Placenta Evaluation: Beyond Previa

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Placental Functions

- Fetomaternal organ
  - Large fetal portion from chorion
  - Smaller maternal portion from endometrium (decidua basalis)

- Functions
  - Physiologic barrier
  - Gas and nutrient exchange
  - Endocrine

Blastocyst

- Embryoblast
  - Inner cell layer
  - Becomes embryo
- Trophoblast (from trophe, Greek for nutrition)
  - Outer cell layer
  - Forms placenta

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- Trophoblast
  - Cytotrophoblast
  - Syncytiotrophoblast

Lacunar stage of trophoblastic development

- Syncytiotrophoblast invades rupturing endometrial capillaries and forming lacunae
- Lacunae mixture of blood and secretions from eroded glands
  - Nutrition for developing embryo

Chorionic villi develop from cytotrophoblast forming primitive uteroplacental circulation
Decidua is endometrium in pregnancy

Intradecidual sac sign

Decidua is endometrium in pregnancy

Double decidual sac sign

Decidua is endometrium in pregnancy

Decidua basalis

Decidua capsularis

Decidua parietalis

Decidua is endometrium in pregnancy

Chorion is from embryonic trophoblast

Chorionic sac = Gestational sac

Smooth chorion

Villous chorion (chorionic frondosum)
Amnion forms from small cavity between embryoblast and trophoblast and grows to surround developing embryo.

Arterial maternal blood enters intervillous space
- Pushes deoxygenated ("venous") blood out into endometrial veins
- Deoxygenated fetal blood enters via umbilical arteries and returns via umbilical vein
- Gas/nutrient exchange occurs at branch villi

Decidua Parietalis
Decidua Capsularis
Decidua Basalis
Amnion
Smooth Chorion
Villus Chorion
Placenta

Arterial bleed in intervillous space or chorionic plate
- Hypoechoic center 20%
- Swirling echoes 27%
- Increase risk of spontaneous abortion
  - 50% loss rate if no embryo
  - 20% loss rate if live embryo

Chorionic Bump
Perigestational Hemorrhage

- Hematoma in subchorionic space
- 3% of all 1st trimester pregnancies
- > 90% survival if small (<20% of sac) and living embryo
- 20% loss if large (> 50% of sac)
- Increase maternal/fetal morbidity
  - Preeclampsia, IUGR, preterm delivery, PHH, abruption

Placental Position

- Grows until 20 weeks
- Covers 15-30% of decidua
- Trophotropism (dynamic placentation)
  - Growth toward better blood supply (food)
  - Atrophy in areas of poorer blood supply
  - Traditional Chinese therapy for previa
    - Acupuncture and herbs to stimulate flow to fundus of uterus
    - Refrain from sexual stimulation and orgasm

Always document placental position and umbilical cord insertion

Succenturiate Lobe

17 weeks 32 weeks
Circumvallate

Placenta Previa
- Implantation in lower uterine segment extending to or over os
  - Complete
  - Partial
  - Marginal
  - Low-lying
- Overlap
- Confusion

Placenta Previa
- 1,240 low-lying (ending within 2 cm from internal os)
  - 27 weeks: 66% resolve
  - 32 weeks: 90% resolve
  - 36 weeks: 96% resolve
- Transvaginal location of placenta with 28 days of term
  - > 2 cm, no indication for C-section
  - 11.20 mm, lower likelihood for C-section
  - 0-10 mm, high likelihood for bleed and C-section
  - Over os, C-section required


**Sonolucencies**

- Lakes lakes and and intervillous thrombi
  - Intervillous spaces with maternal blood
  - May thrombose
- Cysts
  - Usually fetal side
  - Often near cord insertion

**Placenta Accreta**

- Accreta - chorionic villi attach to the myometrium
- Increta - chorionic villi invade into the myometrium
- Percreta - chorionic villi invade through the myometrium
- Morbidly adherent placenta
  - when all or part of the placenta attaches abnormally to the myometrium.

**Risk factors**

- Prior CS
- Placenta previa
- Risk of accreta with C-section + previa
  - 1 prior CS - 5.3%
  - 2 prior CS - 11%
  - 3 prior - 40%
  - 4 prior - 61%
  - ≥ 5 prior - 67%

Clinical Outcomes

- "Torrential audible bleeding"
  - Blood loss: 3,000-5,000 mL
  - Average blood transfusion: 10 Units
- Secondary complications of hemorrhage
  - DIC
  - Renal failure
  - ARDS
  - Death

Clinical Outcomes

- Need for hysterectomy
- Surgical complications
  - Ureteral injury: 10-15%
  - ICU: 25-50%
- Prolonged hospitalization
- Maternal death - up to 7%
  - May be under reported
- Fetal risks due to prematurity / bleeding
- Vesicovaginal fistula

Optimize Outcomes

- Scheduled delivery (34-36 wks)
  - Allows for multidisciplinary approach at a tertiary care center
  - MFM, Gyn Onc, IR, Anesthesia, NICU, nursing, etc.
  - Reduction in perioperative morbidity
    - Avoid attempted removal of placenta
    - Plan ahead for blood products

Ultrasound Findings

- Placenta previa
- Multiple placental lacunae
  - 80-93% sensitive
  - Probability of accreta likely increases with the number of lacunae
- Loss of retroplacental hypoechoic zone (clear space)
  - 7-52% sensitive
  - 21% false positive rate
- Decreased retroplacental myometrial thickness (<1 mm)
- Abnormal bladder interface
- Placenta beyond uterine serosa

Ultrasound Findings

- Color Doppler
  - Turbulent flow in lacunae
  - Increased vascularity at the serosa-bladder interphase
  - "Gap" in myometrial blood flow
  - Bridging vessels at sites of interface disruption

US morbidly adherent placenta
US normal anterior placenta

Loss of Retroplacental Hypoechoic Zone (Clear Space)

Focal bulge

Bladder Invasion