**First Trimester Ultrasound**

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**First Trimester Ultrasound**

- American Institute of Ultrasound in Medicine (AIUM) Practice Guidelines

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**First Trimester Ultrasound**

- Indications (but not limited to)
  - Confirm presence of an IUP
  - Evaluate for a suspected ectopic pregnancy
  - Define cause of vaginal bleeding
  - Evaluate pelvic pain
  - Estimate gestational age
  - Diagnose or evaluate multiple gestations

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**First Trimester Ultrasound**

- Indications (cont)
  - Confirm cardiac activity
  - Adjunct to CVS (chorionic villus sampling) or embryo transfer
  - Locate and remove IUD
  - Assess for fetal anomalies in high-risk preg
  - Evaluate for maternal pelvic masses and uterine anomalies
  - Evaluate for a suspected molar pregnancy
  - Aneuploidy screening (NT)

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**First Trimester US Objectives**

- Locate GS and presence/absence of cardiac activity
- Gestational age & fetal number
- Assess High Risk Patients for anomalies
- Genetic Screening
- Molar pregnancy
- Adnexae, uterus and cervix for abnormalities

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GS/viability
- Location
  - Uterine cavity
  - Within uterus but not in endometrial cavity
  - Cervical pregnancy
  - Interstitial or cornual pregnancy
  - Adnexae - tube/ovary/abdominal
  - Evidence for an abnormal gestation
- Fetal Heart Beat
- M-mode

Location
- Transvaginal probe
- Sagittal view
- Intracavitary
- Fundal
- 2 perpendicular views

Location
- Cornual pregnancy

Ectopic pregnancy

Ectopic Gestation

Ectopic Gestation
### US Evidence for an Abnormal Gestation
- Failure to identify embryo in a GS at least 25 mm by TA or 18 mm by TV
- Absence of a yolk sac in a GS at least 20 mm by TA or 13 mm by TV
- Thin choriodecidual ring
- Distorted sac
- Position of the sac in the lower segment
- Endometrial stripe less than 10mm w/o GS
- Anembryonic? Abortion? Pseudogestational sac?

### Diagnosis of Pregnancy Failure by Ultrasound
- Society of Radiologists in Ultrasound Consensus Conference Guidelines 2012
  - Embryo at least 7 mm with absent heart beat
  - Empty sac with at least a mean sac diameter of 25 mm
- Goal: definitively diagnose a failed preg virtually 100% specificity and sensitivity
- No follow up scanning required

Doubilet NEJM 2013; 369(15):1443-51

### Empty sac
- Transabdominal
- 29.5 mm sac

### Pseudogestational sac
- A pseudogestational sac
  - small amount of intrauterine fluid
  - in the setting of a positive pregnancy test
  - abdominal pain
  - could be erroneously interpreted as a true gestational sac in ectopic pregnancy

### Pseudogestational Sac
- Difficult to distinguish from a early IUP
- YS present?
- Early anembryonic gestation?
- Missed AB?
- No FP - repeat scan 4 to 7 days
- Scan the adnexae
- Ectopic precautions –Pregnancy of Unknown Location
Cardiac Activity

- M mode
- 9w0d

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Gestational Age

- Mean Gestational Sac Diameter
  - Used when no fetal pole identified
- Crown Rump Length (CRL)
  - Most accurate
  - Exclude YS
- BPD/FL
  - Late first trimester

5w2d

- MSD = 12.2 mm or 5w2d

6w2d

7 weeks
8 weeks

9 weeks

10 weeks

11w6d

12 weeks

13 weeks

- Coming Soon
Fetal Number
- Count the sacs
- Amnionicity
- Chorionicity

Dichorionic - Diamniotic
- 2 chorionic sacs
- 2 amniotic sacs
- 2 fetuses
- 2 umbilical cords

Dichorionic Diamniotic
6w3d twins

Monochorionic dichorionic
- 1 chorionic sac
- 2 amniotic sacs
- 1 placenta
- 2 fetuses
- 2 umbilical cords

Monochorionic Diamniotic
2 amnions, 1 chorion

Monochorionic Monoamniotic
- 1 chorionic sac
- 1 amniotic sac
- 1 placenta
- 2 fetuses
- 2 umbilical cords
Monochorionic Monoamnionic

Mono or Dichorionic?

"Twin Peak" sign

Mono or Dichorionic?

Chorion can be seen as a “peak” at the edge of the amnion interfaces indicating dichorionicity

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Fetal Anomalies

Most common anomalies are difficult to see in first trimester

Some are obvious
Fetal Anomalies

- Anencephaly

Fetal Anomalies

- Cystic Hygroma

Fetal Anomalies

- Acardiac second twin

Fetal Anomalies

- Conjoined Twins
  - Thoraco-omphalophagus

Upper image shows doppler of a normal 3 vessel cord. Adjacent and to the right of this is a mobile structure that appear to float freely in the amniotic fluid. What is your diagnosis?

- Gastroschisis
  - Right side of umbilicus
  - Bowel floats freely in amniotic fluid
  - Usually isolated without chromosomal abnormality
- Omphalocele
  - More serious
  - Defect is midline
  - Bowel herniates into the base of the umbilical cord
  - Associated anomalies
    - Cardiac
    - CNS
    - GI/GU
Fetal Anomalies

Ventriculomegaly

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Nuchal Translucency
- Performed between 11w2d and 13w6d
- Margins of the Nuchal space must be clear
- Fetus in mid sagittal plane
- Image magnified to fill with head, neck and upper thorax
- Fetal neck in neutral position
- Amnion must be seen as separate from the NT
- The “+” calipers should be used

Nuchal Translucency
- Calipers
  - Placed on the inner boarders of the space with no portion of the calipers crossbar within the space
  - Placed perpendicular with the long axis of the fetus
  - Measure at the widest space of the NT

Correct
Molar Pregnancy

- Large uterus for dates
- Cystic “hydropic” endometrial cavity

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Adnexae

Normal Ovaries

- Can be difficult to locate without follicles
- Corpus luteum
- Paratubal cysts
- Hydrosalpinx

Simple Ovarian Cyst

10 w IUP with simple ovarian cyst

Uterus
Bicornuate Uterus
Transverse view bicornuate uterus with pregnancy within right horn

Cervix

Cervical Incompetence

Questions?

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Diagnosis of Pregnancy Failure by Ultrasound
- Retrospective study first trimester bleeding 1999-2008
- All had bleeding and visible GS (Th AB)
- 1013 patients included
- 126 (12%) fell into more conservative zones
  - CRL 5-7mm
  - MSD 16-25 mm
- Only 12% required follow up studies
- Study did not look at outcomes only requirement for follow up studies under new guidelines.