



THE UNIVERSITY OF  
TENNESSEE  
HEALTH SCIENCE CENTER.

# Fetal Growth Restriction

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# Learning Objectives

Following this lecture, attendees should be able to :

1. Describe the range of maternal, fetal, and placental etiologies of fetal growth restriction
2. Demonstrate the ability to execute a diagnostic work-up that is both comprehensive and pertinent
3. Effectively counsel patients regarding etiologies of fetal growth restriction, inherent risks, and rationale for monitoring and delivery recommendations

# Disclosures

- I have no relevant conflicts of interest to disclose.

# Definition

- Estimate fetal weight (EFW) <10th percentile for gestational age  
OR
- Abdominal circumference <10th percentile for gestational age (international variation)
  - AC has diagnostic accuracy similar to overall EFW for prediction of neonates that are small for gestational age (SGA)
- "Dropping off the growth curve?"

# Clinical Significance

- Fetuses at all weights less than the 10th percentile have a 2x greater risk of stillbirth than normally-grown fetuses
- Growth-restricted fetuses are more likely to have:
  - Severe acidosis at birth
  - Low 5-minute APGAR scores
  - NICU admission
  - 2-5x higher risk of perinatal death
- Long-term outcomes:
  - Increased risk of metabolic syndrome, cardiovascular disease, endocrine dysfunction, neurologic impairment

# Estimation of Fetal Weight

- Highly dependent on accurate pregnancy dating
- Hadlock formula (1991):
  - Biparietal diameter
  - Head circumference
  - Abdominal circumference
  - Femur length

## Obstetrical Ultrasound

Frank P. Hadlock, MD • Ronald B. Harrist, PhD • Juan Martinez-Poyer, MD

### **In Utero Analysis of Fetal Growth: A Sonographic Weight Standard<sup>1</sup>**

## **MATERIALS AND METHODS**

The study population consisted of 392 predominantly middle-class, pregnant, white women with certain menstrual dates, who were seen in our department between menstrual weeks 10 and 41 for evaluation with US.

# Estimation of Fetal Weight, continued

- Role for customized growth standards?
  - INTERGROWTH-21 (2014)
  - NICHD (2015)
  - WHO (2017)



# Classification of Fetal Growth Restriction

- Early growth restriction (<32 weeks)
  - Higher likelihood of severe growth restriction
  - Greater risk of Doppler deterioration
  - More significant placenta dysfunction
  - Associated with hypertensive disorders of pregnancy
- Severe growth restriction (<3rd percentile)
  - Increased risk of adverse perinatal outcomes
    - Stillbirth risk 3x greater than fetuses in 3rd to 5th percentiles, and up to 7x greater than in fetuses in the 5th to 10th percentiles
- Symmetric vs. Asymmetric



# Etiology of Fetal Growth Restriction

## Maternal

Hypertension  
Diabetes  
Lupus  
Vasculopathy  
Substance use  
Infectious disease  
Teratogen exposure  
Extremes of maternal age

## Fetal

Aneuploidy  
  
Multiple gestation  
  
Structural anomaly

## Placental

Impaired placentation (PAS, previa)  
  
Placental mosaicism  
  
Cord anomalies

## Constitutional

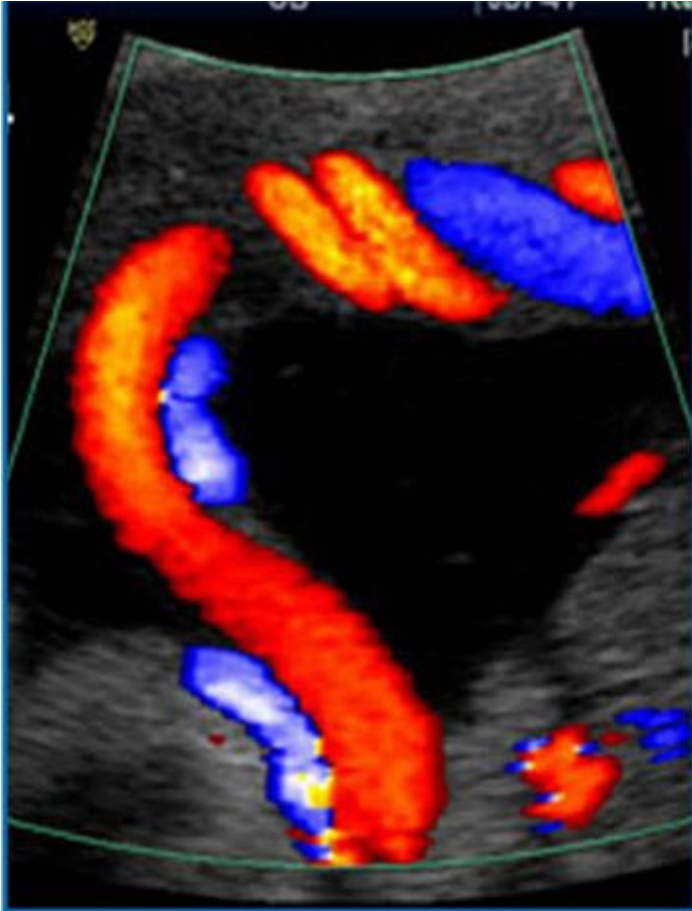
Decreased growth potential

# Work-up of Fetal Growth Restriction



- Thorough review of maternal health history, exposures, substance use
- Amniocentesis if FGR diagnosed <32 weeks gestation
- Detailed obstetric ultrasound
  - Findings of fetal anatomic anomalies OR polyhydramnios should prompt diagnostic fetal testing
- "TORCH" testing NOT routinely recommended
- Screening for CMV is recommended if patient elects for diagnostic testing with amniocentesis.

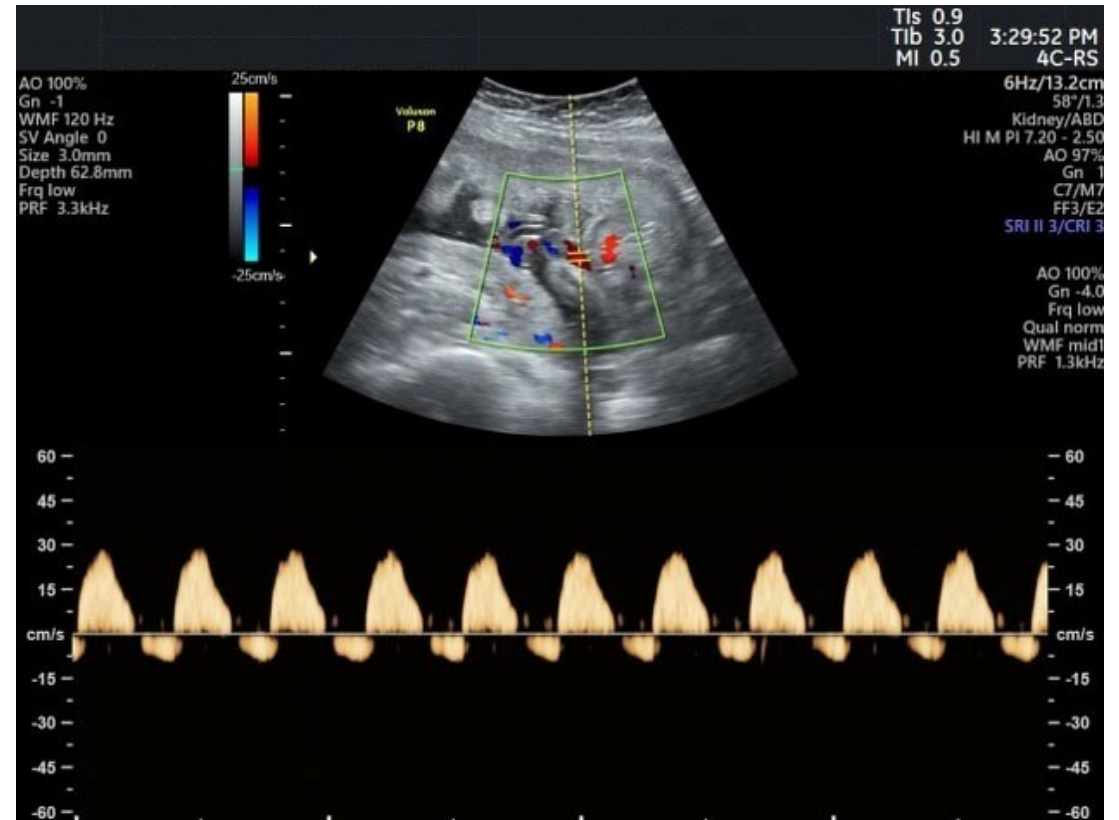
# Fetal Monitoring



- Serial growth ultrasound should be performed every 3-4 weeks
- NSTs should be performed at least weekly after viability.
- Umbilical artery Doppler should be performed every 1-2 weeks.
  - Abnormal Doppler is defined as a systolic/diastolic ratio >95th percentile for gestational age, absent or reversed end diastolic velocity

# Fetal Monitoring, continued

- For severe growth restriction (<3rd percentile) OR elevated S/D ratio, UA Dopplers should be performed weekly.
- AEDV: UA Dopplers should be performed 2-3 times/week.
- REDV: Patient should be hospitalized



# Trial of Randomized Umbilical and Fetal Flow in Europe (TRUFFLE)

- Ductus venosus (DV):
  - Further evidence needed
  - Abnormalities indicate advanced stage of fetal compromise
  - Use in routine surveillance not yet recommended
- Middle cerebral artery (MCA):
  - Abnormalities in chronically hypoxemic fetuses due to "brain-sparing effect"
  - "MCA Doppler did not add useful information beyond UA and DV Doppler assessments for optimizing timing of delivery"

# Delivery Timing

- EFW 3rd-10th percentile, Dopplers normal: 38w0d-39w0d
- EFW <3rd percentile OR <10th percentile with decreased diastolic flow in UA: 37w0d
- AEDV: 33w0d – 34w0d, Cesarean delivery "should be considered"
- REDV: 30w0d - 32w0d, Cesarean delivery "should be considered"

# Conclusions

- Fetal growth restriction is a commonly-encountered clinical entity and providers should be well-versed in counseling patients about etiologies and management.
- Little can be done to prevent or treat growth restriction.
- Goal is to intricately balance maternal and fetal/neonatal risks.
- Careful vigilance can improve outcomes.

# References

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Thank you!

