# ULTRASOUND
## LECTURE SERIES

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# Placenta and Umbilical Cord

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# *Agenda*

## Areas to Be Covered

- Discuss normal appearance of the placenta and umbilical cord.
- Discuss placental lesions.
- Discuss umbilical cord lesions.

# Brief Overview

**The placenta and umbilical cord mature throughout gestation, and knowledge of the normal and changing appearance will allow the identification of placental and umbilical cord abnormalities when they are present.**

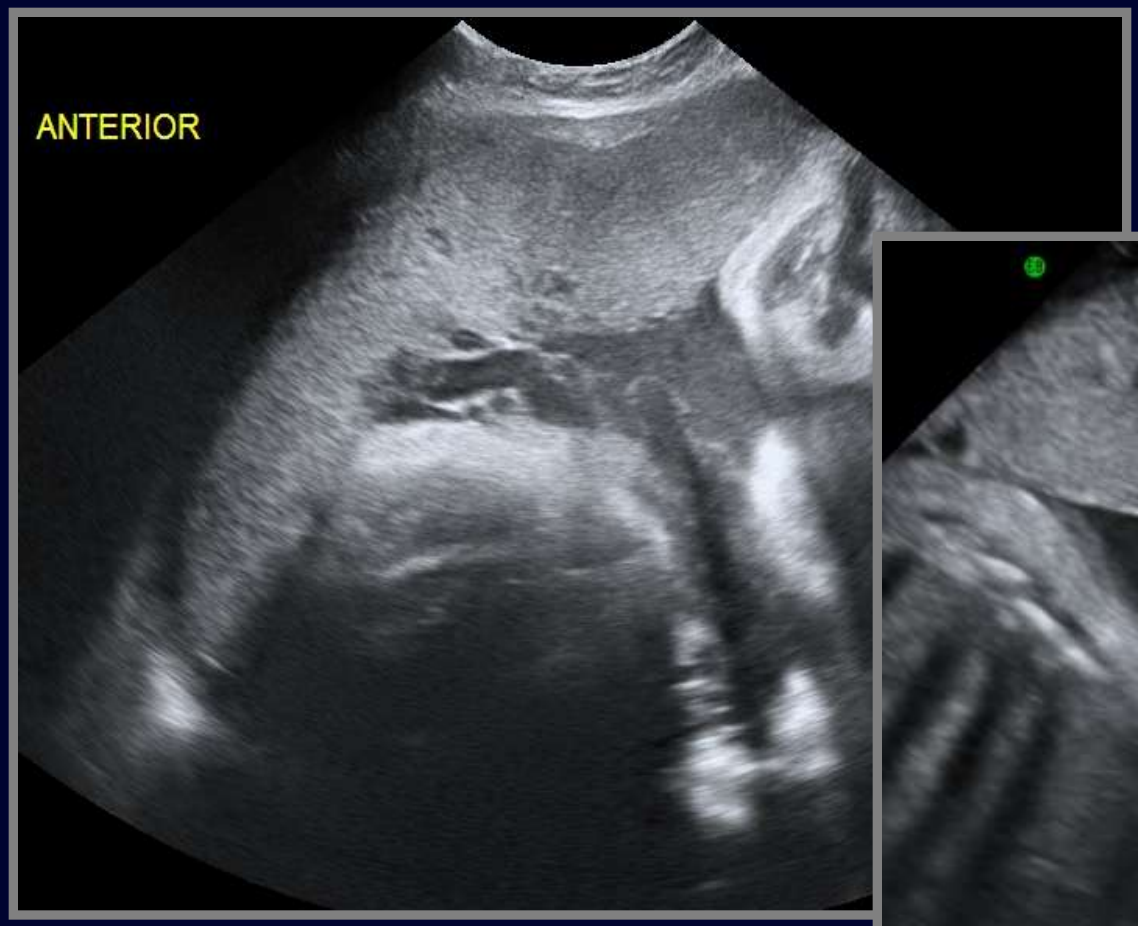
# *Normal Placental Appearance*
## *Second Trimester*

# *Normal Placental Appearance*

## *Umbilical Cord Insertion: Second Trimester*

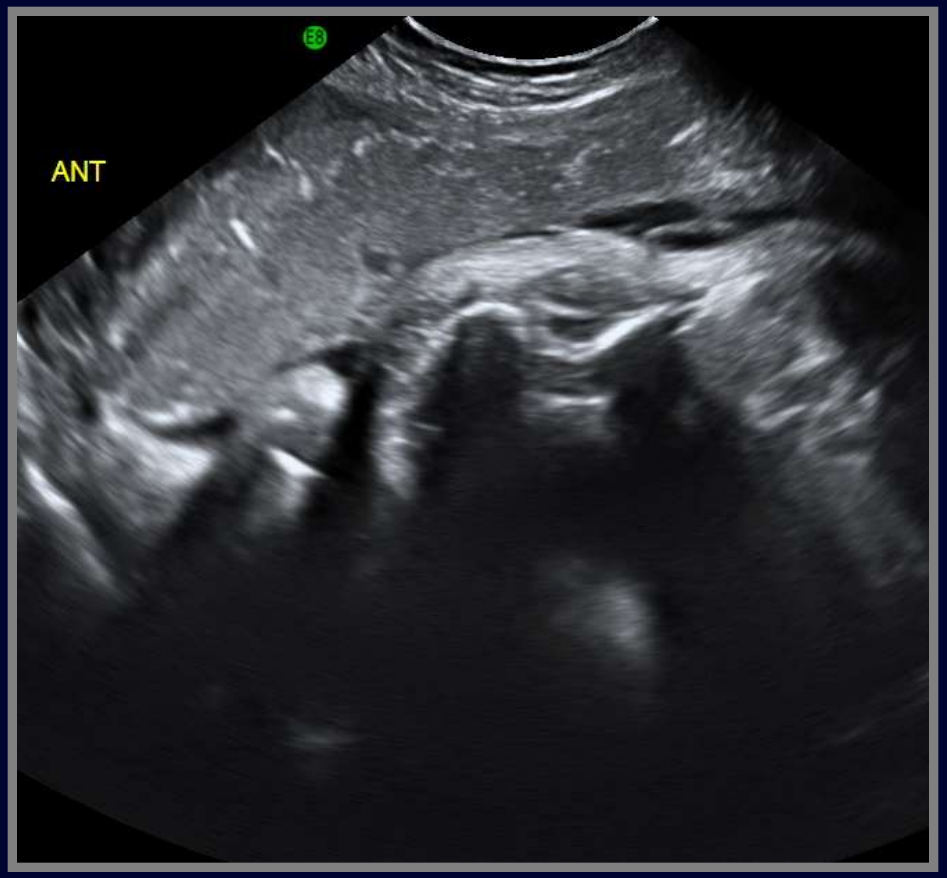
# *Normal Placental Appearance*

## *Umbilical Cord Insertion: Third Trimester*




# *Normal Placental Appearance*

## *Third Trimester: Scattered Calcifications*



# *Normal Placental appearance*

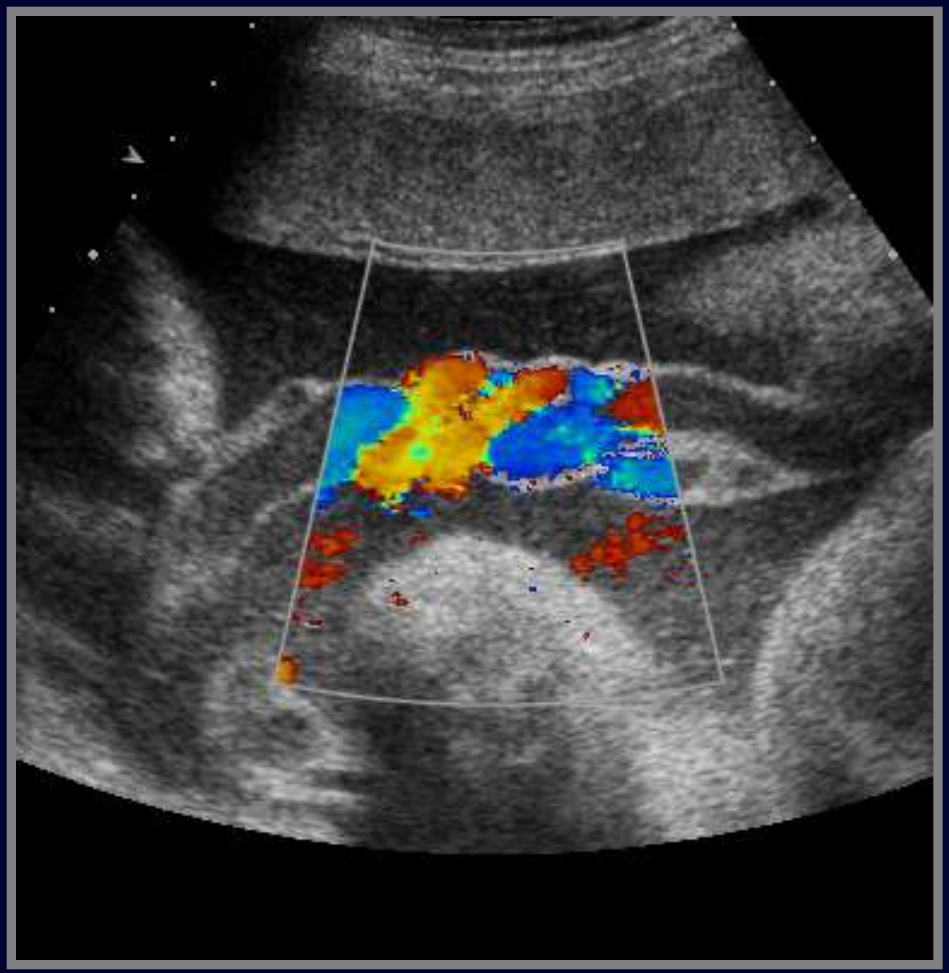
## *Third Trimester: Increasing Calcifications*

# *Normal Placental Appearance*

## *Late Third Trimester: Cotyledons Well Defined*

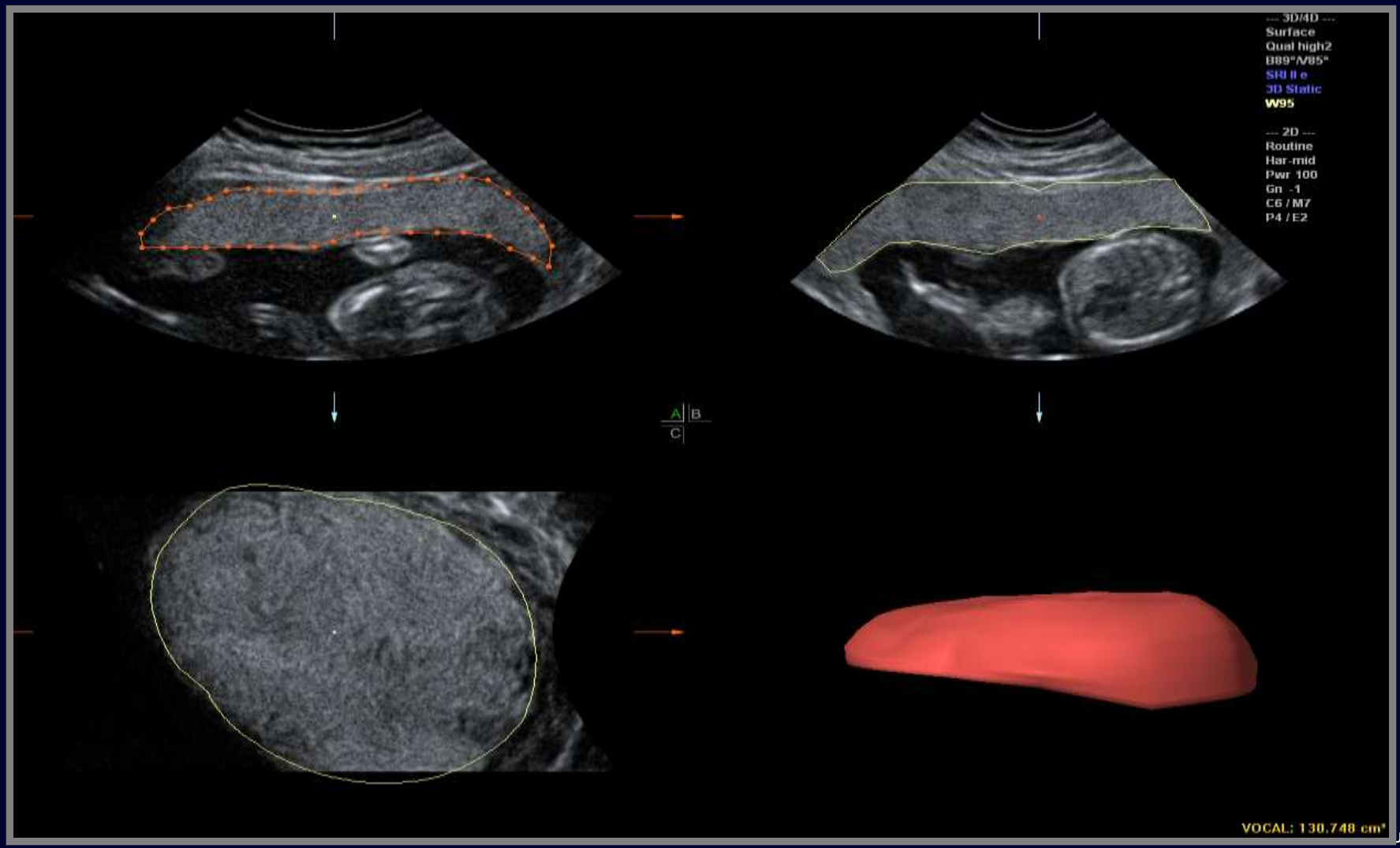
# *Normal Placental Appearance*

## *Normal Umbilical Cord*



# *Normal Placental Appearance*

## *3D Assessment of Placental Size*



# *Placental Lesions*
## *Complete Molar Gestation*

# *Placental Lesions*
## *Partial Molar Gestation*

# *Placental Lesions*
## *Intraplacental Cysts*

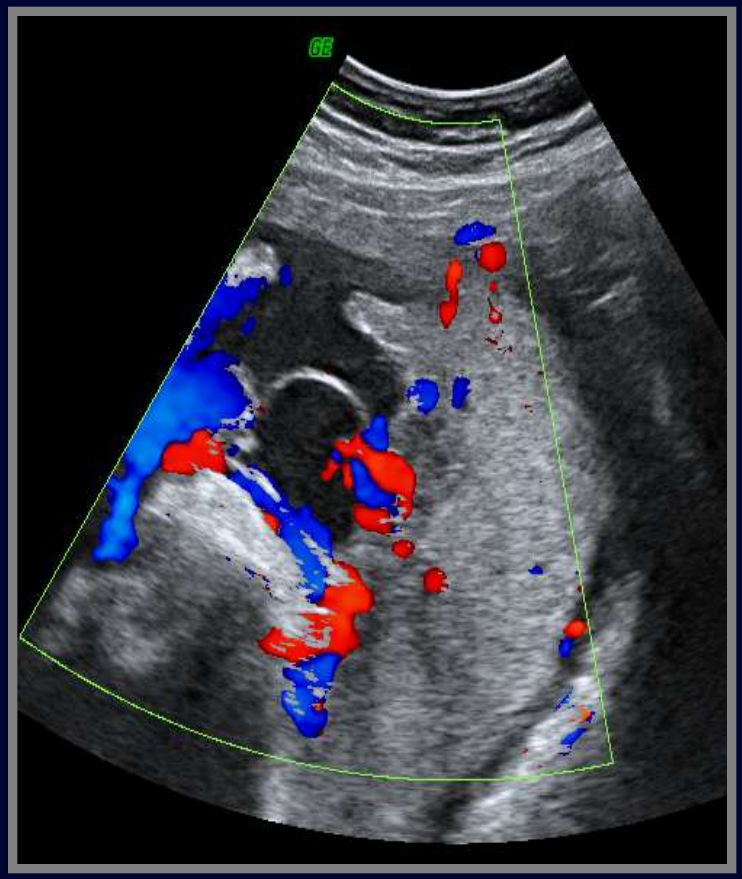
- By term, most pregnancies will have at least 1 placental cyst.
- Typically these are benign findings, even when large.
- They should be correlated with number, size, and presence of maternal disease.

# *Placental Lesions*
## *Placental Surface Cysts*

- Subchorionic placental cysts are usually more sonolucent than amniotic fluid and are almost always benign findings.
- Most fetuses will have normal outcomes.
- Large cysts (>4.5 cm) can be associated with fetal growth restriction.

# *Placental Lesions*
## *Placental Surface Cysts*

- Maternal floor infarction is also associated with these cysts.
- They are commonly located near the placental umbilical cord insertion.
- Correlation with maternal disease, especially vascular disease, is also recommended.



# *Placental Lesions*

## *Subchorionic Hematoma and Follow-up*

# *Placental Lesions*
## *Placental Infarctions*

- Occur throughout the placenta and are common at term.
- If >3 cm or involve >5% of the placenta, there is increased perinatal morbidity.
- Maternal and fetal thrombophilias can be etiologically associated.

# *Gross Placental Abnormalities*
## *Placental Abruption*

- Typically present with pain and bleeding in third trimester.
- 0.5% of pregnancies.
- Can be difficult to diagnose when acute, as they have a similar echogenicity as the placenta.
- Over time, they become more organized.

# *Gross Placental Abnormalities*
## *Placenta Previa: Definitions*

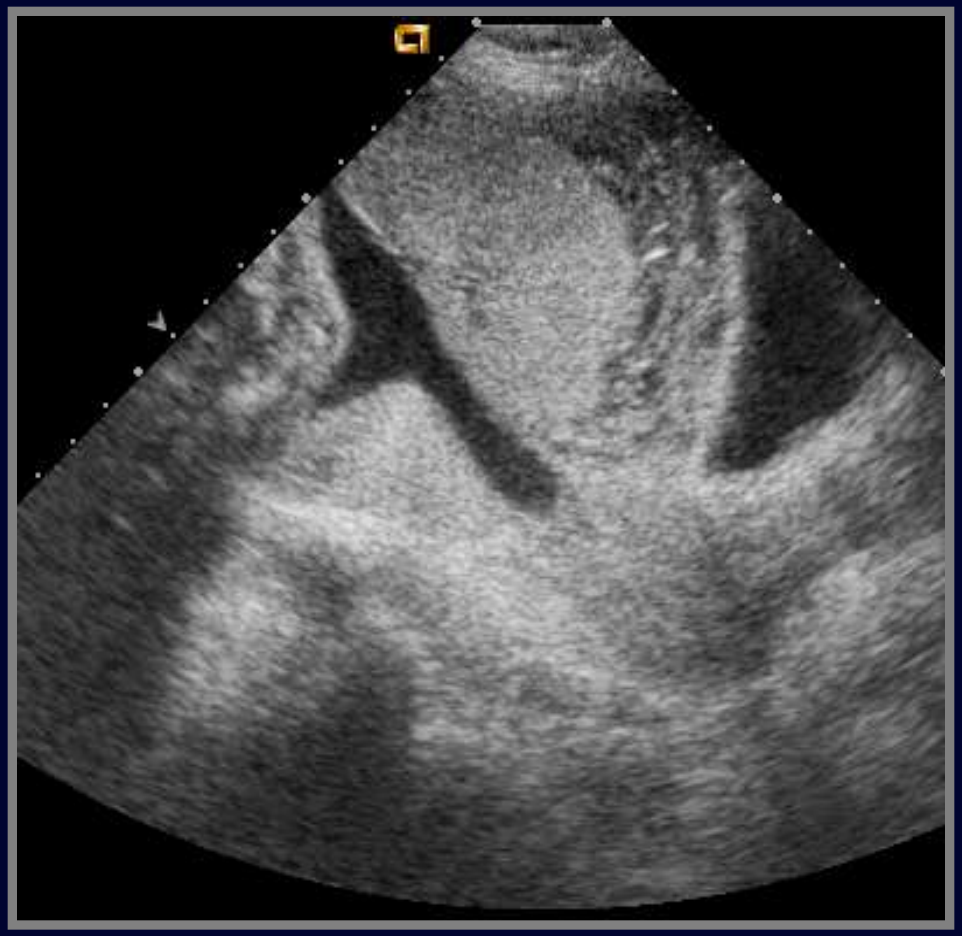
- Ultrasound is vital to the diagnosis:
  - Complete previa: placenta covers the internal cervical os.
  - Marginal previa: placenta encroaches on the internal cervical os, lying within 1 cm of the internal cervical os.
  - Low-lying placenta: placenta lies within 2 cm of the internal cervical os.

# *Gross Placental Abnormalities*
## *Placenta Previa*

- Transvaginal sonography is indispensable for making the diagnosis of placenta previa.
- Follow-up sonography is frequently necessary, as many with low-lying placentae will migrate away from the internal cervical os by term.

# *Gross Placental Abnormalities*

## *Marginal Placenta Previa*

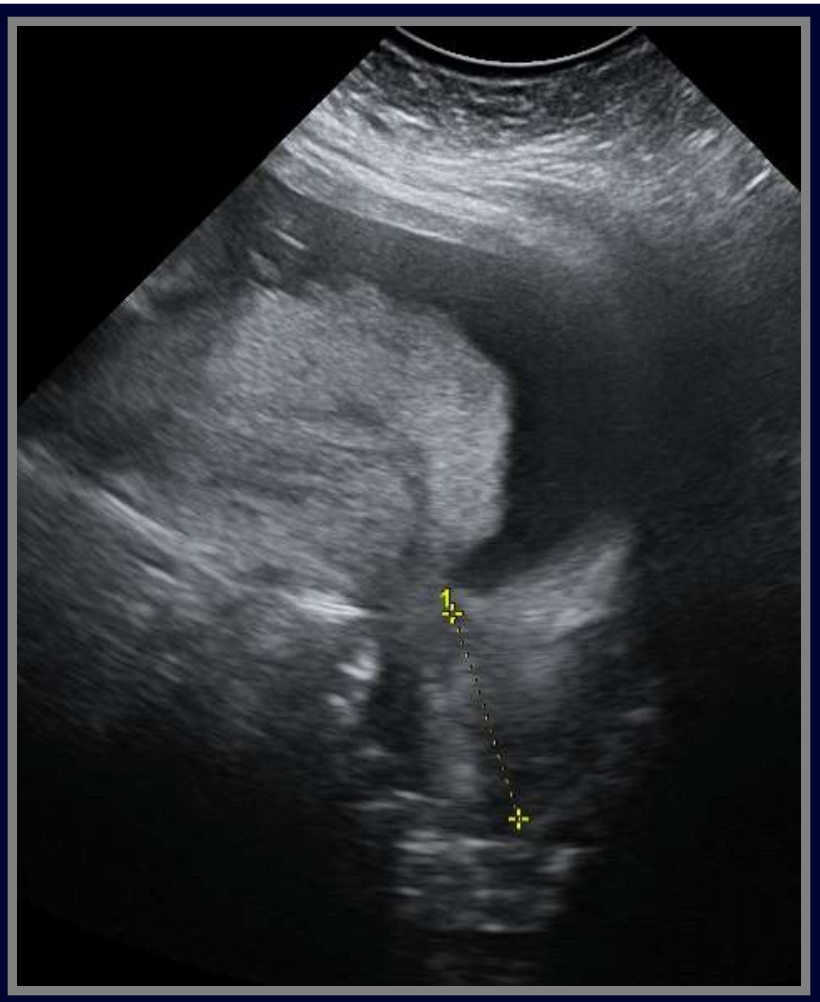


# *Gross Placental Abnormalities*
## *Low Placenta*

- Low-lying placentae are common in the second trimester as the placenta occupies a relatively larger portion of the uterus.
- The term “low-lying” is used for placentae in the second trimester when the internal cervical os is not precisely seen, yet the placenta is proximate to the cervix.

# *Gross Placental Abnormalities*
## *Low Placenta*

- Risk factors for persistent placenta previa include advanced maternal age, increasing parity, increasing number of prior cesarean deliveries, and a prior spontaneous or induced abortion.

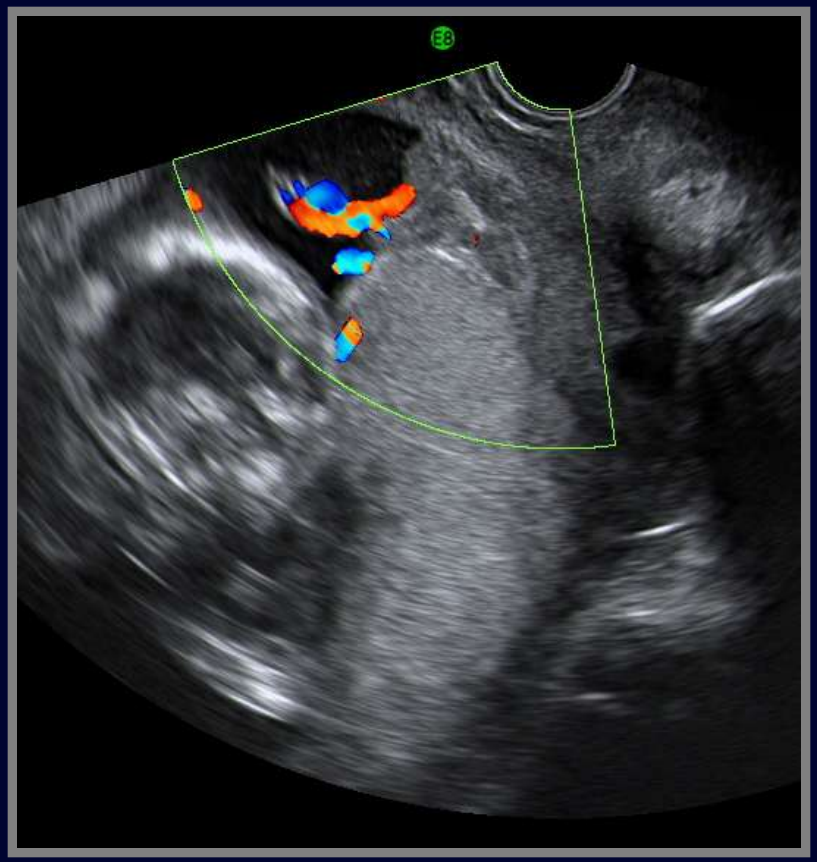


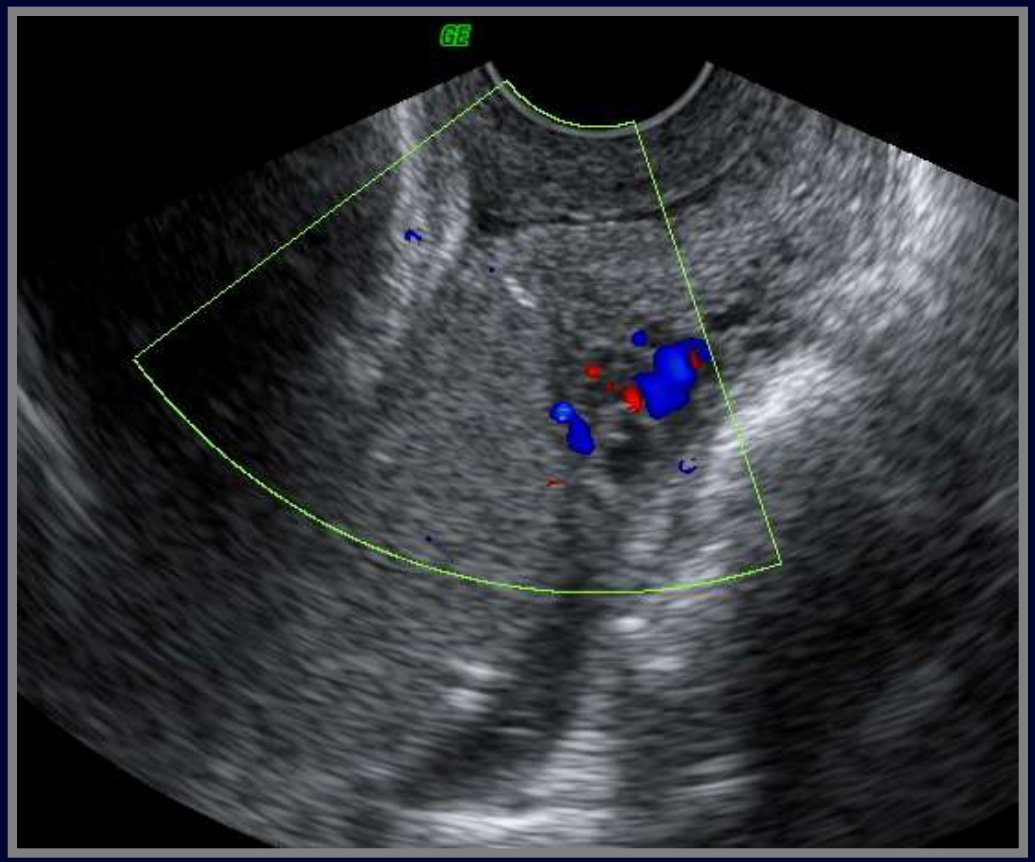
# *Gross Placental Abnormalities*

## *Low Placenta*


# *Gross Placental Abnormalities*

## *Placenta Previa: Color Doppler*



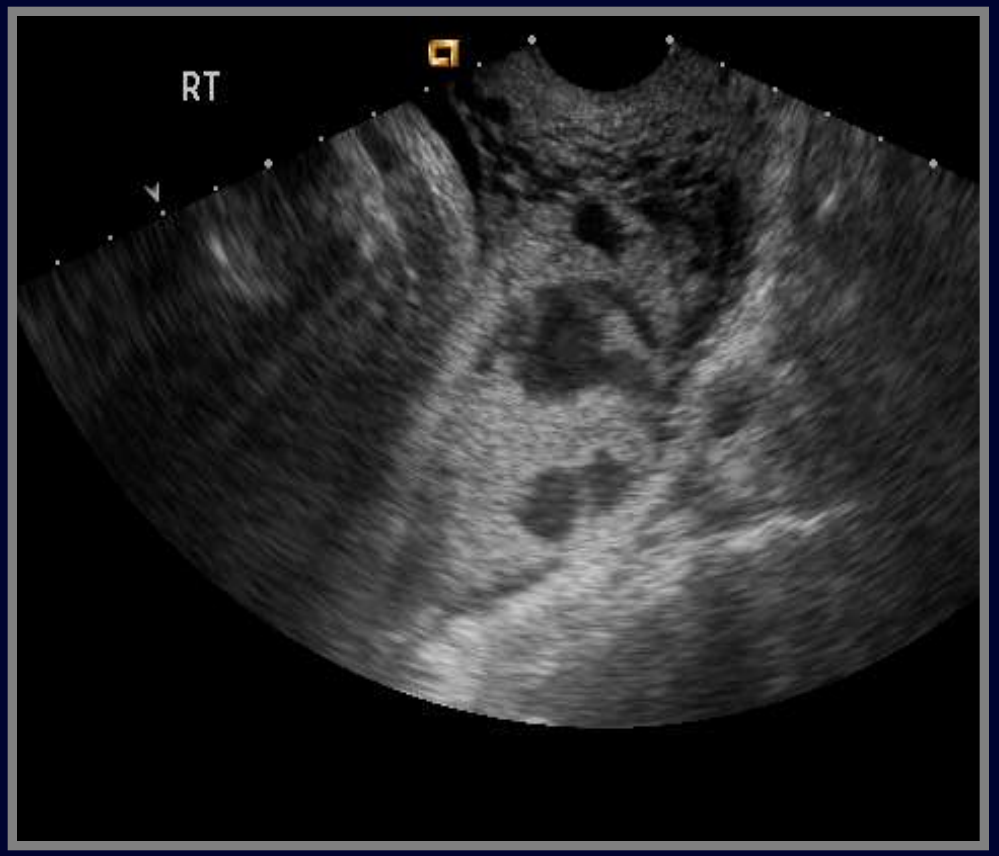


# *Gross Placental Abnormalities*
## *Placenta Accreta*

- Placenta adherent to uterine wall after delivery is a placenta accreta due to loss of decidua basalis.
- Increta invades the myometrium.
- Percreta extends through the myometrium.

# *Gross Placental Abnormalities*
## *Placenta Accreta*

- Risk factors for placenta accreta include advancing maternal age, placenta previa, and prior cesarean delivery.
- A number of sonographic signs can predict placenta accreta.

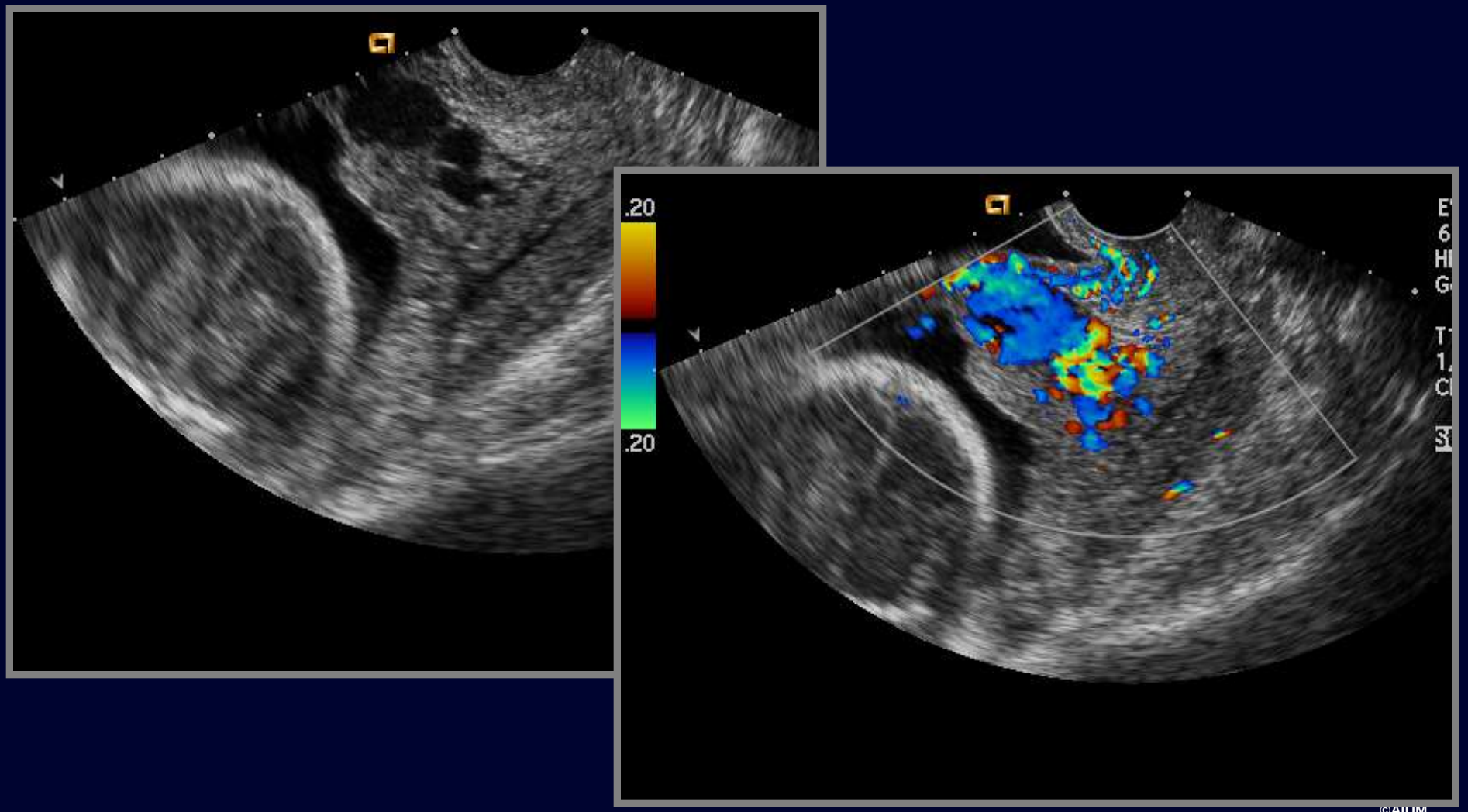


# *Gross Placental Abnormalities*
## *Placenta Accreta: Sonographic Signs*

- Presence of multiple placental lacunae (lakes) with or without blood flow
- Obliteration of the retroplacental-myometrial hypoechoic border
- Presence of exophytic placental masses outside uterus
- Intense retroplacental blood flow, especially with vessels crossing the retroplacental-myometrial disruption area

# *Gross Placental Abnormalities*

## *Placenta Accreta: Color Doppler*



# *Gross Placental Abnormalities*

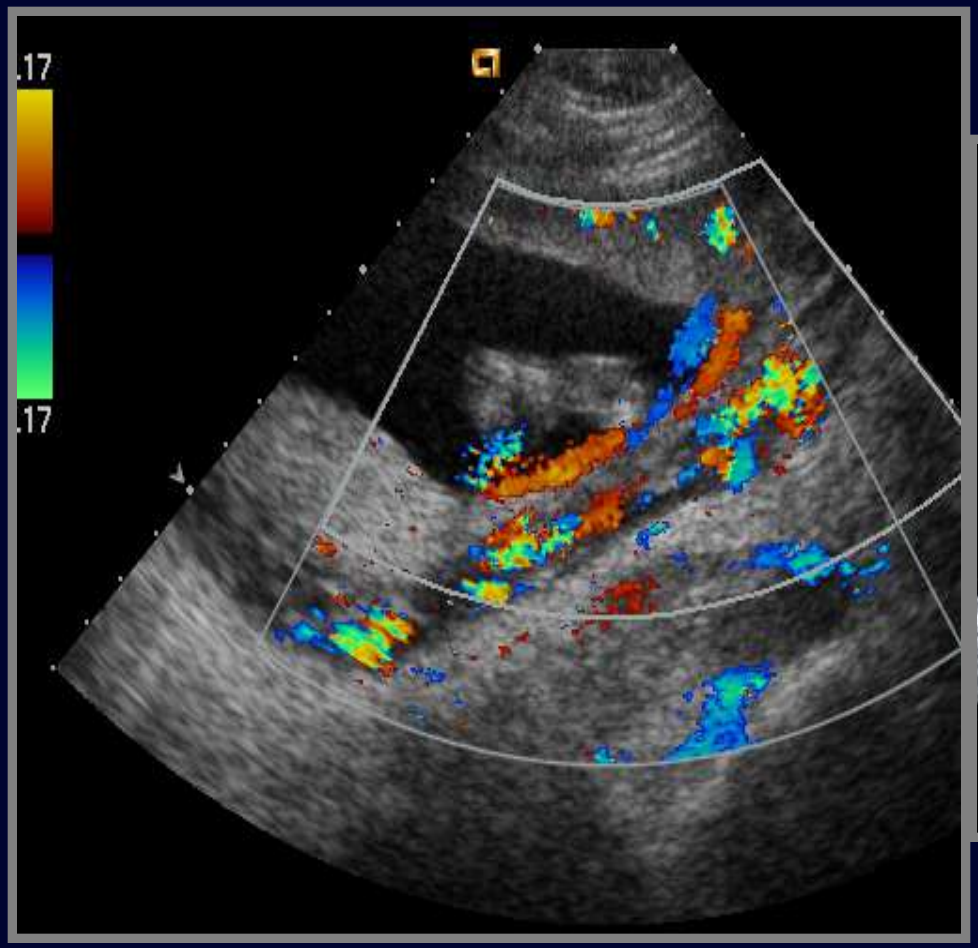
## *Placenta Previa Percreta*

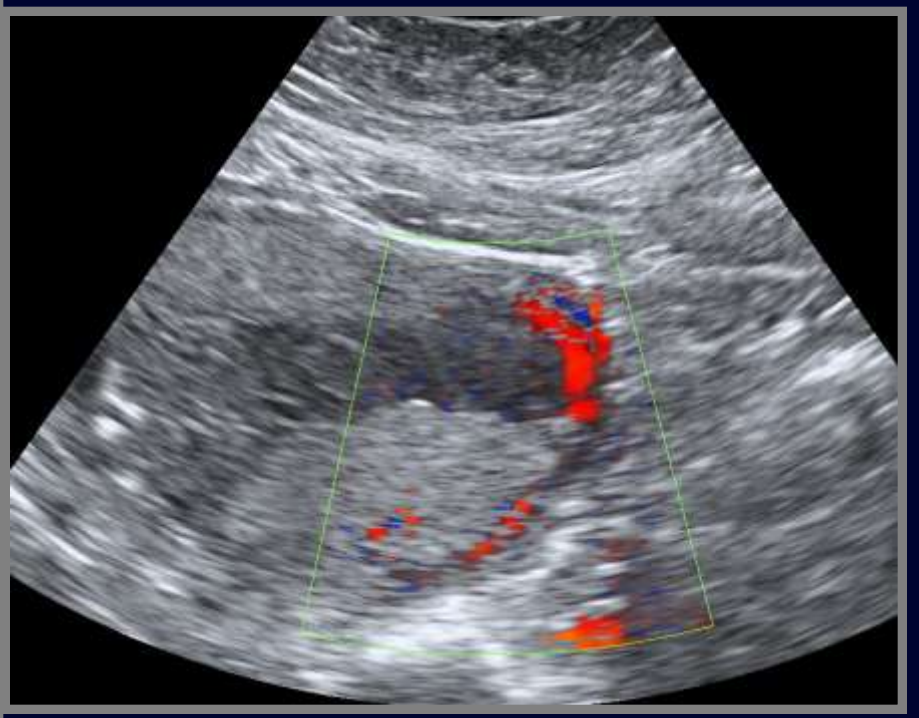
# *Gross Placental Abnormalities*
## *Succenturiate Lobe of the Placenta*

- Accessory lobes of the placenta can occur in up to 5% of pregnancies.
- They are a cause of retained placenta after delivery.
- There must be some vascular connection between the placenta and accessory lobe.

# *Gross Placental Abnormalities*

## *Succenturiate Lobe of the Placenta*



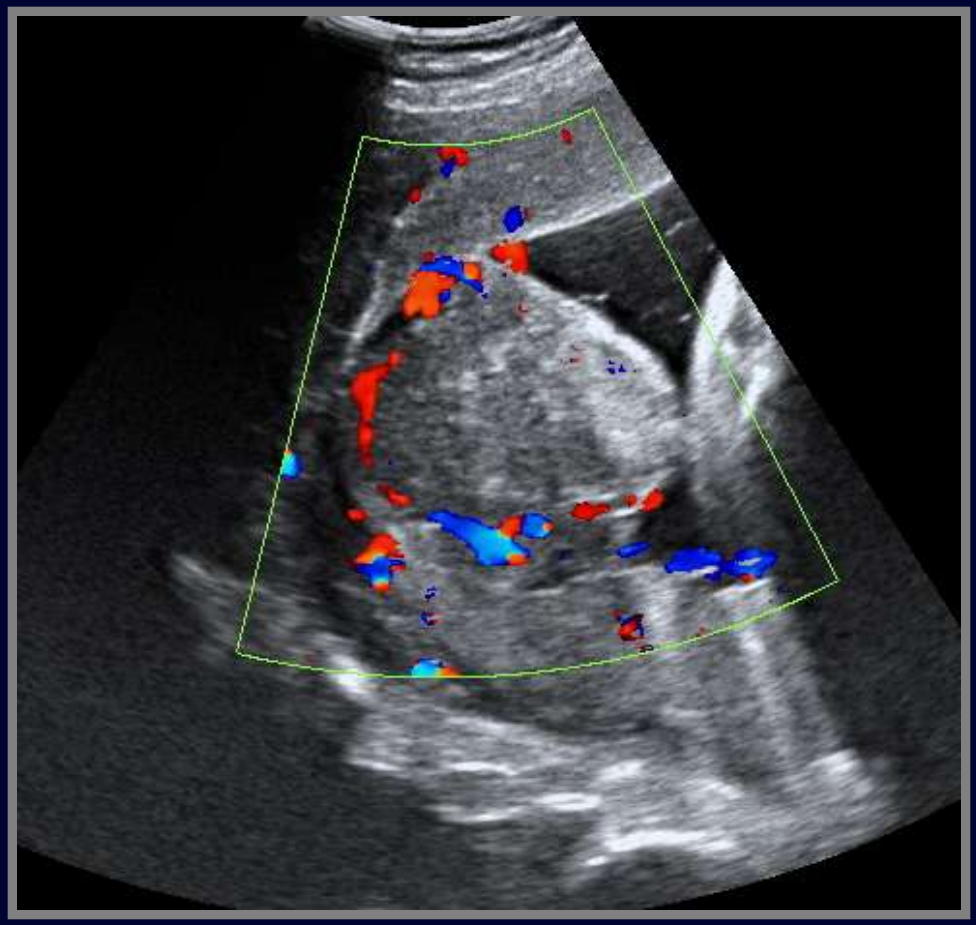


# *Gross Placental Abnormalities*
## *Chorioangioma of the Placenta*

- Most common benign tumor of the placenta, occurring in approximately 1% of pregnancies.
- When large (>5 cm), they can be associated with high-output heart failure, anemia, hydrops, and fetal death.

# *Gross Placental Abnormalities*

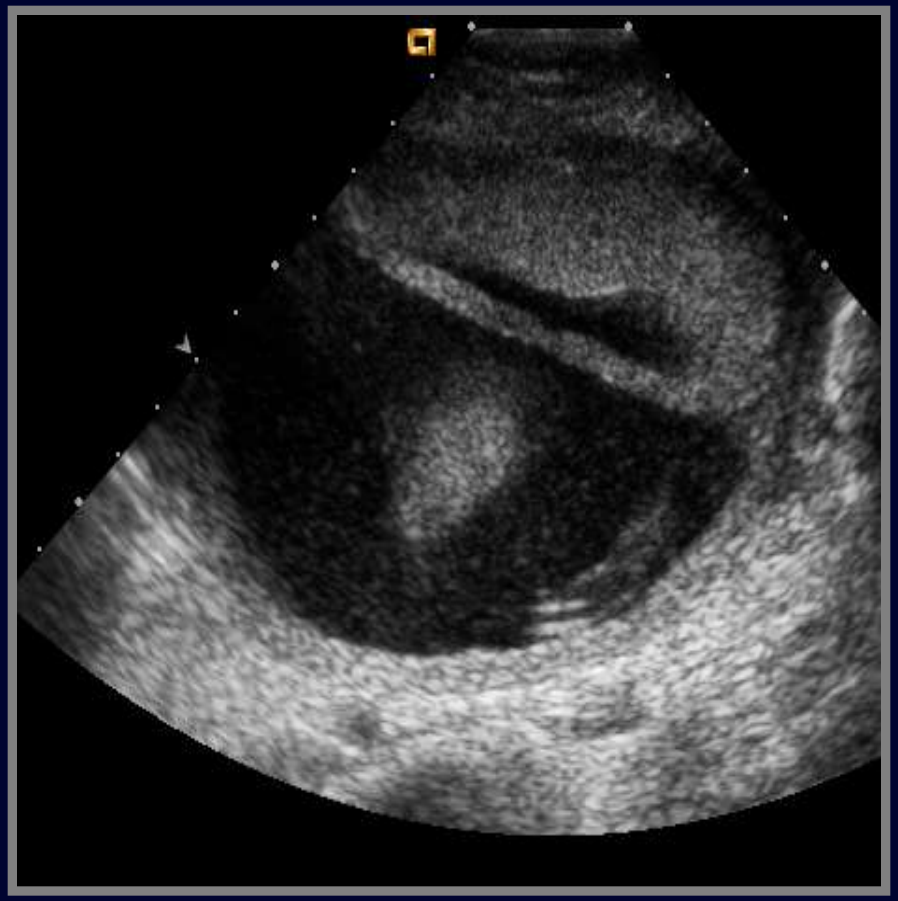
## *Chorioangioma of the Placenta: Color Doppler*



# *Gross Placental Abnormalities*

## *Circumvallate Placenta*

- Partial circumvallate placentae are common and should be seen as normal variants.
- Complete circumvallate placentae are rare and are associated with adverse neonatal outcome.



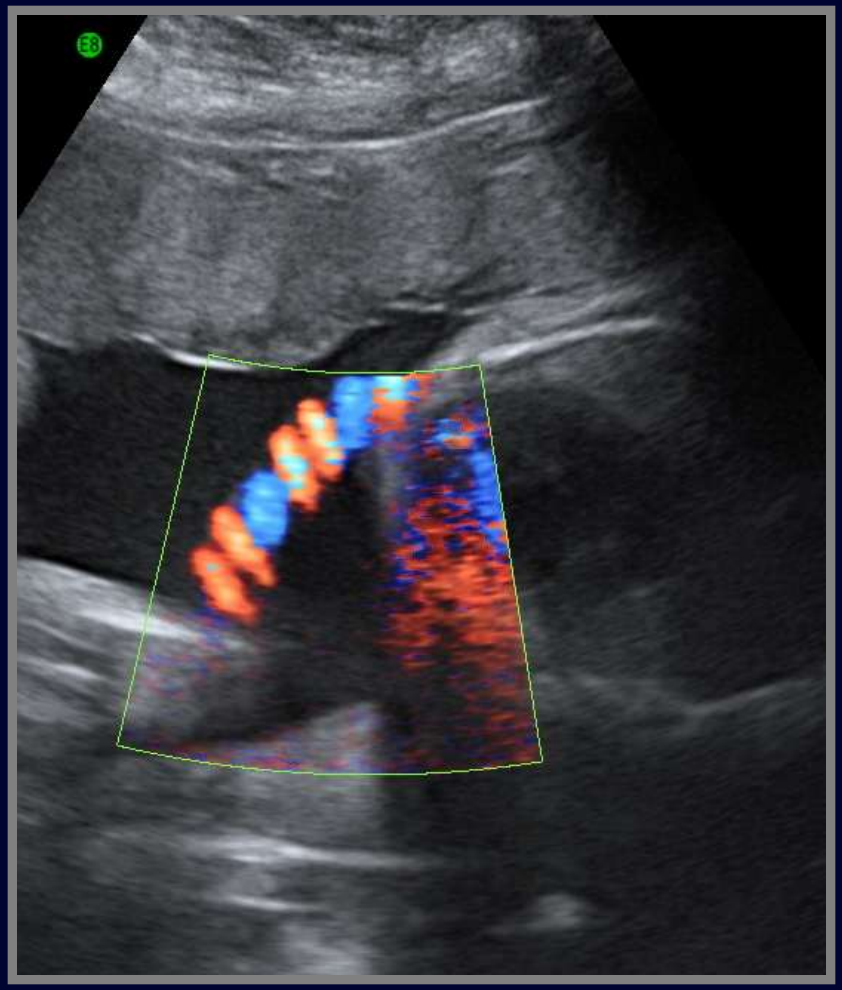
# *Gross Placental Abnormalities*

## *Circumvallate Placenta*


# *Umbilical Cord Abnormalities*

## *Normal Umbilical Cord Anatomy*

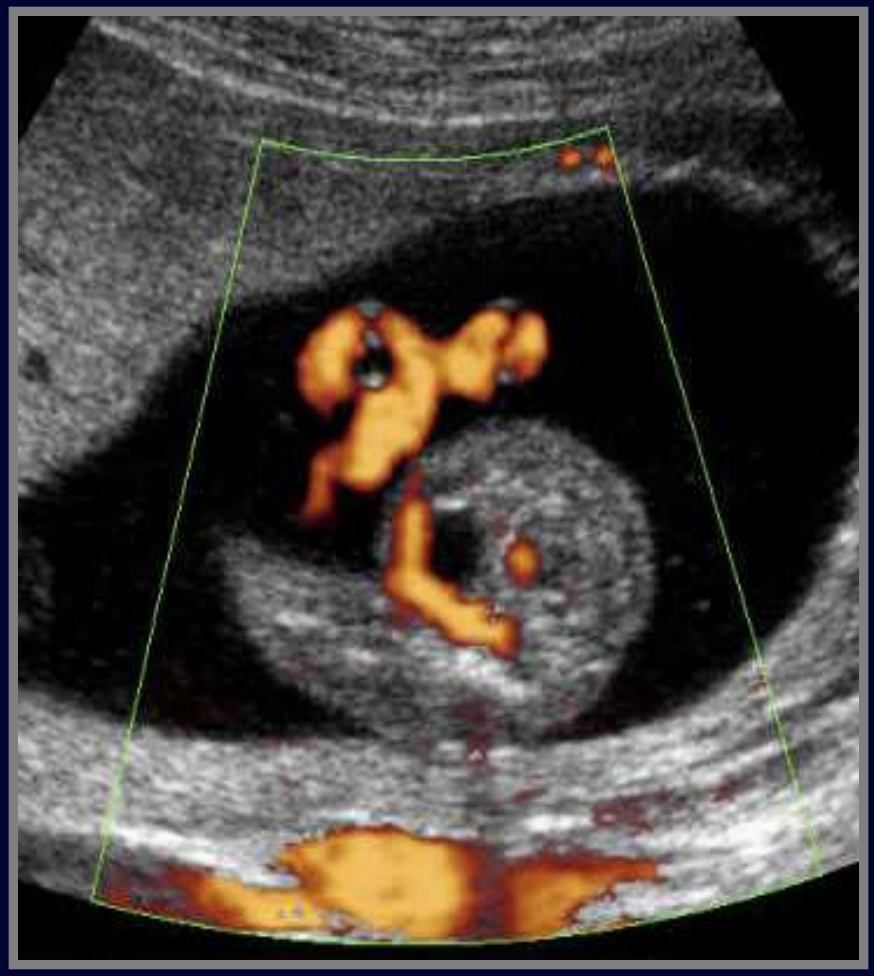
- Blood flow in the umbilical cord can be documented using Doppler imaging.
- Color Doppler demonstrates the difference in the arteries (red) and vein (blue) since flow is directionally assessed.



# *Umbilical Cord Abnormalities*

## *Two-Vessel Umbilical Cord*

- Assessing the arteries as they course around the bladder is an easy way of documenting the number of umbilical arteries.
- Two-vessel umbilical cords are associated with structural defects, aneuploidy, and growth restriction.



# *Umbilical Cord Abnormalities*

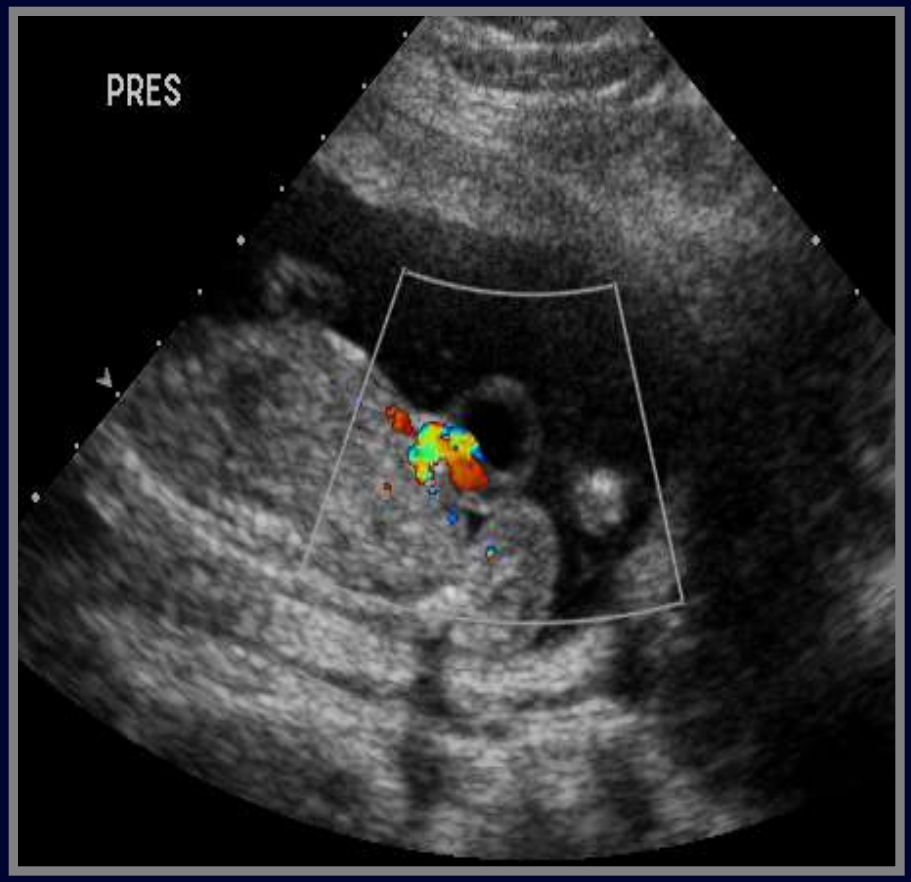
## *Umbilical Cord Cyst*

- Umbilical cord cysts can be seen throughout gestation.
- Most occur near the fetus.
- They are associated with structural defects and aneuploidy, especially trisomies 13 and 18.

# *Umbilical Cord Abnormalities*

## *Umbilical Cord Cyst*

- Genitourinary and gastrointestinal abnormalities are the most common defects seen with cord cysts.
- A detailed structural fetal survey and correlation with serum screening should occur in the presence of umbilical cord cysts.



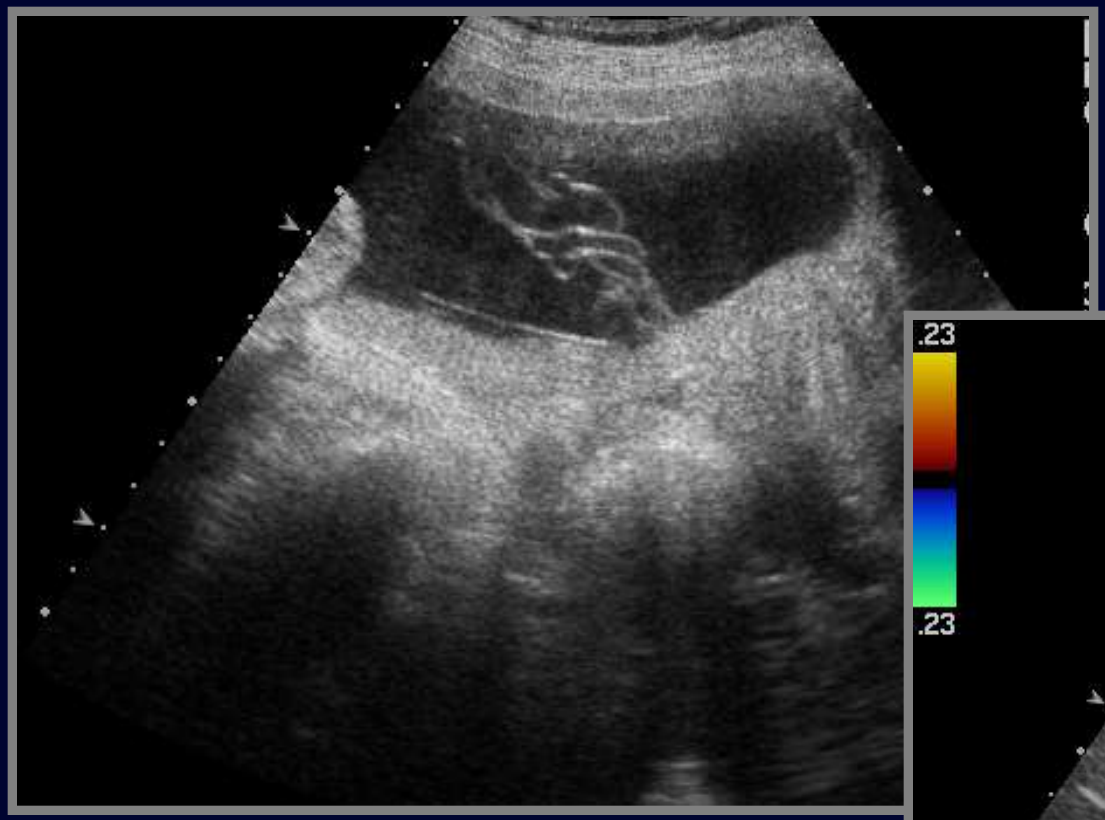
# *Umbilical Cord Abnormalities*

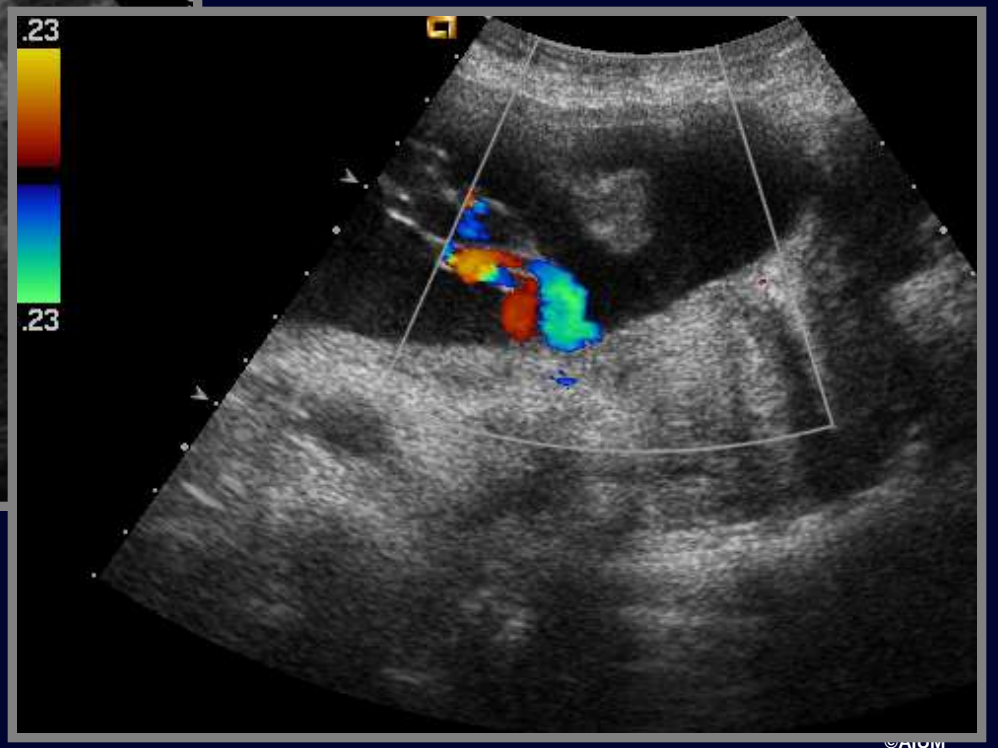
## *Uncoiled Umbilical Cords*

- Uncoiled umbilical cords are associated with single umbilical arteries, multiple gestations, smaller fetal size, and fetal demise.
- Assessment of the degree of coiling in the second trimester does not correlate well with that seen at term.

# *Umbilical Cord Abnormalities*

## *Velamentous Umbilical Cord Insertion*

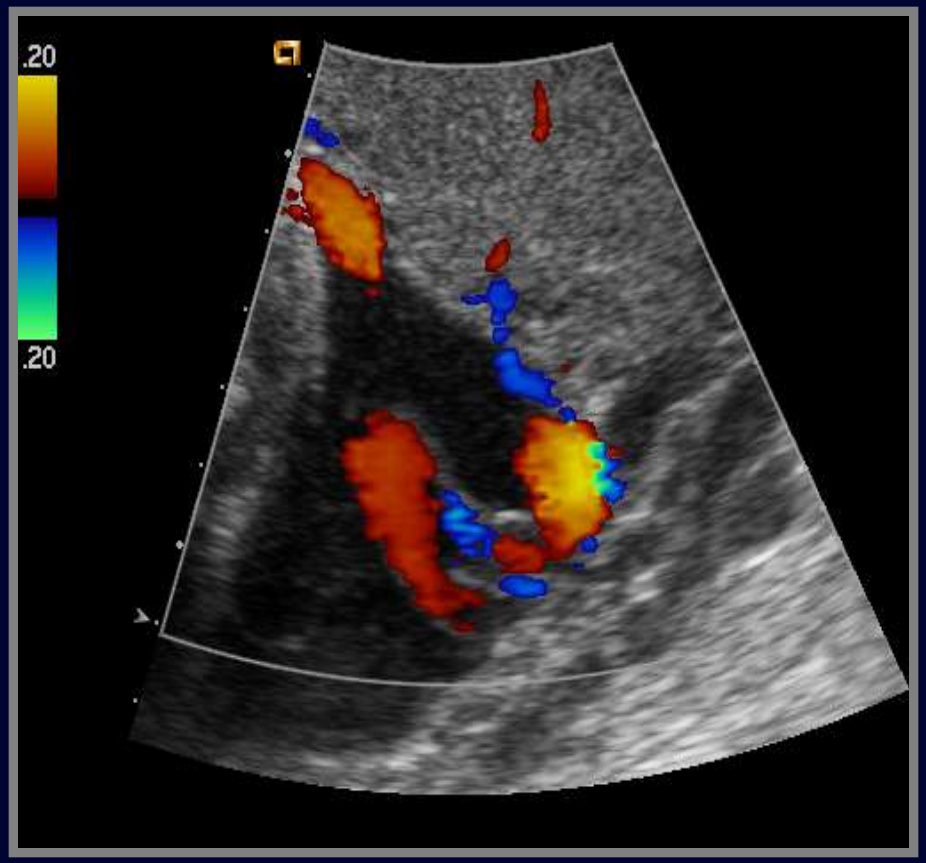




# *Umbilical Cord Abnormalities*

## *Velamentous Umbilical Cord Insertion*

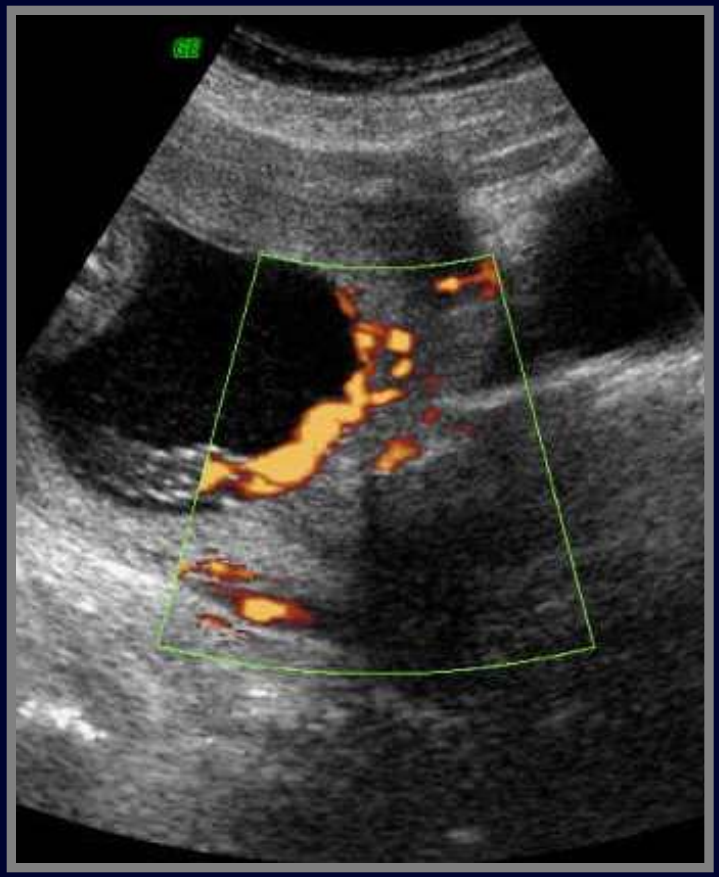
- Velamentous cord insertions occur in 1% of singletons and are more frequent among multiple gestations.
- They are associated with single umbilical arteries.



# *Umbilical Cord Abnormalities*

## *Velamentous Umbilical Cord Insertion*

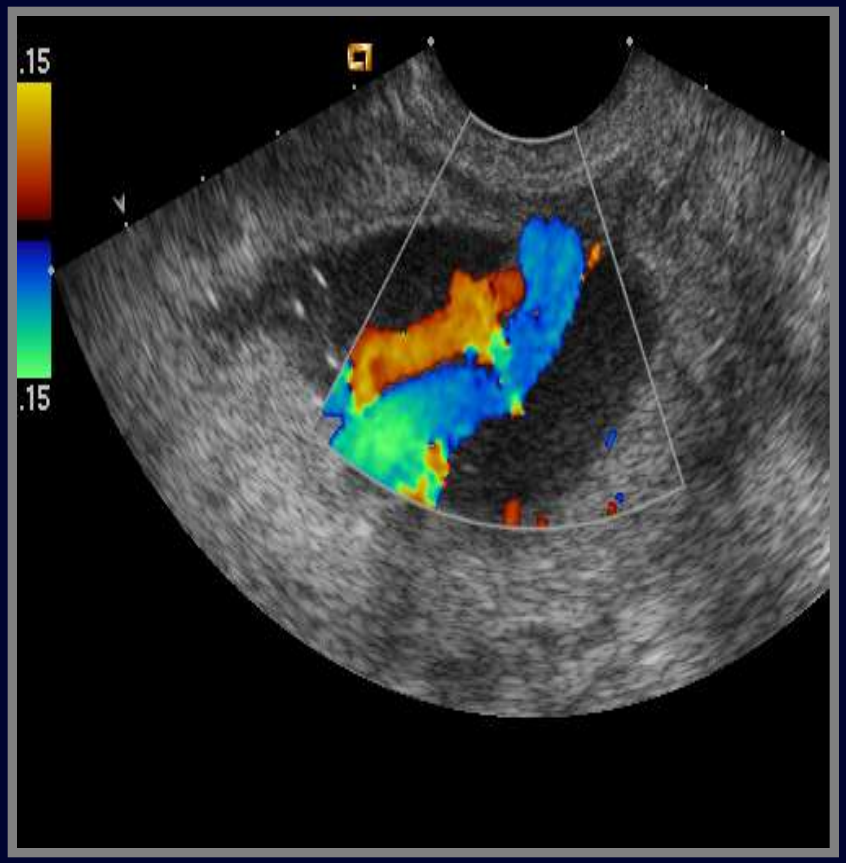
- When searched for, velamentous umbilical cord insertions can be identified in the vast majority of pregnancies.
- They are associated with fetal growth restriction, preterm delivery, structural defects, neonatal death, and retained placentae.



# *Umbilical Cord Abnormalities*

## *Velamentous Umbilical Cord Insertion*

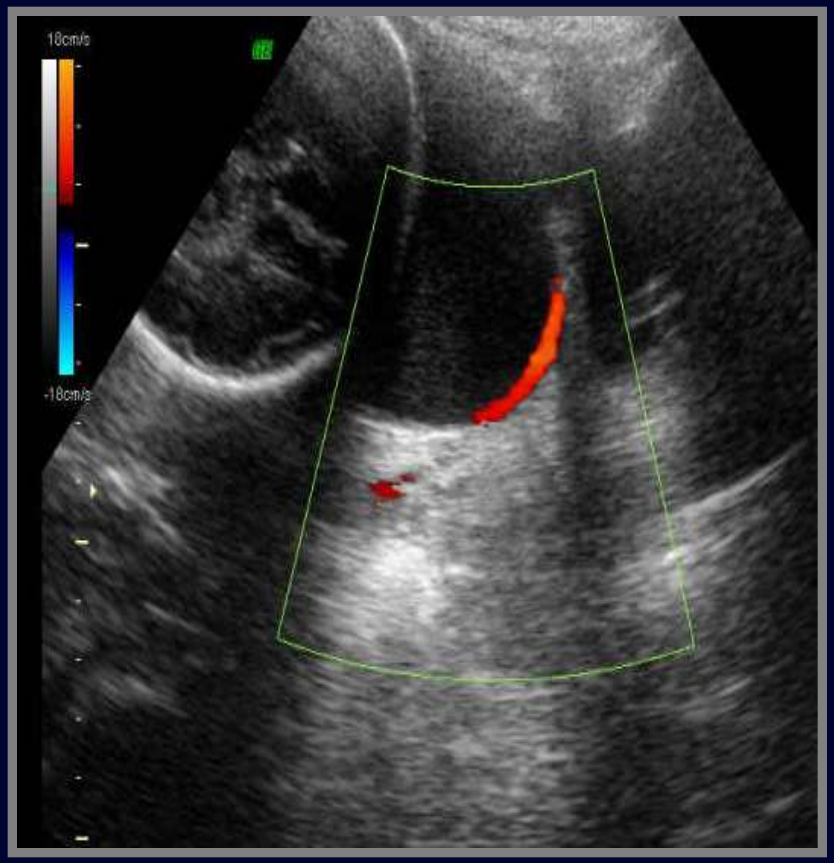
- More recent data suggest that velamentous umbilical cord insertions are associated with intrapartum fetal heart rate abnormalities, especially with insertions low in the uterus, and with increasing length of unsupported vessels.



# *Umbilical Cord Abnormalities*

## *Vasa Previa*

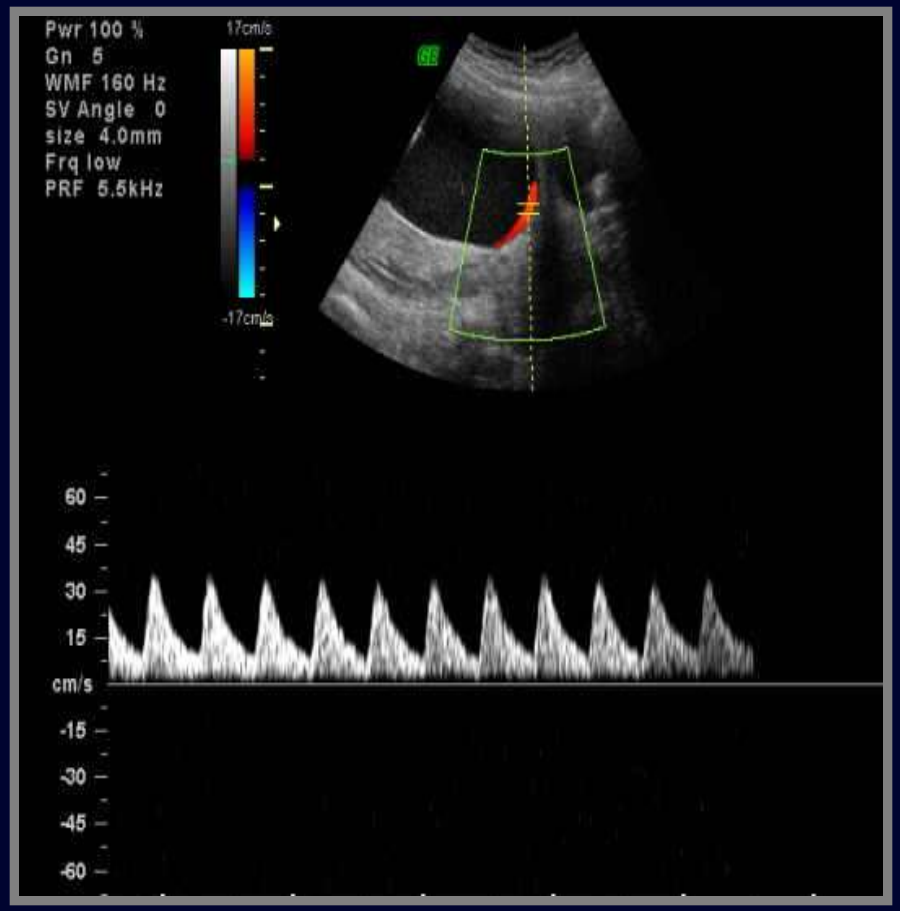
- A vasa previa occurs with umbilical vessel(s) overlying the internal cervical os.
- Vasa previa is a cause of painless vaginal bleeding, especially late in gestation.
- Fetal death can quickly result from exsanguination.



# *Umbilical Cord Abnormalities*

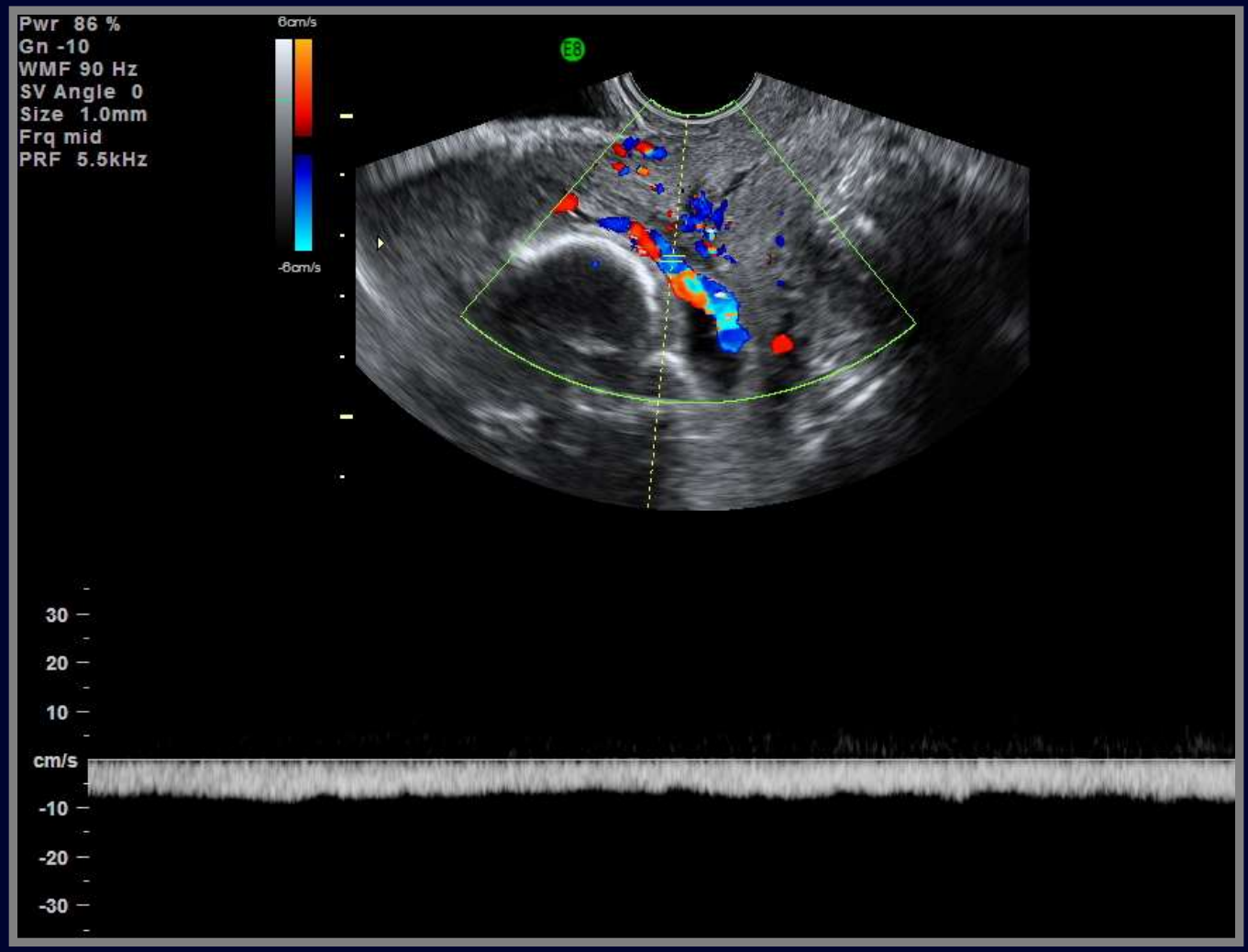
## *Vasa Previa*

- Risk factors for vasa previa include: velamentous cord insertions, marginal cord insertions, especially with aberrant vessels, bilobed or succenturiate placental lobes, prior low-lying placentae, multiple gestations, and in vitro fertilization.



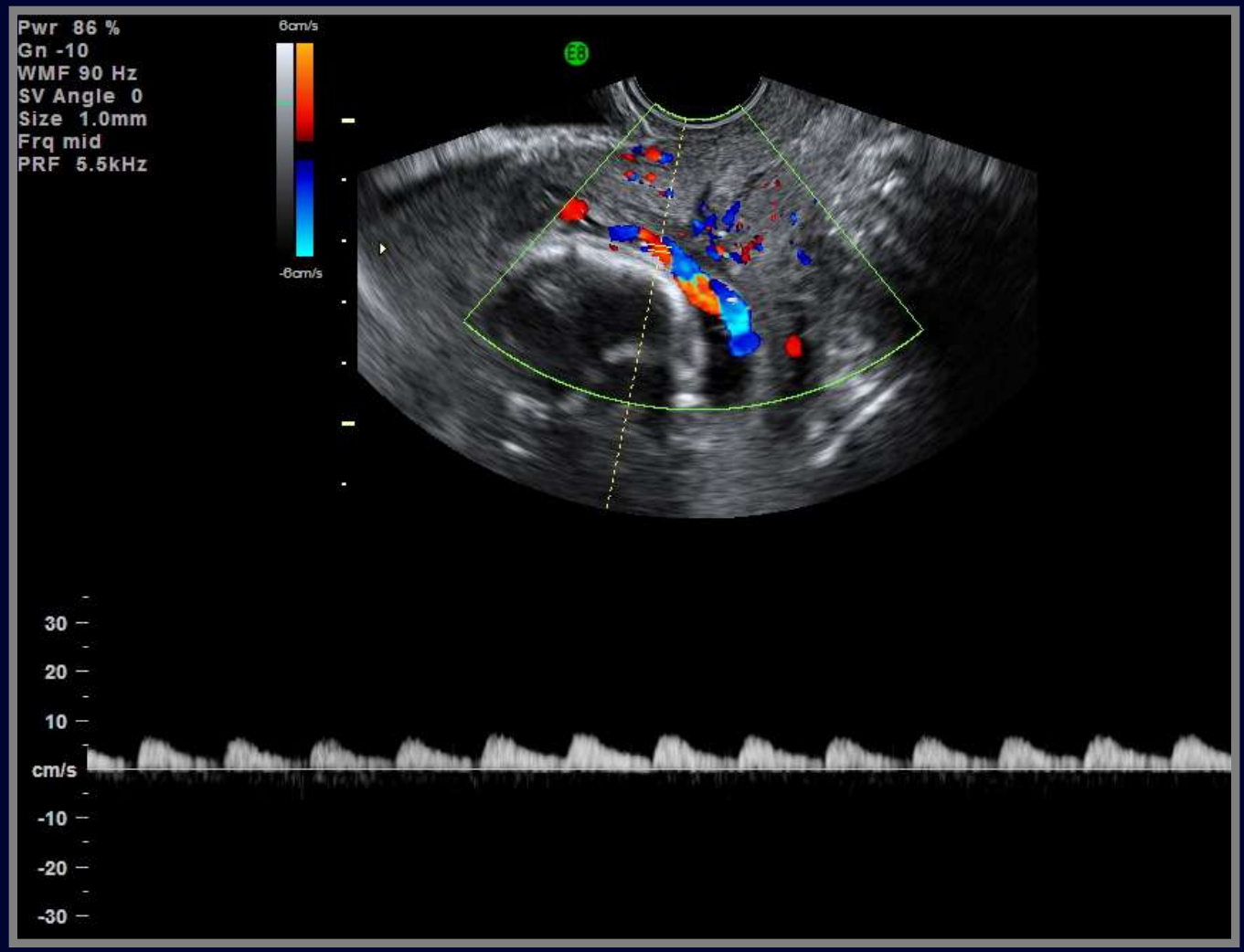
# *Umbilical Cord Abnormalities*

## *Vasa Previa: Venous Flow*



# *Umbilical Cord Abnormalities*

## *Vasa Previa: Arterial Flow*



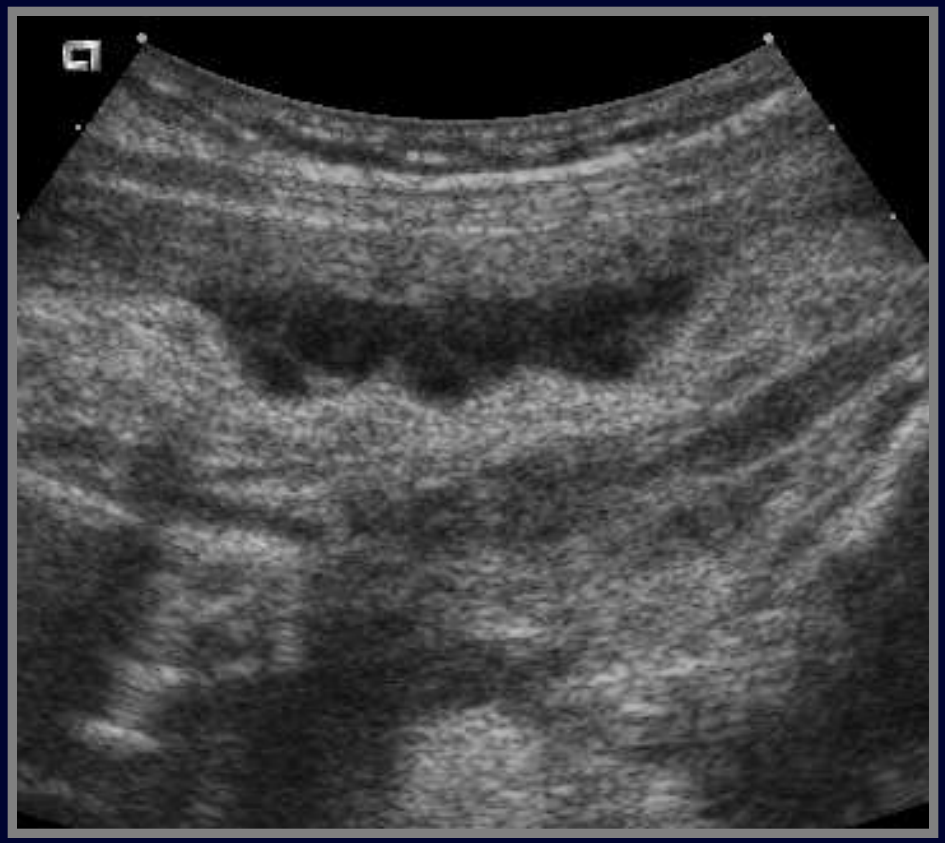
# *Umbilical Cord Abnormalities*

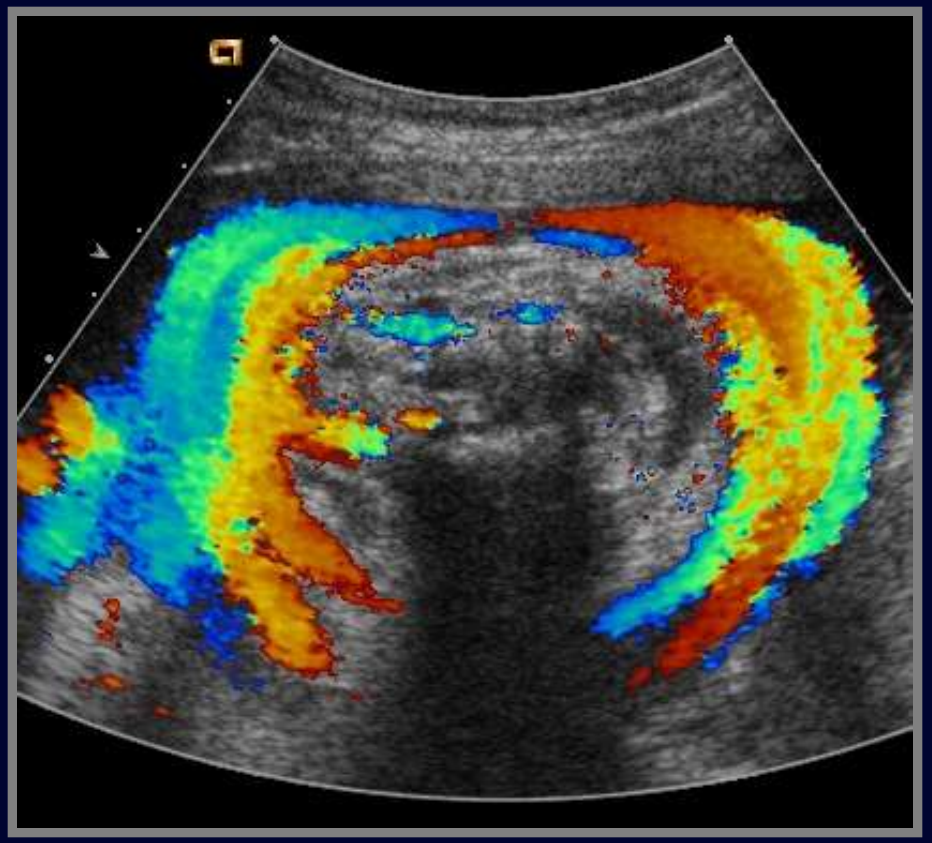
## *Vasa Previa*

- When any of the risk factors for vasa previa are identified, at a minimum, the internal cervical os should be evaluated to determine whether a vasa previa is present.
- There should be a low threshold for use of the transvaginal probe.

# *Umbilical Cord Abnormalities*

## *Nuchal Cord*





# *Umbilical Cord Abnormalities*

## *Funic Presentation*

- A funic presentation is diagnosed when the umbilical cord is presenting.
- Management must be individualized depending on gestational age, fetal position, and labor.

# *Conclusions*

- Many of the abnormalities with the placenta and umbilical cord can be identified with prenatal sonography.
- A basic understanding of placental structure and function is vital to determine the context in which to interpret abnormal findings of the placenta.
- Umbilical cord abnormalities can be associated with an adverse perinatal outcome.

# THANK YOU.