Ob-Gyn Ultrasound: Only the Basics

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Overview

Pelvic sonography is the imaging modality of choice for evaluating the female pelvis.

US uses NO ionizing radiation (which can cause cancer and birth defects in fetus)
GOALS & OBJECTIVES

• US images are obtained, US image orientation, US terminology, how sound waves travel
• normal uterine and ovarian anatomy
• first and second trimester pregnancy normal appearance and measurements used for dating
• Systematic approach to reading US
• This is NOT intended to cover all Ob Gyne pathology
US terminology

Isoechoic- Same brightness as surrounding soft tissue structures

Hyperechoic- Brighter than surrounding soft tissue, “whiter”

Hypoechoic- Darker than surrounding soft tissue, “blacker”

Anechoic- Completely black, no echoes. This is what fluid looks like.
Sound waves

- Ultrasound transducer sends sound waves through the body. Sound waves are reflected differently by various types of tissue, and sent back to transducer where signal is transformed into visible image.
- Sound waves travel through soft tissue or fluid. These types of structures are used as “windows” for US scanning.
- Sound waves do not travel through and are reflected by air or bone (calcium), resulting in shadowing behind these structures.
LONGITUDINAL SCAN PELVIS

BLADDER

VAGINA

FUNDUS

FIBROID

FIBROID WITH CALCIFICATIONS AND POSTERIOR SHADOWING INDENTS ON THE BLADDER
Technique

• The standard pelvic examination
  • Composed of the traditional transabdominal approach (TAS)
  • Combined with transvaginal sonography (TVS)
  • Frequently using Doppler sonography
Technique

- Transabdominal sonography uses a distended bladder as window to pelvic structures for a global view.
Transabdominal Sonography

- Sagittal and transverse views of the pelvis
- Uterus on sagittal has “teardrop” appearance
Technique

• Transvaginal sonography gives a more detailed evaluation of pelvic architecture using higher-frequency transducers at closer proximity to pelvic structures.
Transvaginal Sonography

LONGITUDINAL VIEW

CORONAL VIEW

cephalad

anterior

posterior

right

left

posterior
Transvaginal US

Transabdominal US
Use all the information from the labeling that you are given to orient yourself to anatomy.

Long = longitudinal, usually sagittal relative to body. Convention: patient’s head to left of screen.

Trans = transverse, usually axial relative to body. Convention: patient’s right side to left of screen.
Use all the information from the labeling that you are given to orient yourself to anatomy and history.
The Normal Sonographic Appearance of the Nongravid Genital Tract
Pelvis
Anatomy Pelvis

Bladder

Vagina

R ovary  L ovary

Uterus: cervix, body, fundus
Premenopausal Endometrium

Uterine anatomy: myometrium vs. endometrium
The ovaries are ellipsoid and can be identified in menstruating females by the presence of follicles.
Cul-de-sac

- Physiologic fluid in cul-de-sac
Basic obstetrical ultrasound
LMP? Pregnant?

- In the female in the reproductive years, the physiologic as well as the pathologic processes are driven by the menstrual cycle and hormonal stimulation.

- Therefore, know the day of your patients’ day of the cycle, therefore...

- Know if your patient has a positive pregnancy test, and if so, what the quantitative serum beta hCG is.
Early Gestational Sac

- Decidualized endometrium = echogenic
- Early gestational sac 16-21 days after conception
- Yolk sac seen about 5 weeks
First Trimester

• By the 6th menstrual week, the early embryo can be identified.
  – Usually with cardiac activity
  – The crown-rump length (CRL) is the best estimation of GA once appears.
Second Trimester

- After 13-14 weeks, measurements used for dating are:
  biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL)
Fetal dating: BPD biparietal diameter

BPD measured from outer to inner
Fetal dating: HC head circumference

Note: HC measured on the outside
Fetal dating: FL femur length

Only ossified bone is measured
Fetal dating: AC abdominal circumference

Note: AC is measured on outer circumference
Second Trimester

- Placenta

Placenta and cervix: placenta previa
- Flow to the transducer is shown in red and away in blue.

- The Doppler sample volume (oblique arrow) shows the sampling site for pulsed Doppler interrogation.

- The right panel shows spectral Doppler of umbilical artery flow. As the flow is toward the transducer, it is depicted as positive or upward deflections.
Systematic approach to reading US

- Use annotation as cues for
- Approach (transabdominal or transvaginal)
- Orientation (long/sag or trans/axial)
- Laterality (right or left)
- Organ (adnexa/ovary, or uterus)
Systematic approach to reading US

- **Uterus**
  - Endometrium (thickness, gestational sac)
  - Myometrium (masses)

- **Ovaries**
  - Masses: cystic or solid, calcium
  - Doppler for blood flow

- **Other**
  - Free fluid in cul de sac
  - Pregnancy test
  - Compare to prior imaging studies, know clinical history
Take Home Points

• US is first line modality to examine female pelvis and gravid female pelvis
• US uses no ionizing radiation
• US uses sound waves, which travel best through soft tissue or fluid
• US can be performed transabdominally or transvaginally
• Conventional orientation for US images is used
Take Home Points

- Use terminology “hyperechoic” and “hypoechoic”
- Fluid is black or anechoic on US
- We reviewed appearance of normal uterine and ovarian anatomy
- We reviewed first and second trimester pregnancy normal appearance
- Measurements used for fetal dating: BPD, HC, AC, FL
Practice cases for students: Normal and abnormal

• Transabdominal, transvaginal or can’t tell?
• Orientation, laterality, body part?
• Normal or abnormal (provide diagnosis or Ddx if possible)
Group 1
Group 2
Group 3
Answers
Group 1
Normal fetal head, BPD and HC
Normal early pregnancy, Cardiac Activity
normal ovary with follicles
Echogenic free fluid (Blood) in pelvic cul de sac
Chronic bilateral hydrosalpingitis
Group 2
Normal fetal abdomen
Second trimester twin pregnancy
Normal Uterus with myometrium and endometrium
Left ovary functional or simple cyst
Left ovarian cystic mass: Tumor (Benign cystadenoma)
Group 3
Normal early pregnancy, CRL
Fetal head: Hydranencephaly
Normal Cervix
Right Ovarian torsion, normal left ovary
Right adnexal Ectopic gestation
Extra cases
Extra case 1
Extra case 1: Placenta previa
Extra case 2
AFI= Amniotic fluid index
Normal 8-20 cm
Polyhydramnios
Olgiohydramnios
Extra case 3:
Extra case 3:
Myometrial perforation by IUD