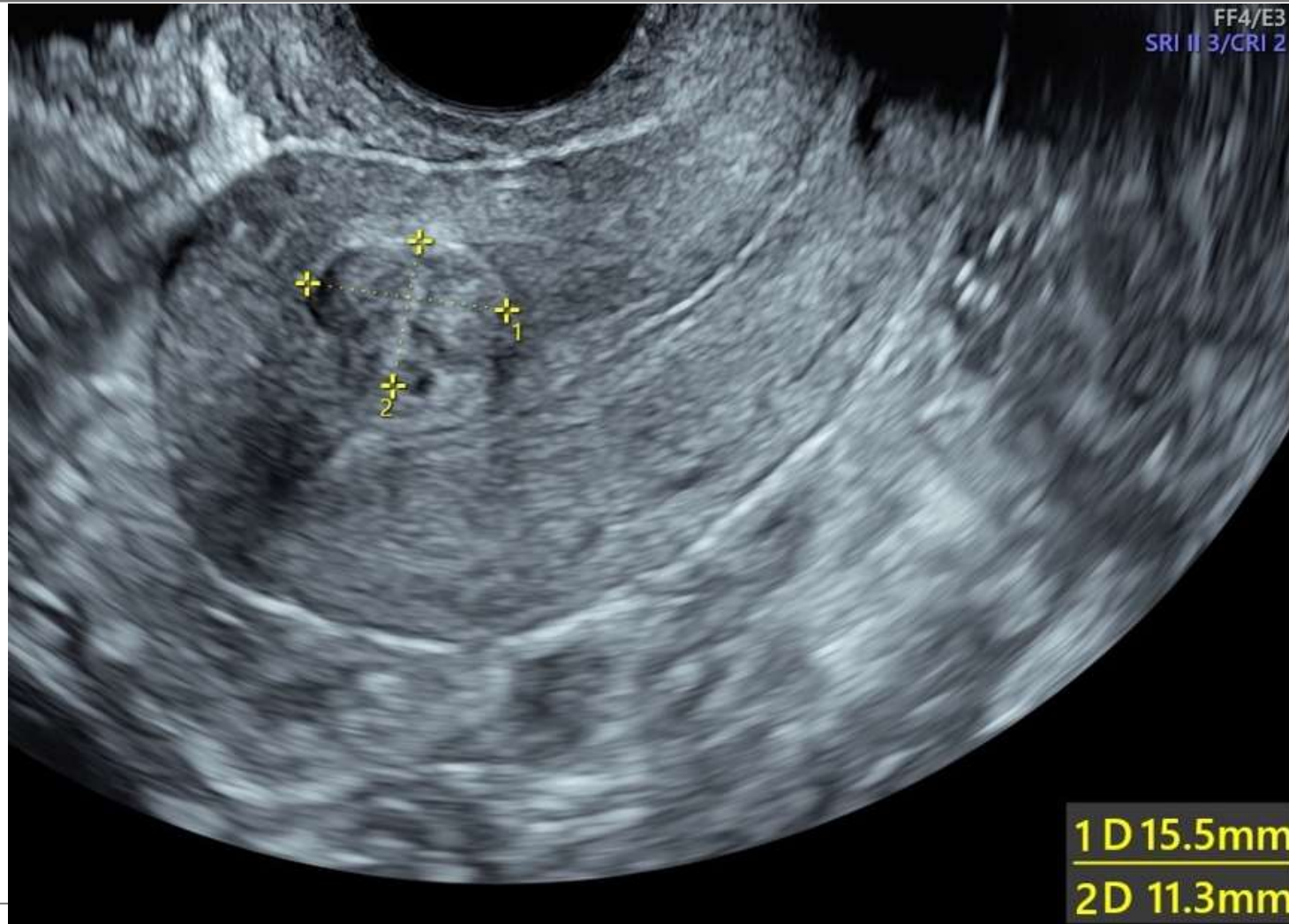


Nongravid Female Pelvis

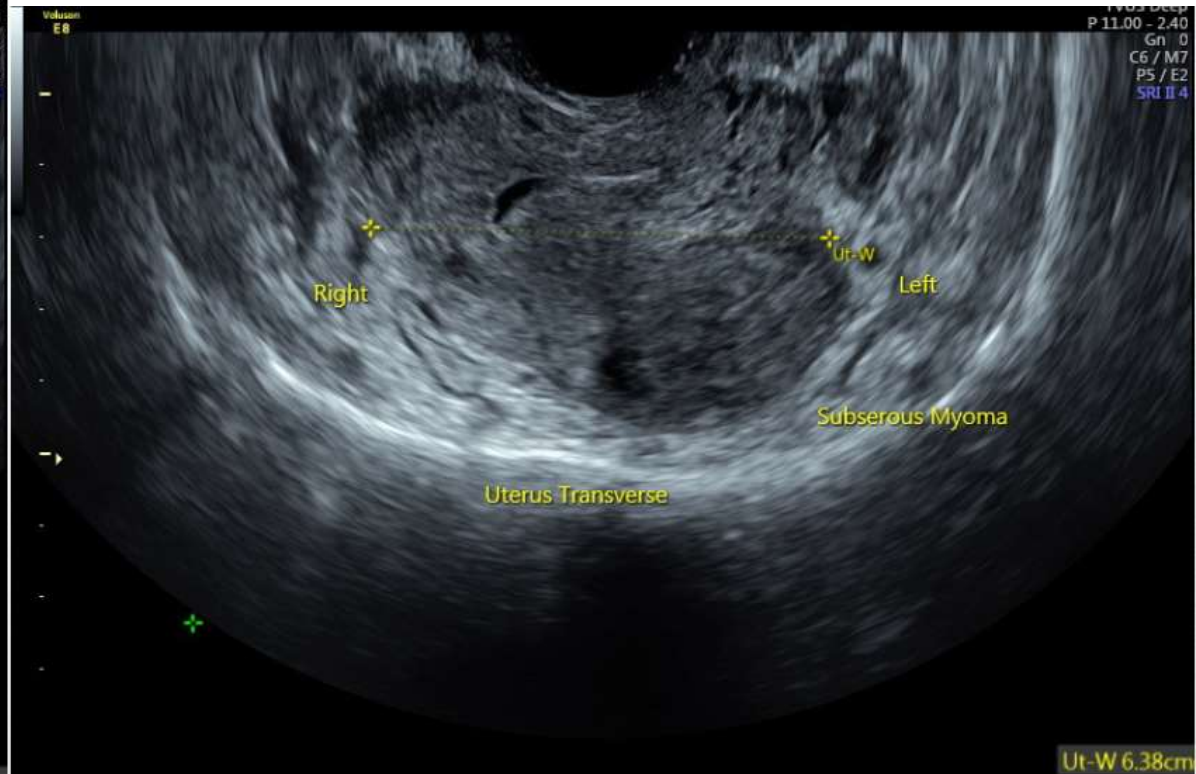
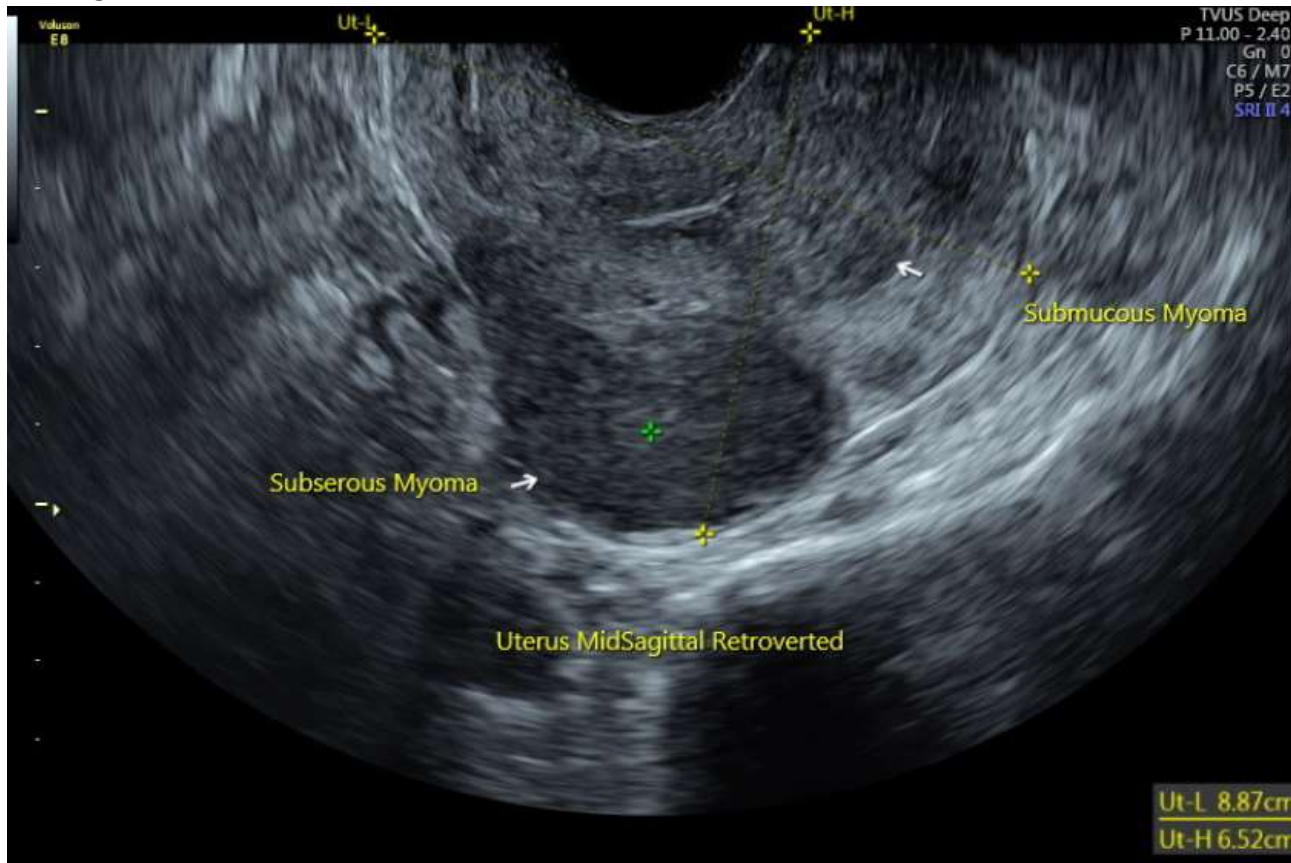
- Review Pre-course Materials
 - Interpret imaging of normal anatomy in the nongravid female pelvis
- Next
 - Distinguish common abnormalities



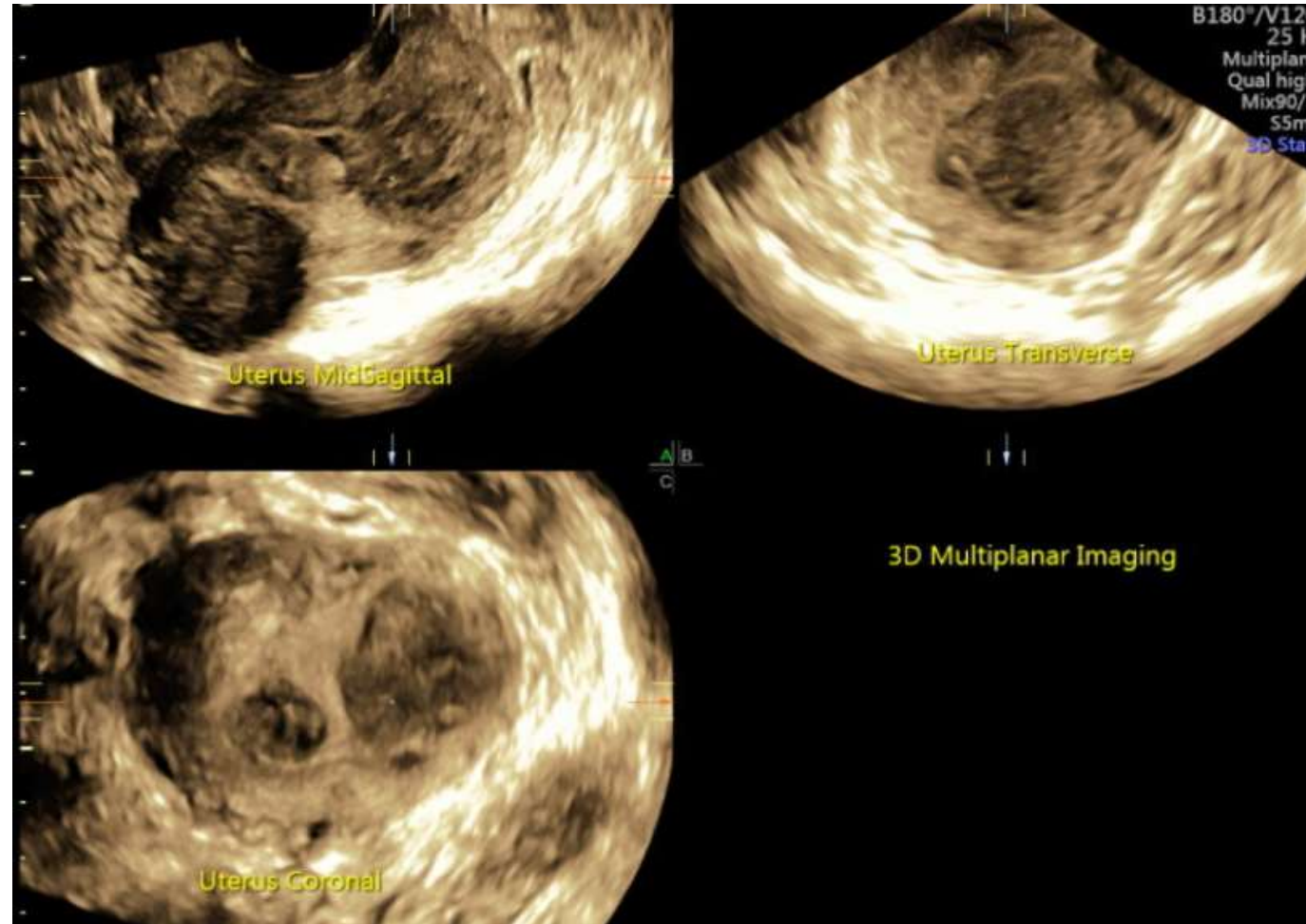
What do you see?



What do you see?

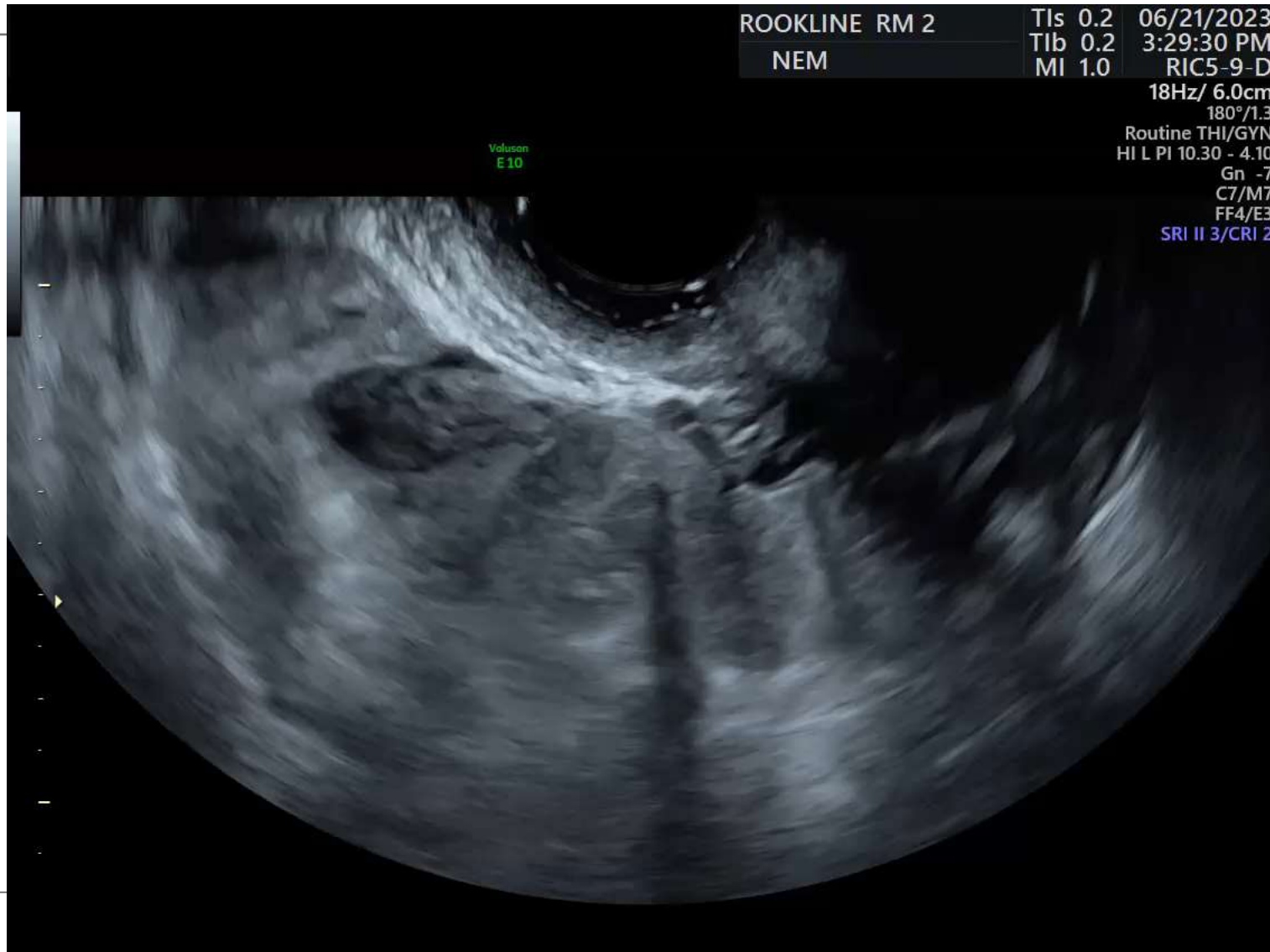


What do you see?



What do you see?

What do you see?



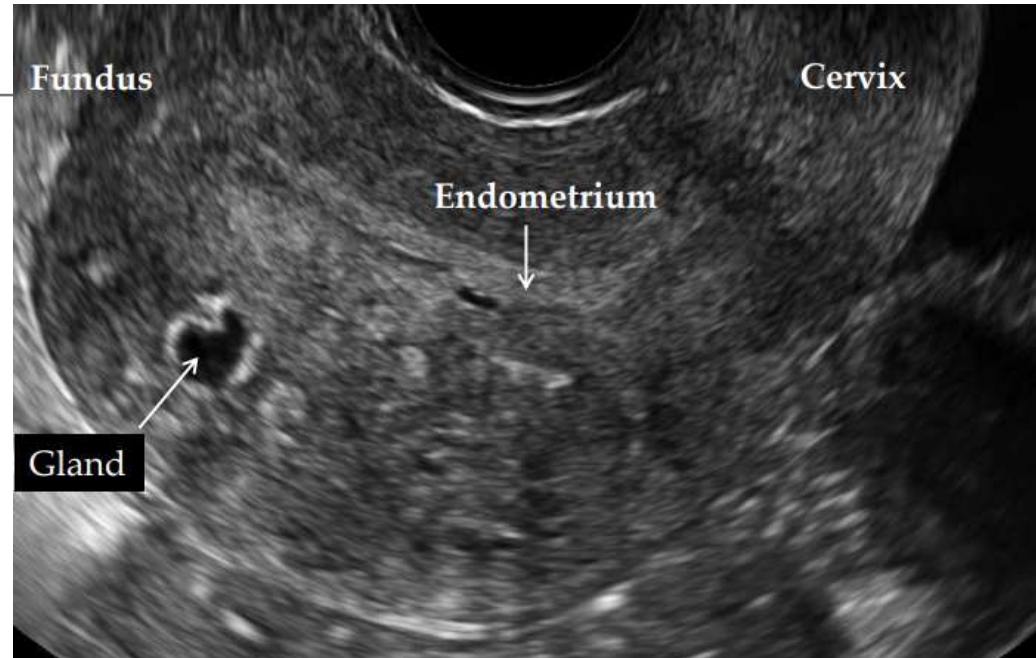
Endometrial polyp



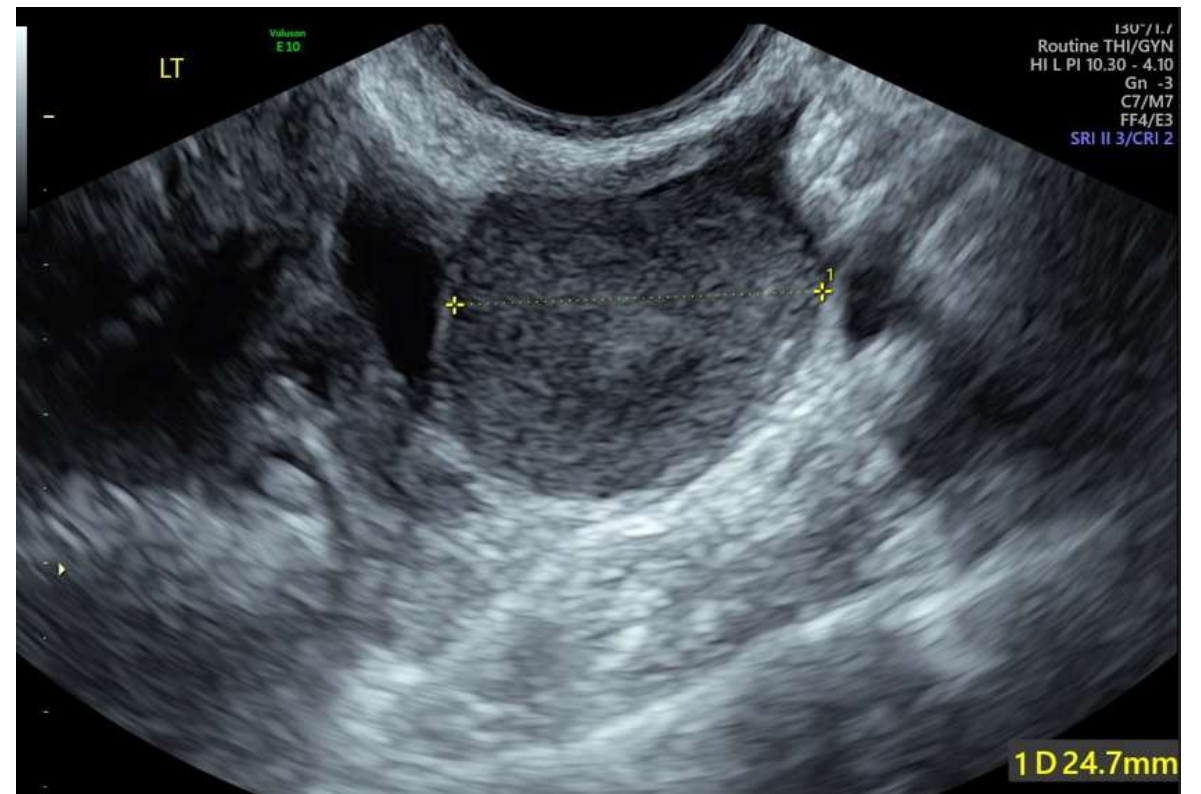
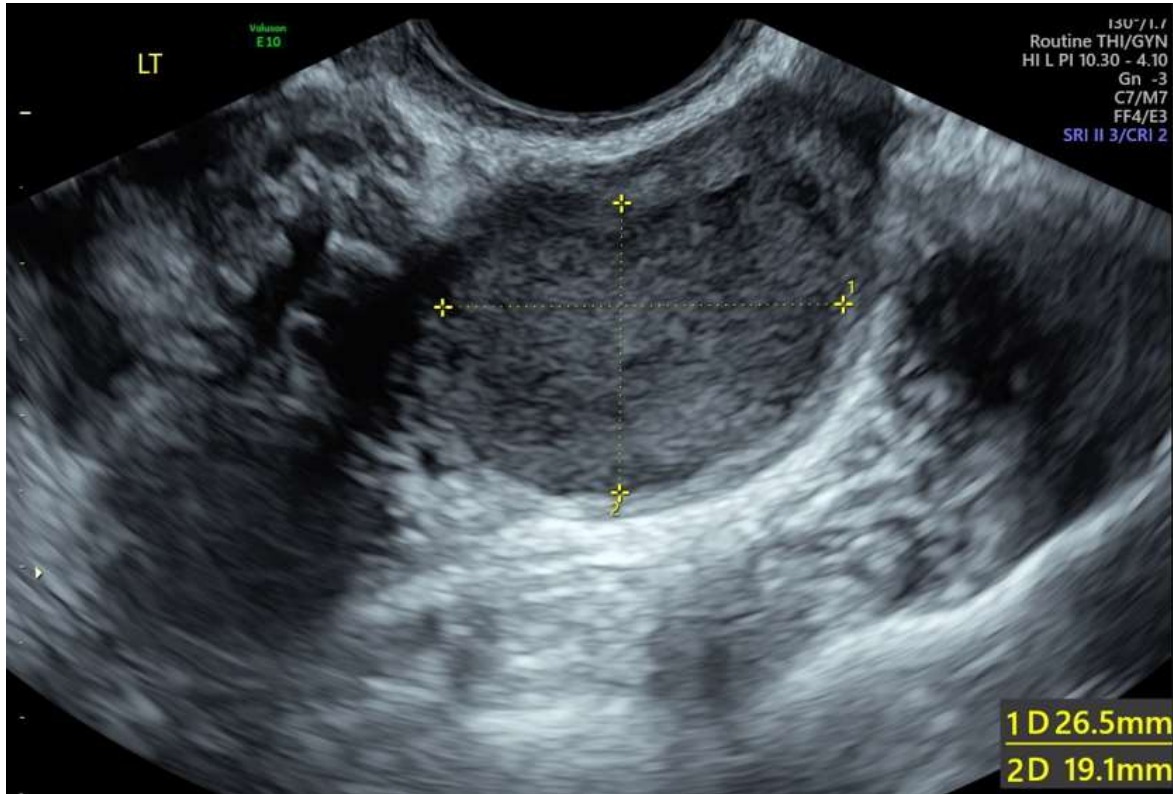
What do you see?



What do you see?



Ovaries



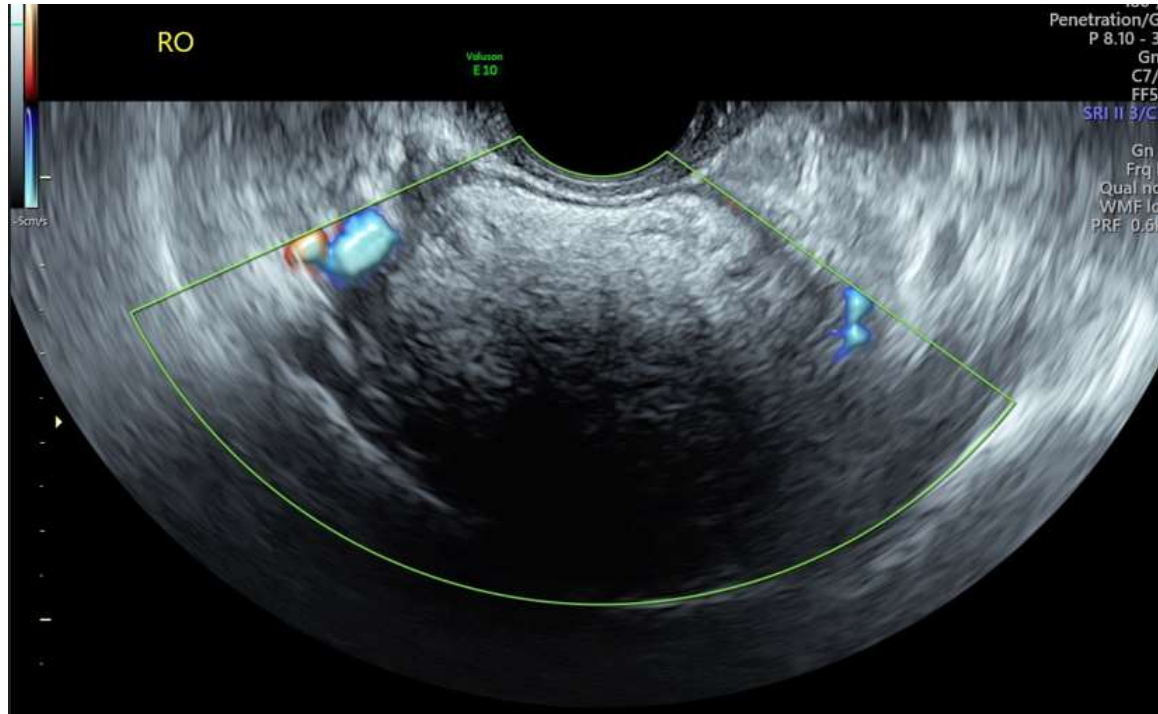
20 Year Old Female

Symptoms:

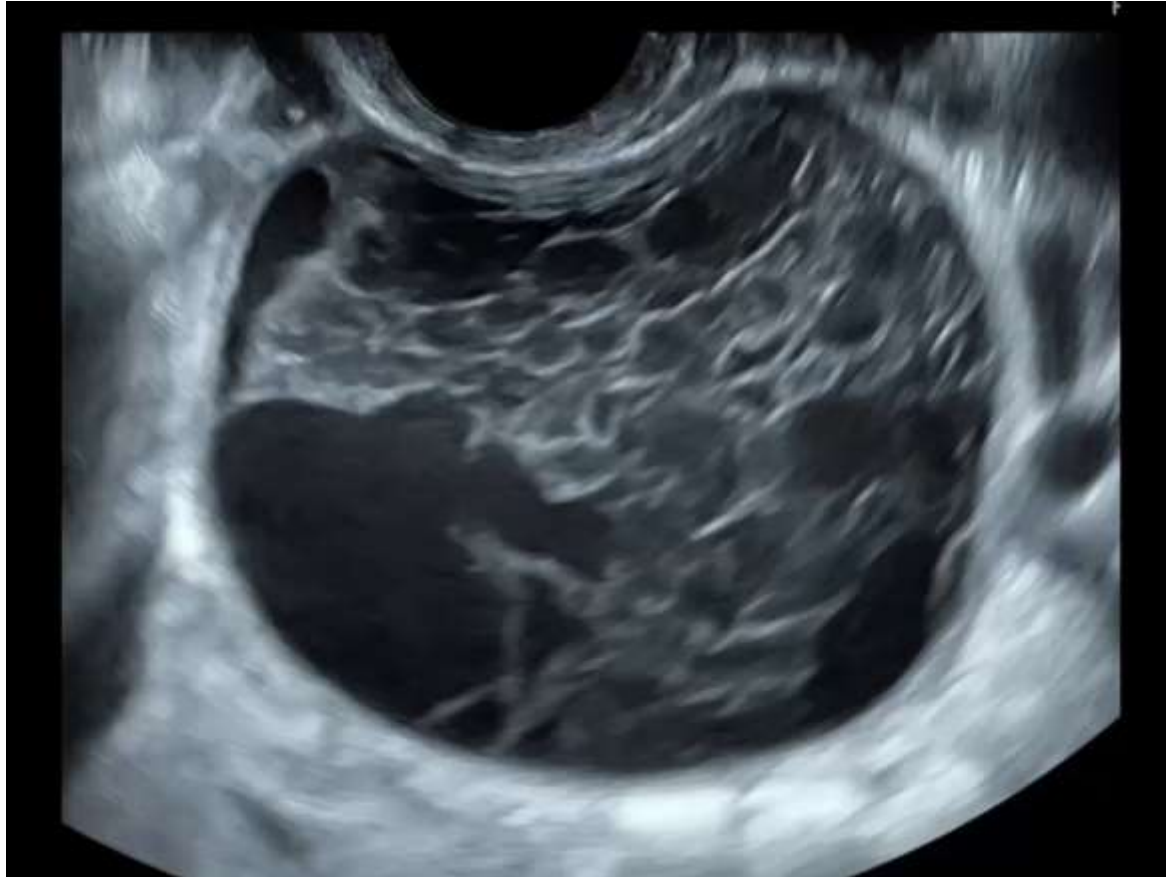
1. Pelvic Pain and Pressure
2. Pain during intercourse
3. Unusually heavy periods.



What do you see?



What do you see?

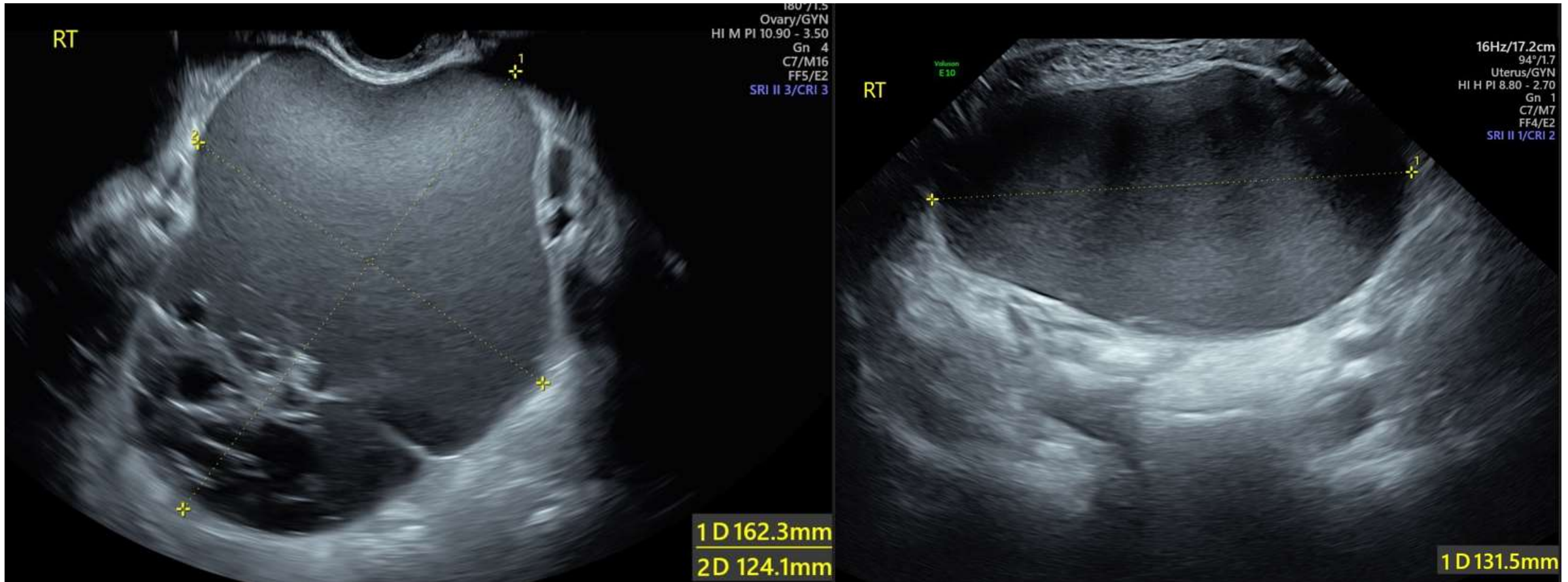


1 D 53.4mm
2 D 62.9mm

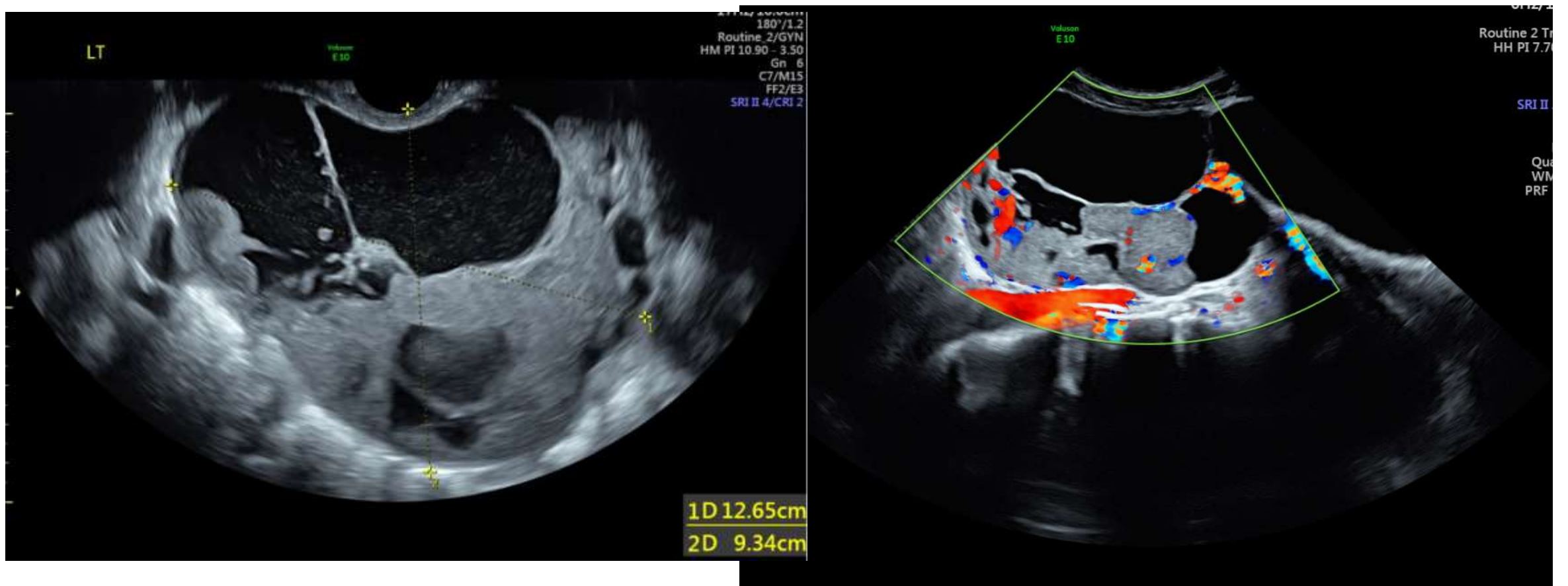


1 D 66.9mm

What do you see?



What do you see?



What do you see?



Limited Obstetric Ultrasound

Review the Pre course work

Reminder of the learning objectives

Limited Obstetric Objectives

- **Review Precourse**

- Overview of the ultrasound appearance of a normal intrauterine pregnancy and how to distinguish it from a pregnancy of unknown location or ectopic pregnancy (precourse)
- Discussion of ultrasound findings that indicate fetal viability, such as fetal cardiac activity and gestational sac size (precourse)
- Recognize a viable first trimester intrauterine pregnancy including and pregnancy of unknown locations as well as fetal dating (precourse)
- Evaluate fetal growth and recognize basic fetal anatomy relevant to biometric assessment (precourse)

- **Learning objective**

- Identify fetal presentation, cervical assessment, and placental location
- Assess parameters indicative of fetal well-being (Biophysical Profile)

Review Pre-course

Sonographic Evaluation of Early Pregnancy Loss

- Summary

- Understand limitations of hCG, sonographically distinguish definite pregnancy failure from probable pregnancy failure during early pregnancy.

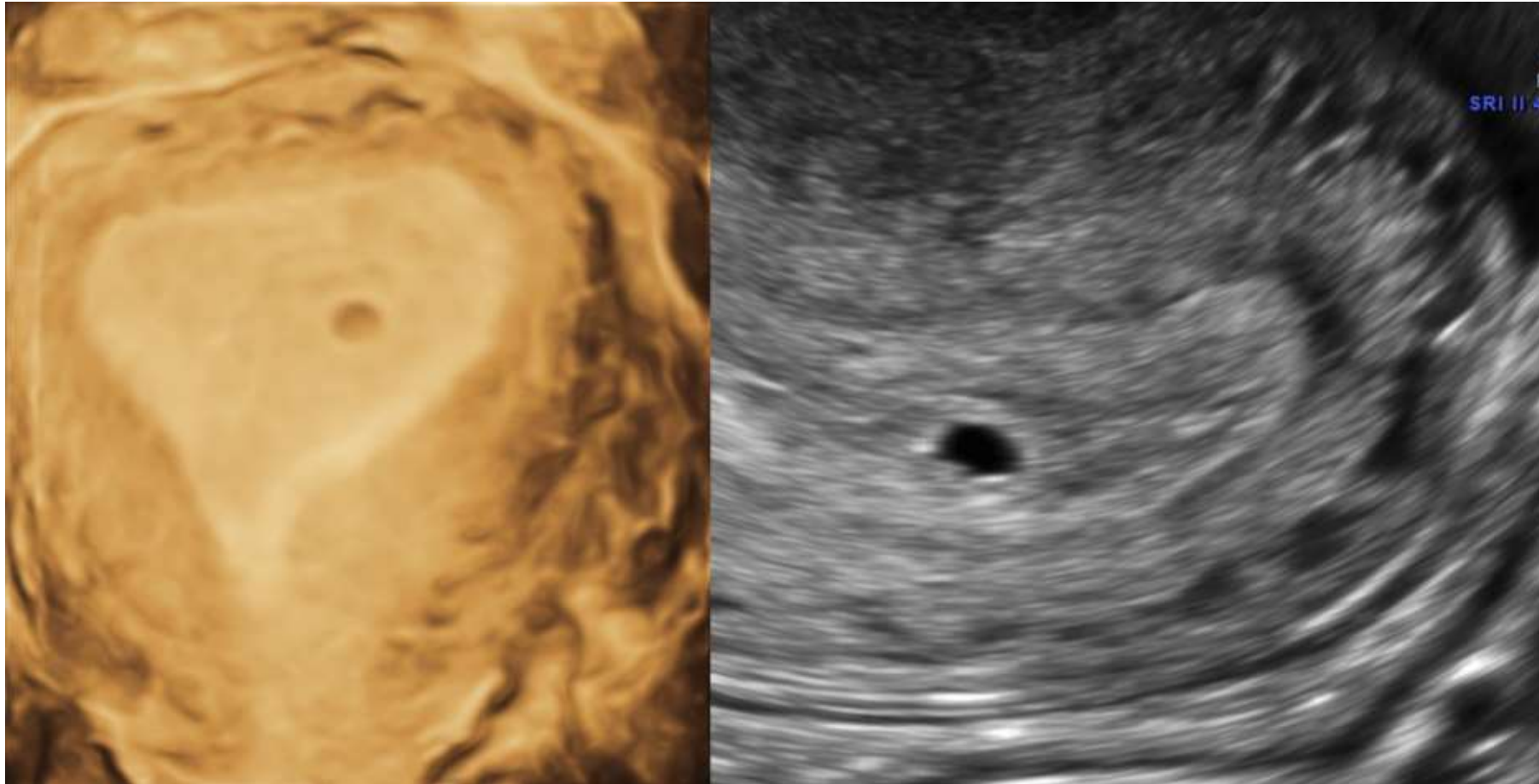
- Takeaways

- TVS timeline for normal findings 5 wks = GS; 5.5 wks = YS
6 wks = Embryo with FHR; 7 wks = Amnion around embryo
- False positive or false negative consequences if erroneously diagnosed
- Three scenarios (with positive hCG and normal adnexa)
- hCG “discriminatory level” rationale
- Important to know the criteria for diagnosing pregnancy failure

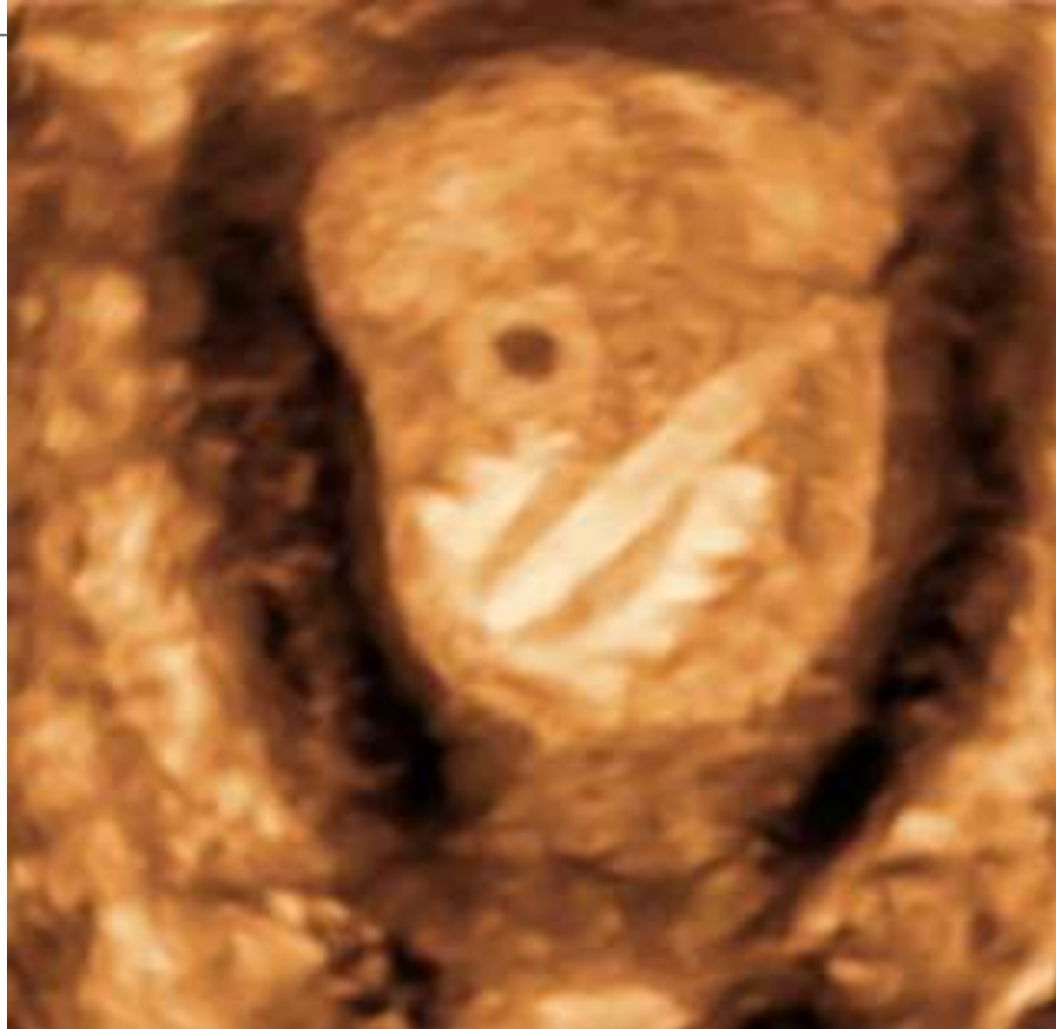


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Early Intrauterine Pregnancy



Early Intrauterine Pregnancy



Review Pre-course

Ultrasonography for Dating Pregnancies

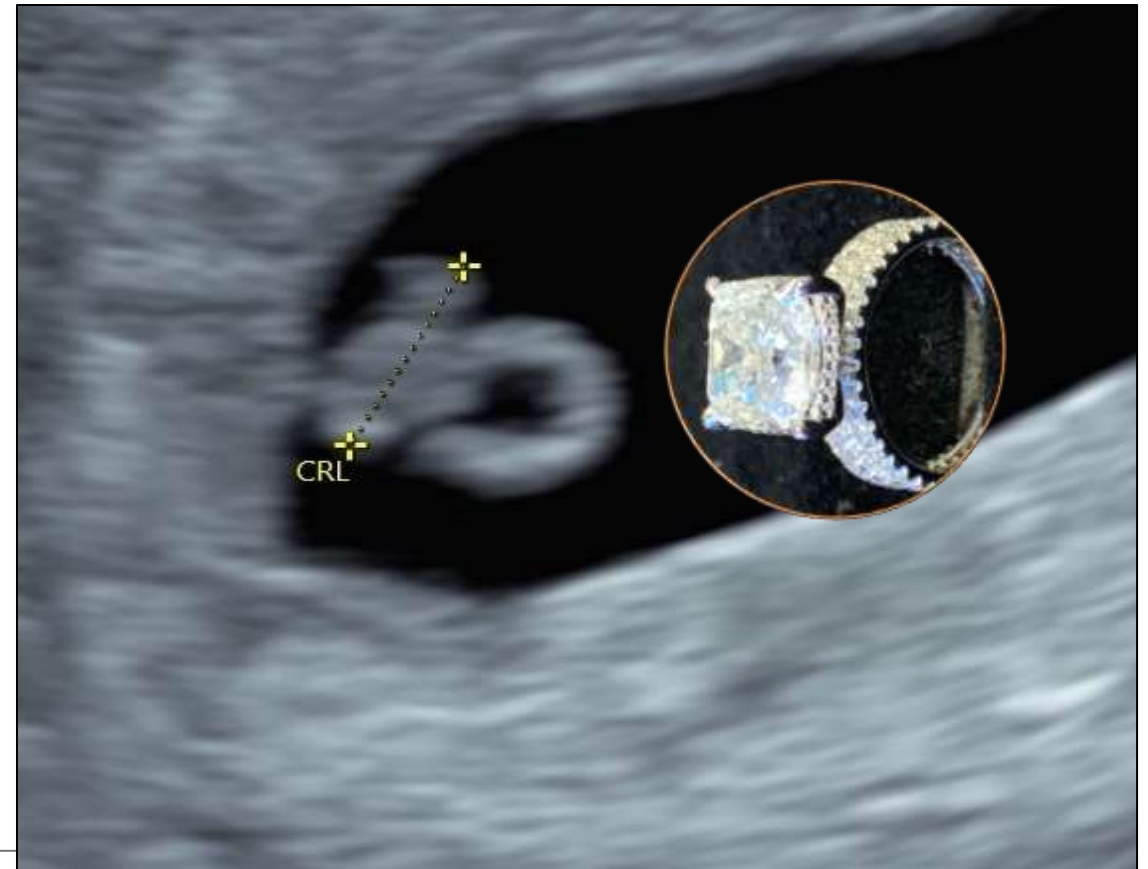
- Summary of objectives
 - Understand the importance of accurate pregnancy dating, describe first and second trimester measurements and accuracy, and a utilize a simple algorithm for assigning a due date
- Takeaways
 - Assigning a correct due date is the most important task. Why?
 - Traditional pregnancy dating. Electronic due date calculator
 - Mean Sac Diameter mostly useful for establishing follow up or demise
 - CRL is the preferred method of dating for singletons and twins
 - Second trimester dating accuracy and proper imaging planes important to evaluate proper fetal growth



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1st Tri : 6 weeks

“Diamond on the ring”



US: CRL up to 13+6d weeks most accurate

± 8% GA

± 5-7 days



FHR - First Trimester

Fetal Heart Rate Evaluation

Although Doppler instruments without imaging capability are permissible to be used, spectral Doppler imaging should not be used to document the fetal heart rate unless clinically indicated. When attempting to document the fetal cardiac activity or obtain the heart rate with a diagnostic ultrasound system, the AIUM recommends using either an M-mode or a B-mode scan, keeping the TI as low as possible, preferably less than or equal to 0.7, and not prolonging the procedure beyond what is necessary to obtain the measurement.¹ Use the TI for soft tissues for the TI if pregnancy is less than 10 weeks; use the TI for bone if 10 or more weeks.

If an M-mode scan cannot be obtained at an embryonic size (crown-rump length) of 2 mm to 1 cm (approximately 5+ to 7 weeks), the heartbeat may be visualized by B-mode imaging and retained for documentation. Pulsed Doppler (spectral, power, and color flow imaging) ultrasound should not be used routinely due to increased acoustic output.

More on this at www.aium.org/resources/official-statements



Best way to an accurate CRL



- Fills 2/3 image space
- Fetus perpendicular to US beam
- Mid-sagittal entire profile, spine and rump seen
- Neutral position -fluid between chin and chest
- Maximum Length measured in a straight line
- Crossbar-skin of head and rump
- Report mean of 3 discrete acceptable measurements

Fetal Presentation

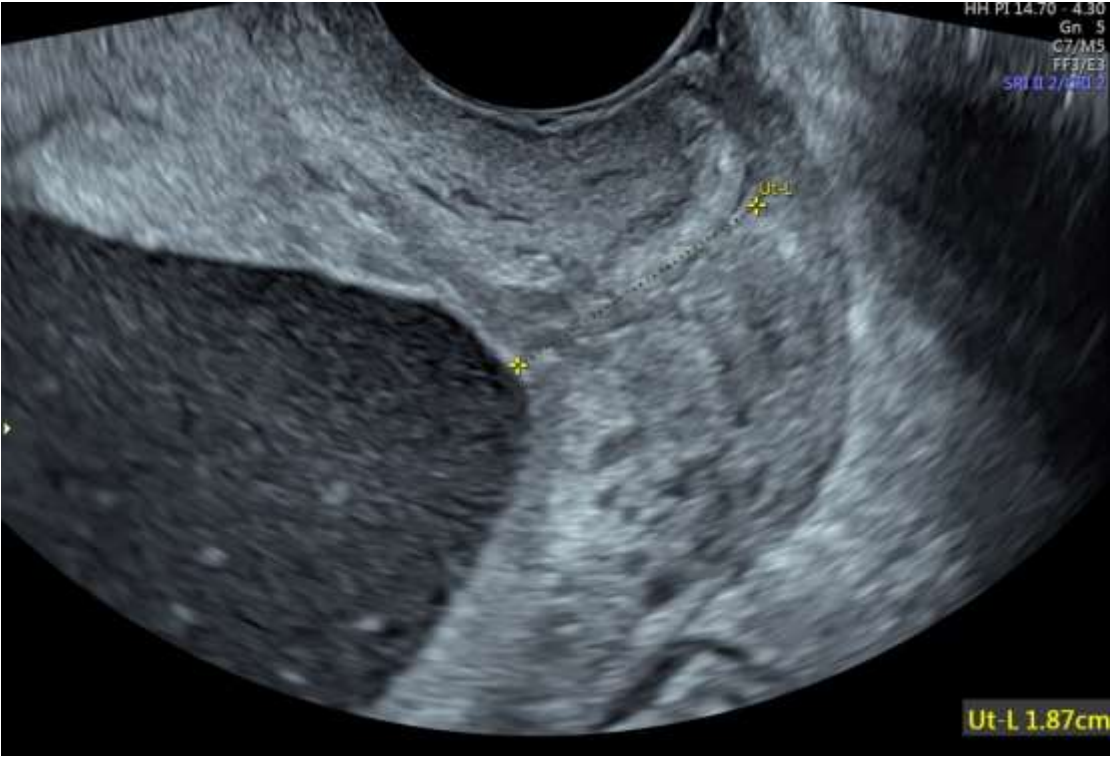


Cervical Measurement - Transabdominal view



- Measure as screening only between 16-24 weeks (recommended by the SMFM)
- According to Fetal Medicine Foundation TA fails to visualize in particular those with a short cervix

Cervical measurement



Cervical measurement

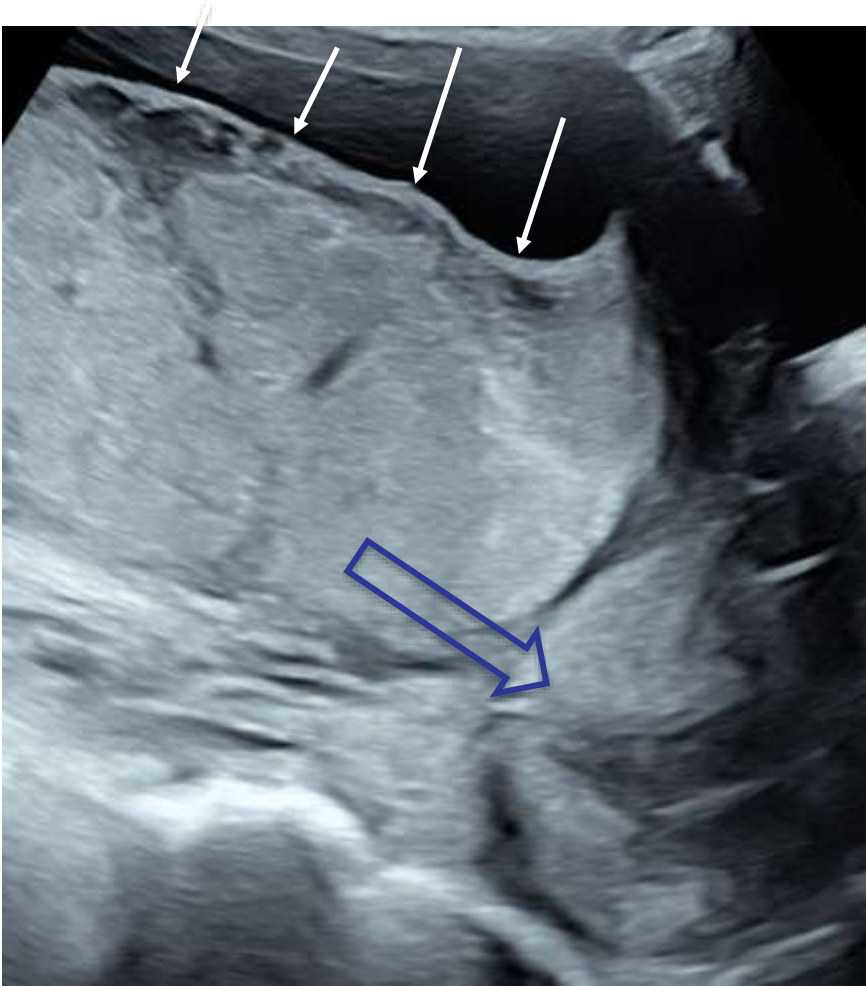
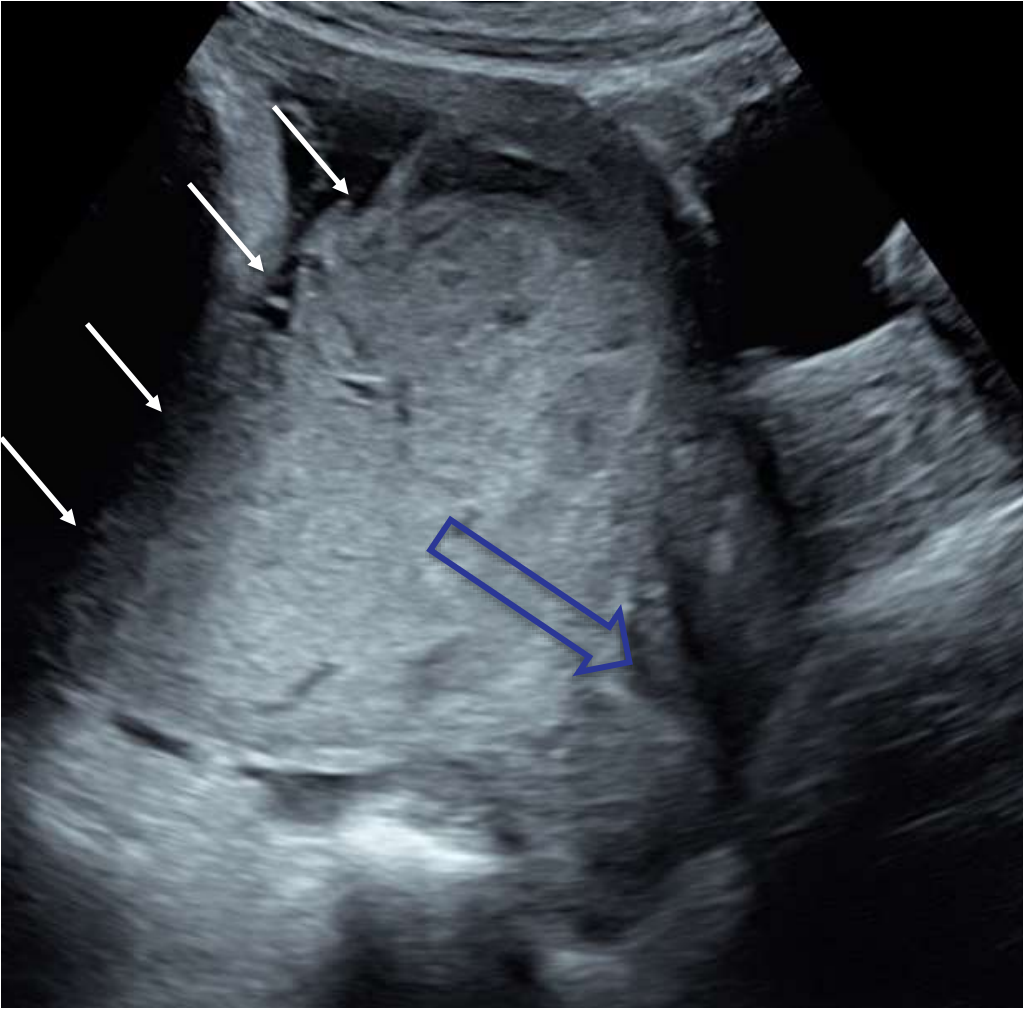


Learn more <https://courses.fetalmedicine.com/>

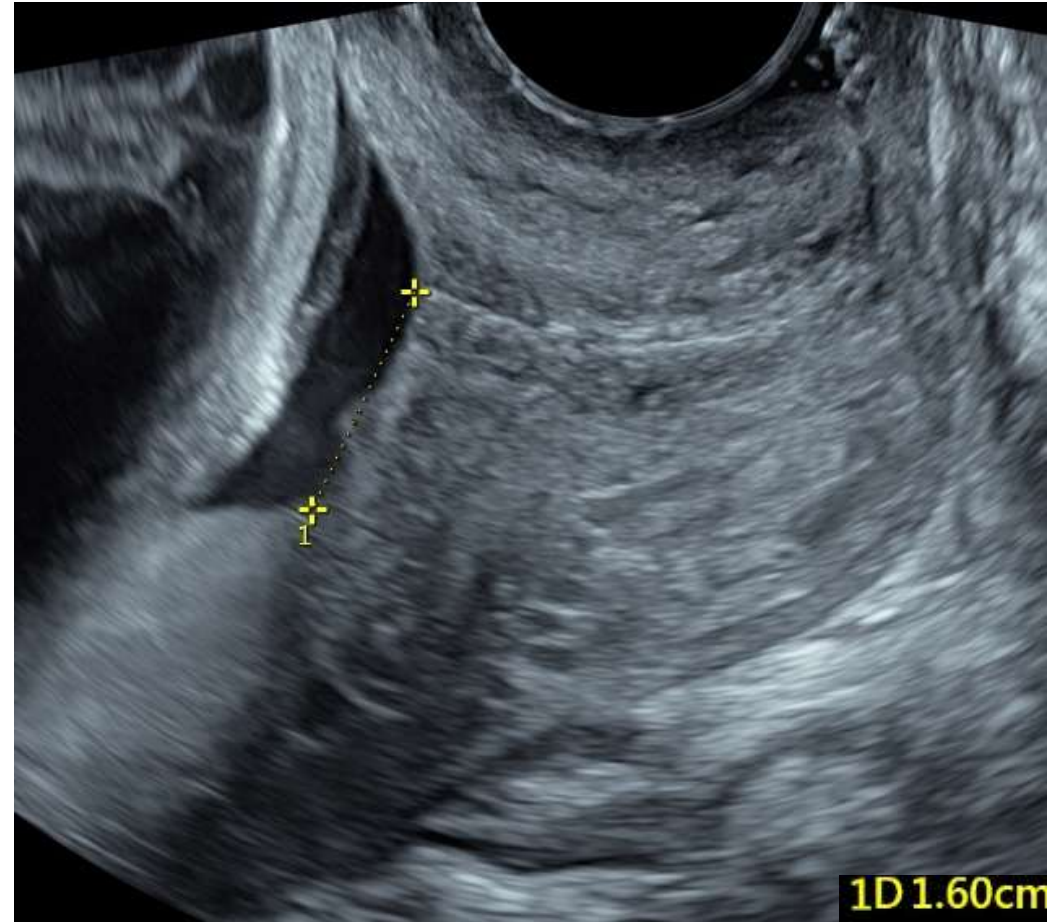
Fetal Presentation and Placenta



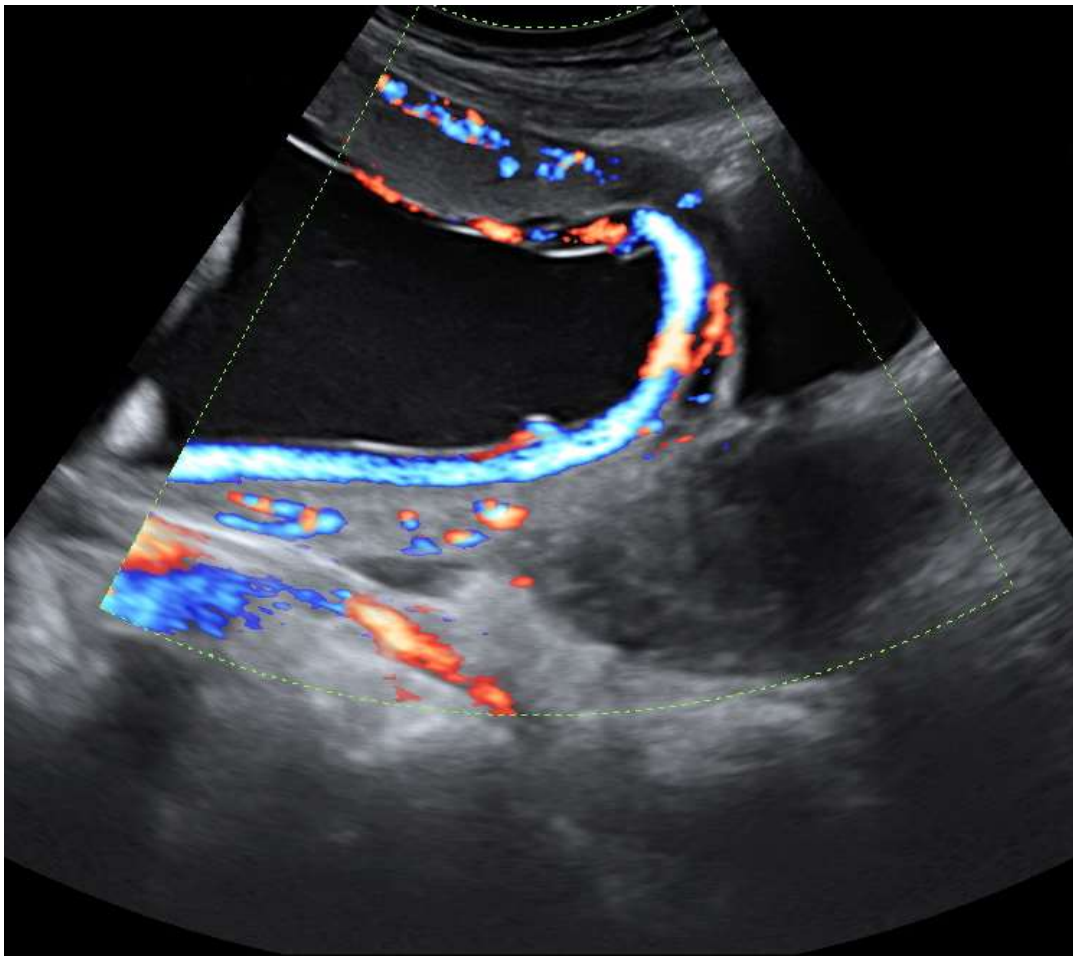
Fetal Presentation and Placenta



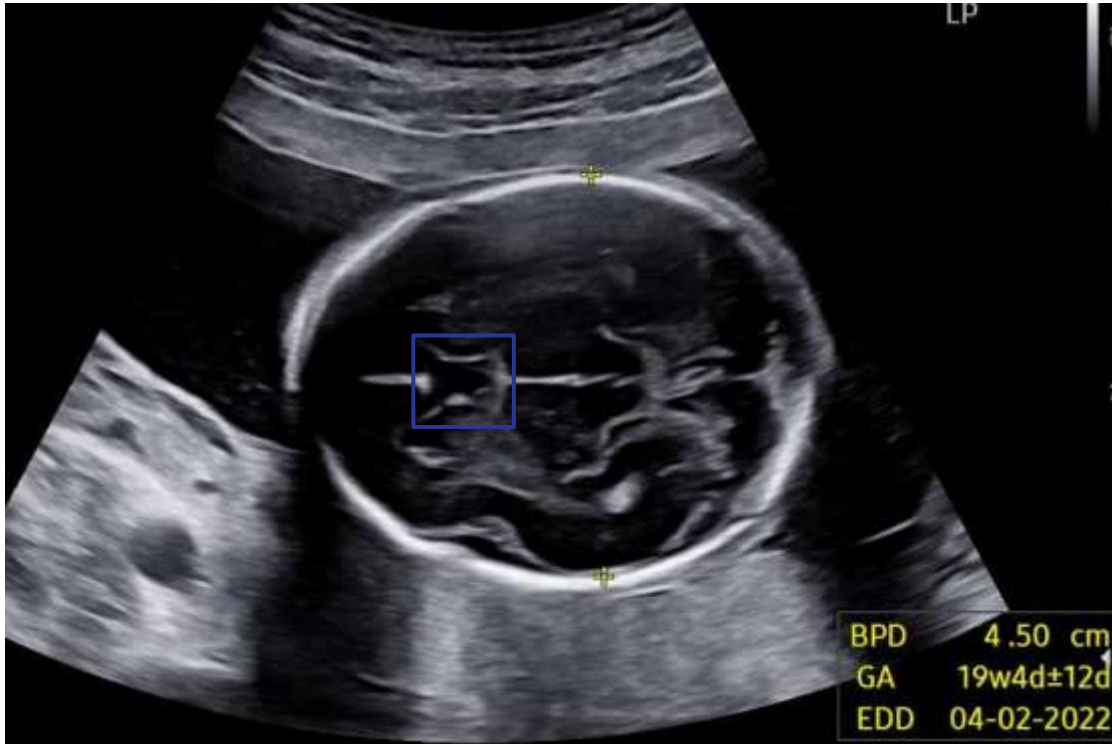
Placenta



Cervix and Placenta

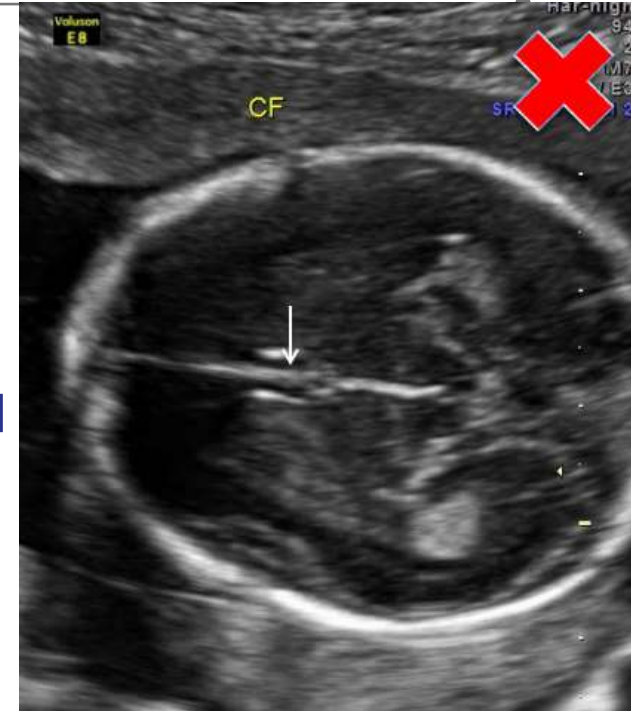


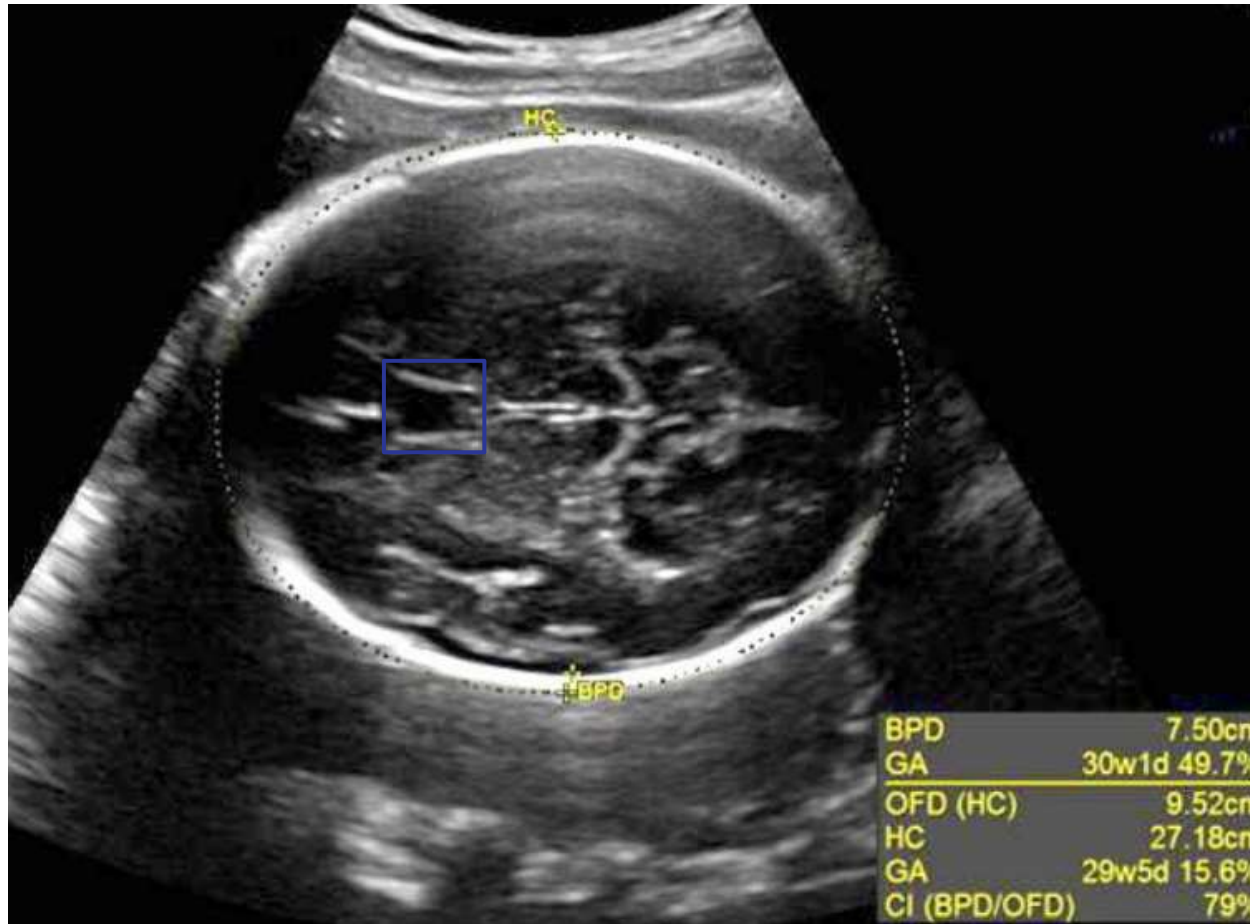
BPD



Landmarks

- Level of thalami and CSP
- Midline echo horizontal and perpendicular to the ultrasound beam
- Symmetrical hemispheres
- No cerebellum seen

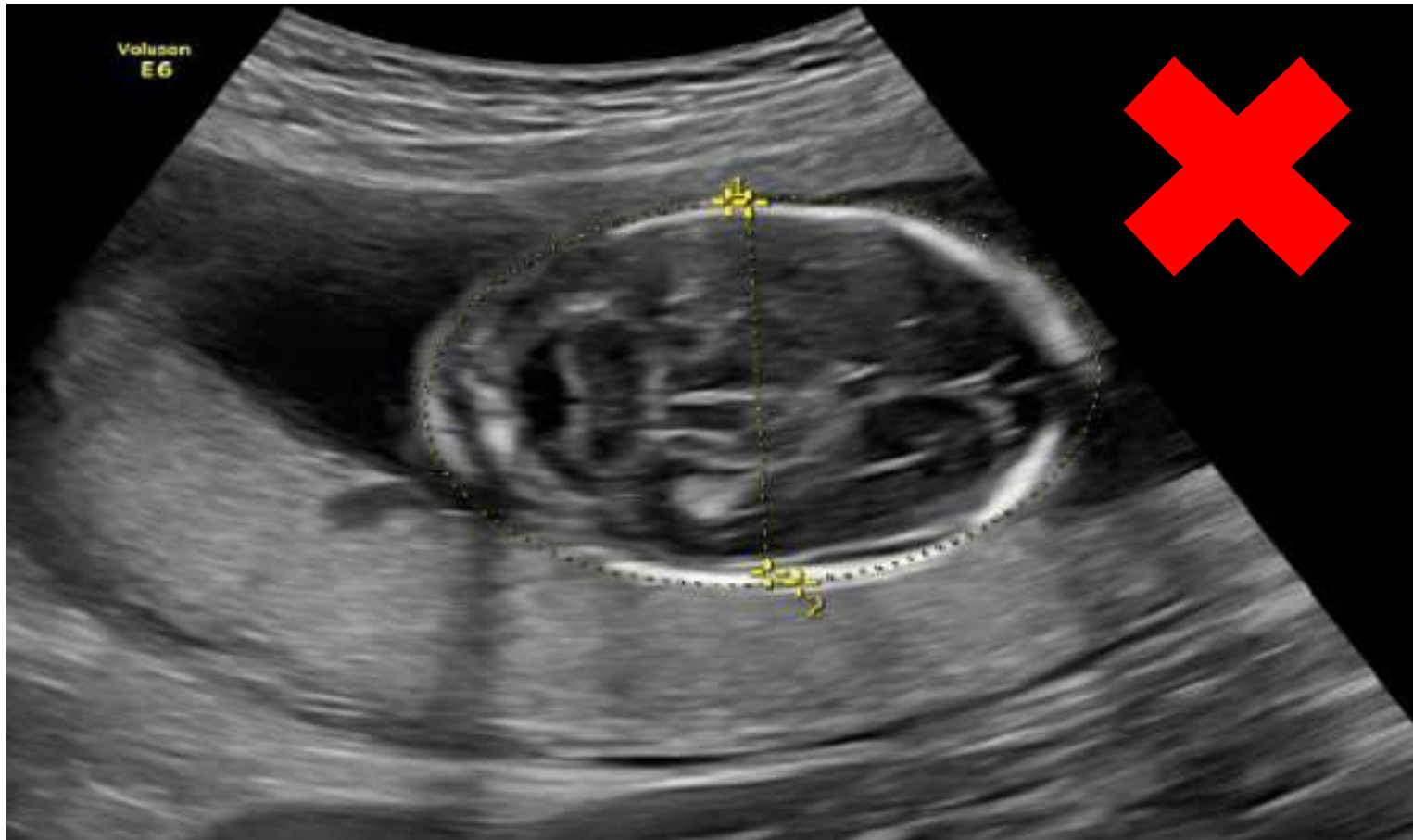




Landmarks

- Level of thalami and CSP
- Midline echo horizontal and perpendicular to the ultrasound beam
- Symmetrical hemispheres
- No cerebellum seen

Examples of inadequate measurements



Abdominal Circumference

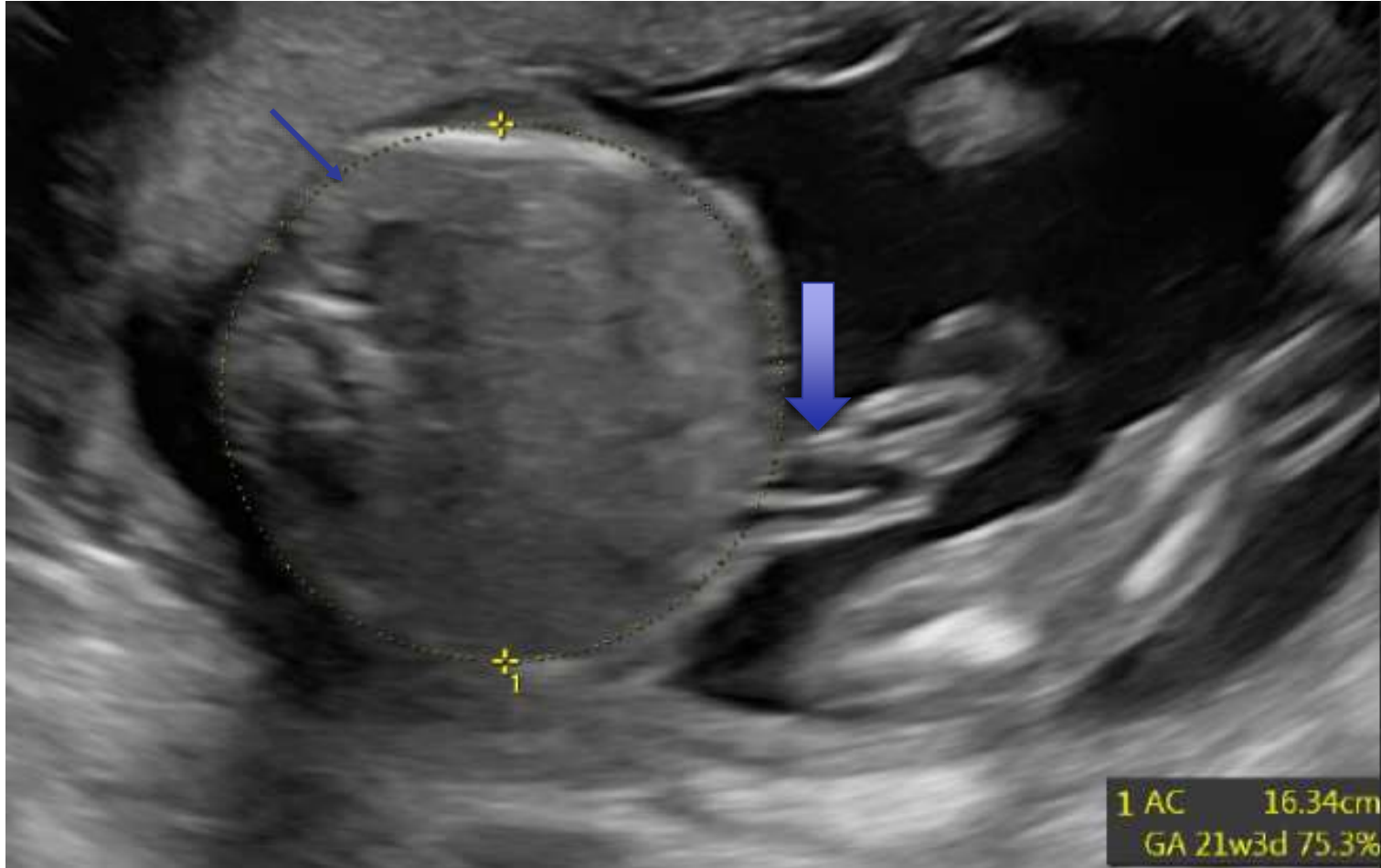


Landmarks

- Measure at the level of the skin
- Stomach and junction of the portal sinus and umbilical vein
- No Kidneys



Examples of inadequate measurements



Femur Length

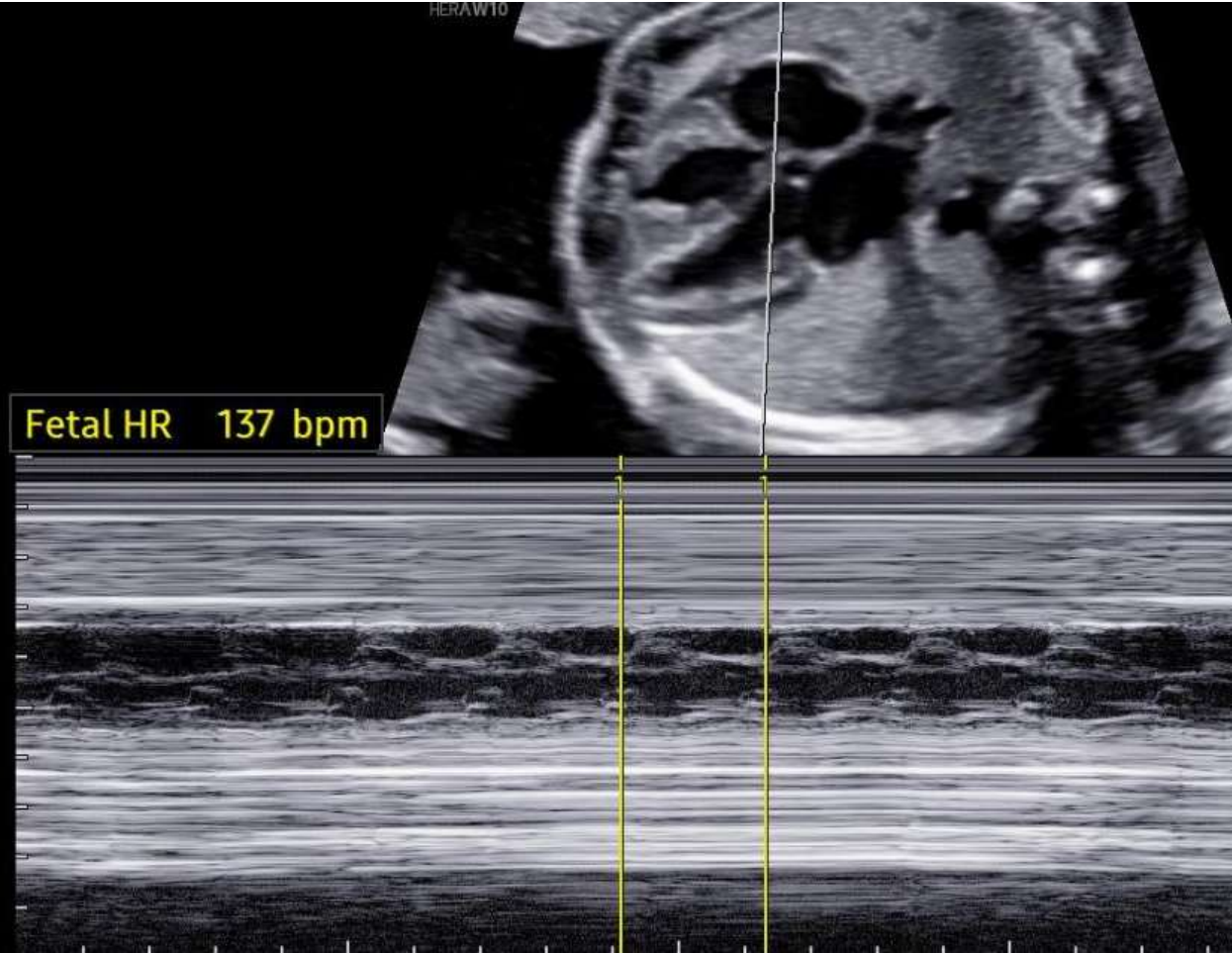


Landmarks

- Measure only diaphyseal length of the bone
- Femur needs to be horizontal and perpendicular to the ultrasound beam



Fetal Heart Rate



Biophysical Profile Parameters

Component	Normal (2 points)	Abnormal (0 points)
Fetal Breathing Movements	One or more episodes of fetal breathing lasting at least 30 seconds within 30 minutes.	No episodes of fetal breathing movements lasting at least 30 seconds during a 30 minute period of observation.
Gross Body Movement	3 or more discrete body or limb movements within 30 minutes	Less than 3 body or limb movements in 30 minutes
Fetal Tone	One or more episodes of active extension and flexion of a fetal extremity OR opening and closing of the hand within 30 minutes	Slow extension with no return or slow return to flexion of a fetal extremity OR no fetal movement
<u>Amniotic Fluid Volume</u> *	A single deepest vertical pocket of amniotic fluid measures greater than 2 centimeters. is present	A single deepest vertical pocket of amniotic fluid measures 2 centimeters or less

Depth of largest visible pocket	Qualitative Description
< 1 cm	severe oligohydramnios
≥ 1 and ≤ 2 cm	mild oligohydramnios
> 2 and < 8 cm	normal
≥ 8 and < 12 cm	polyhydramnios
≥ 12 cm and < 16	moderate polyhydramnios
≥ 16 cm	severe polyhydramnios

Biophysical Profile

Breathing = 30 seconds



BPP

Tone = 1 or more



BPP

Gross body movement =
3 or more



BPP

DVP = >2 but <8 cm



Training Guidelines

Training Guidelines for Licensed Medical Providers (PA, NP, NMW, DPT, and DC) Who Evaluate and Interpret Diagnostic Ultrasound Examinations

Mar 10, 2023

In order to meet this training guideline, the individual must be [licensed medical providers](#) such as a Physician Associates (PA), Nurse Practitioner (NP), Nurse Midwife (NMW), Chiropractor (DC), or a Physical Therapist (DPT) and perform and interpret ultrasound examinations. They must have a thorough understanding of the indications and guidelines for ultrasound examinations as well as familiarity with the basic physical principles and limitations of the technology of ultrasound imaging. They should be familiar with alternative and complementary imaging and diagnostic procedures and should be capable of correlating the results of these other procedures with the ultrasound examination findings. It is important to have an understanding of ultrasound technology and instrumentation, ultrasound power output, equipment calibration, and patient and operator safety. Performance and interpretation of most ultrasound examinations require advanced skills and knowledge including familiarity with the anatomy, physiology, and pathophysiology of those organs or anatomic areas that are being examined. All qualified providers (PA, NP, NMW, DPT, and DC) must present evidence of training and requisite competence needed to successfully perform and interpret ultrasound examinations in the area(s) they practice. The training should include methods of [documentation](#) and [reporting of ultrasound studies](#). A physician who meets the [Training Guidelines for Physicians Who Evaluate and Interpret Ultrasound Examinations](#) should be available for supervisory consultation in an appropriate clinical time frame (unless not required by local/regional standard). Only those clinical providers that meet these training requirements can request to be part of an ultrasound practice accreditation application.

Practice Parameters

AIUM Practice Parameter for the Performance of Limited Obstetric Ultrasound Examinations by Advanced Clinical Providers

The American Institute of Ultrasound in Medicine (AIUM) is a multidisciplinary association dedicated to advancing the safe and effective use of ultrasound in medicine through professional and public education, research, development of practice parameters, and accreditation. Practice parameters of the AIUM are intended to provide the medical ultrasound community with recommendations for the performance and recording of high-quality ultrasound examinations.

To promote this mission, the AIUM is pleased to publish, in conjunction with the National Association of Nurse Practitioners in Women's Health (NPWH), Association of Physician Assistants in Obstetrics and Gynecology (APAOG), American College of Nurse-Midwives (ACNM), American College of Obstetricians and Gynecologists (ACOG), American College of Osteopathic Obstetricians and Gynecologists (ACOOG), and Society for Maternal-Fetal Medicine (SMFM) the *AIUM Practice Parameter for the Performance of Limited Obstetric Ultrasound Examinations by Advanced Clinical Providers*. This practice parameter has been developed for use by women's health nurse practitioners (WHNPs), physician assistants in obstetrics and gynecology (PAOGs), and certified nurse-midwives (CNMs)/certified midwives (CMs) performing and interpreting limited obstetric ultrasound studies within their scopes of practice.¹⁻³

Scope-of-practice laws and requirements that govern each health care provider's clinical activity vary by individual state, including requirements for physician consultation and supervision. Health care providers and interprofessional health care teams should understand their scopes of practice within the state where they are practicing.⁴

With respect to this *AIUM Practice Parameter for the Performance of Limited Obstetric Ultrasound Examinations by Advanced Clinical Providers*, when the imaging issue is outside of advanced clinical provider's education, experience, or scope of practice, or when a high-risk situation is identified, consultation should occur with a qualified

Guidelines for Physicians Who Evaluate and Interpret Diagnostic Obstetric Ultrasound Examinations in accordance with state law.^{1-3,5} A plan should be in place to address imaging concerns outside the advanced clinical provider's scope of practice.

This parameter reflects what the AIUM considers the minimum criteria for a limited obstetric ultrasound examination within the scopes of practice of advanced clinical providers in women's health. For the purpose of this document and the associated AIUM Training Guideline, "advanced clinical providers in women's health" refers specifically to WHNPs, PAOGs, and CNMs/CMs. It is not intended to establish a legal standard of care or to replace the performance of a clinically indicated standard diagnostic^{6,7} or detailed⁸ obstetric ultrasound examination. If not previously performed during the index pregnancy, a standard diagnostic or detailed obstetric ultrasound examination should be performed as soon as reasonably possible after the limited ultrasound examination.

A limited obstetric ultrasound examination may be performed in an acute clinical situation when an immediate impact on management is anticipated: for example, evaluation of cardiac activity or fetal presentation in a laboring patient. A limited obstetric ultrasound examination may also be performed in patients requiring serial examinations in which a subsequent anatomic evaluation may be unnecessary or impractical.

When a patient undergoes a limited ultrasound examination, it is important that she understands why a limited scan is being done and that she has appropriate expectations regarding the information being sought.

Clinical judgment should be used to determine the proper type of ultrasound examination performed.

I. Introduction

The clinical aspects contained in specific sections of this parameter (Introduction, Classification of Fetal Sono-

AIUM Practice Parameter for the Performance of an Ultrasound Examination of the Female Pelvis

Introduction

The American Institute of Ultrasound in Medicine (AIUM) is a multidisciplinary association dedicated to advancing the safe and effective use of ultrasound in medicine through professional and public education, research, development of clinical practice parameters, and accreditation of practices performing ultrasound examinations.

The *AIUM Practice Parameter for the Performance of an Ultrasound Examination of the Female Pelvis* was developed (or revised) by the AIUM in collaboration with other organizations whose members use ultrasound for performing this examination(s) (see "Acknowledgments"). Recommendations for personnel requirements, the request for the examination, documentation, quality assurance, and safety may vary among the organizations and may be addressed by each separately.

This Practice Parameter is intended to provide the medical ultrasound community with recommendations for the performance and recording of high-quality ultrasound examinations. The parameter reflects what the AIUM considers the appropriate criteria for this type of ultrasound examination but is not intended to establish a legal standard of care. Examinations performed in this specialty area are expected to follow the parameter with recognition that deviations may occur depending on the clinical situation.

Indications

Indications for pelvic ultrasound include but are not limited to the following:

Introduction

Accurate and complete documentation and communication by all members of the diagnostic ultrasound health care team are essential for high-quality patient care. There must be a permanent record of the ultrasound examination and its interpretation. Images of all relevant areas defined in the particular parameter, both normal and abnormal, should be recorded and stored in a retrievable format (electronic preferred). Retention of the ultrasound images and report should be consistent both with clinical needs and with relevant legal and local health care facility requirements. Communication between the interpreting provider and the referring provider should be clear, timely, and in a manner that minimizes potential errors. In certain cases, the referring/ordering, performing, and interpreting physician may be the same person; if so, this should be documented. All communication should be performed in a manner that respects patient confidentiality and complies with relevant regulations. The reader is urged to refer to the applicable practice parameter for each type of ultrasound examination, as it may contain additional documentation requirements. Use of ultrasound without generating a separate report is not addressed in this document.

Requirements for the Ultrasound Examination

Ultrasound examinations should be recorded in a manner that will allow subsequent review for adequacy for diagnostic purposes. Although for some applications still-frame images may suffice, archiving of dynamic imaging (video/cine loop) may be required or preferred for some types of examinations (see relevant practice parameters).

Whether still-frame images or cine images (or both) are captured, the archived images should contain the following:

- Patient's name and other identifying information
- Facility's identifying information
- Date and time of the ultrasound examination
- Output display standard (thermal index and mechanical index)
- Label of the anatomic location and laterality, when appropriate
- Image orientation when appropriate

AIUM Practice Accreditation

- Practice Accreditation
 - AIUM ultrasound practice accreditation allows practices to demonstrate that they meet or exceed nationally recognized standards in the performance and interpretation of diagnostic ultrasound examinations.



Case Study Submission Requirements: Limited Obstetric Ultrasound *(for Advanced Clinical Providers)*

➤ Refer to the *Accreditation Application Manual* for [additional case study submission requirements](#).

Each Advanced Clinical Provider (ACP) performing and interpreting limited OB ultrasounds who meets the [training guidelines](#):

- submit 1 normal limited OB case that includes biometry with its corresponding final report
- and
- submit 1 limited OB case documenting an abnormal placenta location with its corresponding final report



aium.org

Thank you!

Contact information: tcooper@aium.org

