Understanding FETAL GROWTH RESTRICTION

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OPTUMHealth™ Education

OHS Clinical Educational Series

Understanding Fetal Growth Restriction

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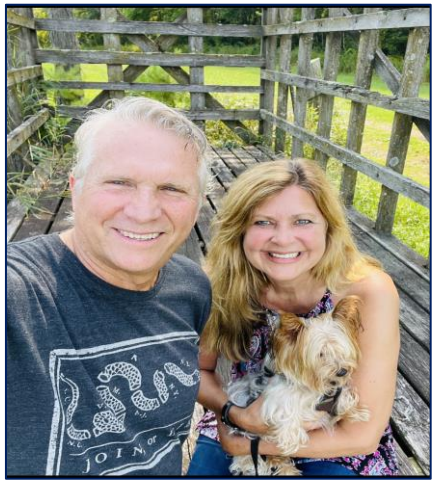
Disclosure Information

- No pertinent financial disclosures or conflicts of interest

Introduction of Faculty

- Dr. Daria Klachko-Totten
- HFS Medical Director
- Optum since 2019
- Trained at Beth Israel Medical Center, NYC
- Clinical interests: The Menopause Transition
- Resides in New Jersey



Objectives

- Discuss the terminology surrounding fetal growth restriction (FGR) versus small for gestational age (SGA).
- Identify the etiologies of intrauterine growth restriction (IUGR).
- Describe perinatal risks, associated screening practices and approaches to the prevention of IUGR.
- Recognize optimal management approaches to IUGR and antenatal testing, including inpatient and outpatient testing options.
- Define potential IUGR-related consequences to the neonate.

Definitions

- Fetal growth restriction is a complex obstetrical problem that affects about 10 percent of pregnancies, and it is the leading cause of infant morbidity and mortality.

FGR: Fetuses who are less than the 10th percentile for gestational age for a singleton pregnancy and/or an abdominal circumference of less that 10th percentile

SGA : Newborns whose birth weight is less than the 10th percentile

Etiology of Fetal Growth Restriction

- Fetal growth restriction can be caused by maternal, fetal and placental issues

- Chromosomal Disorders and Congenital Malformations: 20%
- Suboptimal Perfusion of Maternal Placental Circulation: 25-30%

Maternal Etiologies

Mothers who were growth-restricted at birth have a twofold increase in risk for FGR in their offspring.

Mothers who give birth to a prior SGA newborn have a 20 percent recurrence risk

Maternal Etiologies

- Autoimmune Disease/APA
- Cyanotic Heart Disease
- Pregestational Diabetes
- Chronic Kidney Disease
- Chronic Pulmonary Disease
- Pregestational Diabetes
- Severe Chronic Anemia
- Sickle Cell Disease
- Uterine Malformation
- Pregnancy-related HTN
- Substance Abuse
- Multiple Gestation
- Teratogen Exposure
- Infectious Disease

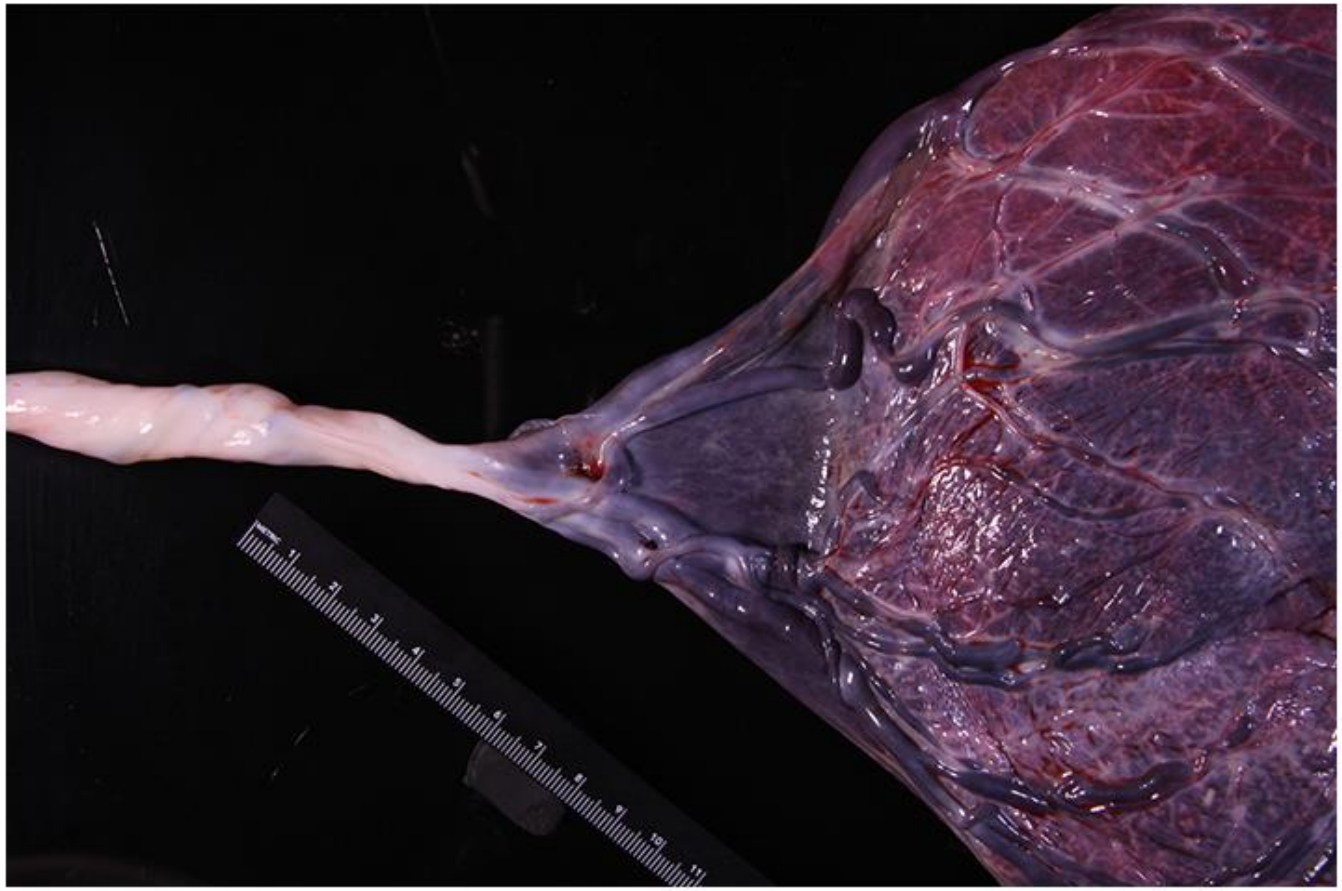
Fetal Etiologies

- Chromosomal Disorders: Trisomy 13, Trisomy 18, single gene mutations, partial deletions or duplications
- Congenital Malformations: Congenital Heart Disease, Gastroschisis

Placental Etiologies

- Abnormal Placentation
- Placental Disorders – abruption, infarction, circumvallate shape, hemangioma and chorioangioma, Chromosomal mosaicism
- Umbilical Cord Disorders- Velamentous, marginal cord insertion, single umbilical artery
- Ischemic Placental Disease

Velamentous insertion of the umbilical cord



The placental end of the umbilical cord consists of divergent umbilical vessels surrounded only by fetal membranes, with no Wharton's jelly.

Courtesy of Drucilla J Roberts, MD.

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Prevention

- Cessation of smoking/alcohol
- Avoidance of short or long interpregnancy interval
- Low Dose ASA for prevention of preeclampsia

Screening For Fetal Growth Restriction

All pregnant women should be evaluated for risks for growth restriction

- History
- Physical
- Fundal Height Measurements
- Ultrasound

Ultrasound

To find the estimated fetal weight four measurements are combined to generate an estimated fetal weight

- Biparietal Diameter
- Head Circumference
- Abdominal Circumference
- Femur Length

* Maternal obesity and fibroids can throw off these measurements making them less accurate.

Evaluation and Management

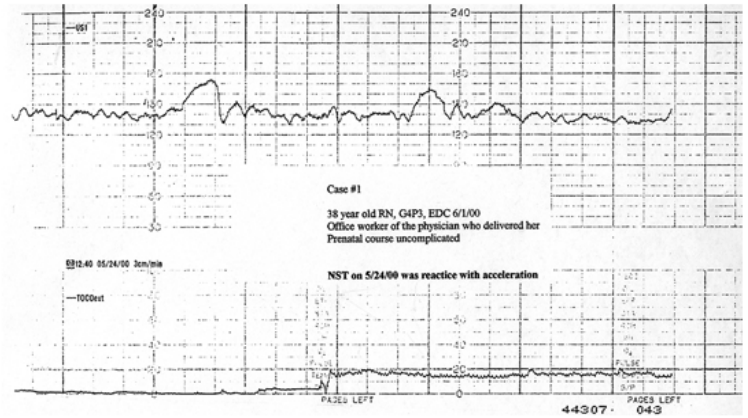
- Increased Antenatal Surveillance
  - Serial ultrasounds for growth and fluid
    - NST
    - BPP
    - Doppler Studies

The Non-Stress Test

- Identify fetuses at risk of hypoxic injury or death

- Identify normally oxygenated fetuses so pregnancy can be continued safely

Reactive nonstress test performed 8 days before the patient's estimated delivery date



Reactive nonstress test. The baseline fetal heart rate is between 130 and 140 beats per minute. There are two accelerations >15 beats per minute; one peaks at approximately 170 beats per minute and the other peaks at approximately 160 beats per minute. The duration of each acceleration exceeds 20 seconds. Variability is moderate (6 to 25 beats per minute).

The top tracing is the fetal heart rate. The y-axis reflects the fetal heart rate measured in beats per minute. The x-axis reflects time; each of the smallest divisions represents 10 seconds with one minute between bold vertical lines.

The bottom tracing shows the frequency and duration of uterine contractions.

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Biophysical Profile

Nonstress test

Fetal Breathing Movements

Fetal Movements

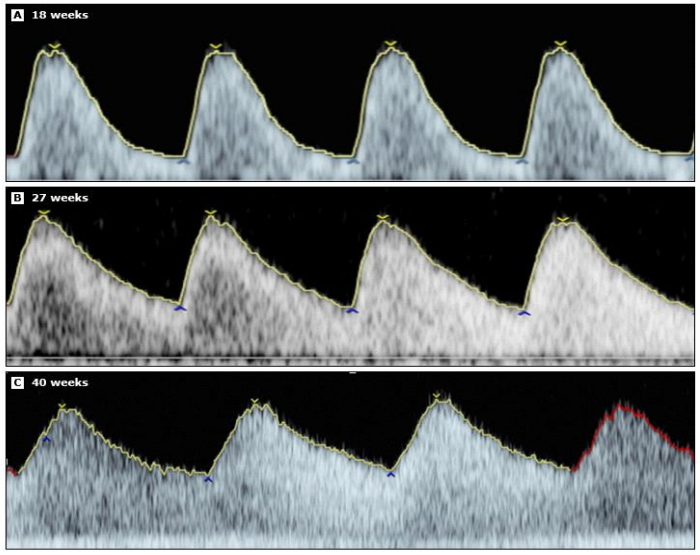
Fetal Tone

AFI

Doppler Velocimetry

A noninvasive technique used to look at vascular resistance in pregnancies complicated by FGR.

Umbilical artery Doppler waveforms with advancing gestational age in fetuses of appropriate size for gestational age



Note that the diastolic flow (valleys between peaks) increases with advancing gestation.

Courtesy of Giancarlo Mari, MD.

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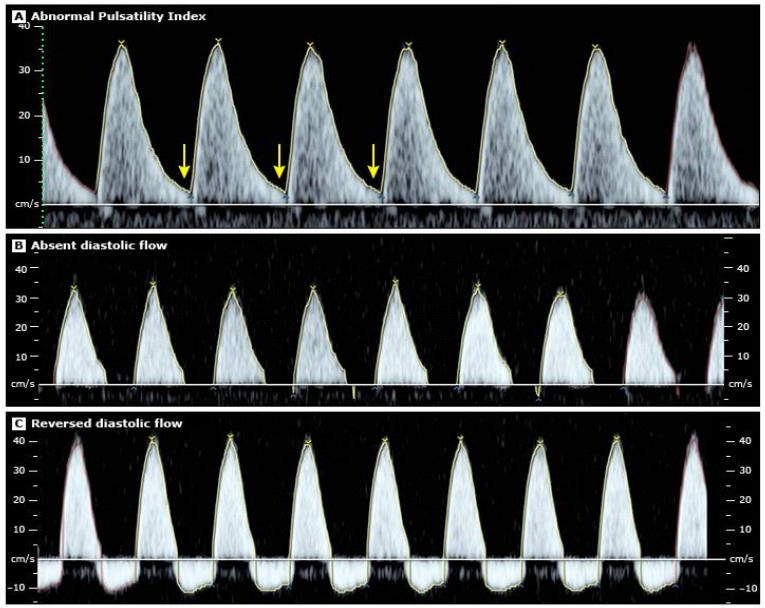
Umbilical artery Doppler flow velocity waveforms in fetal growth restriction



Note the low diastolic flow (arrows) in panel A, absent diastolic flow in panel B, and reversed diastolic flow in panel C.

Courtesy of Giancarlo Mari, MD.

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Frequency of Testing

Growth scans – every 3-4 weeks

BPP and Doppler – 1-2 times per week

* More frequent intervals with abnormal testing

Management: Outpatient vs Inpatient

- Can maintain normal activities
- No evidence that bedrest improves outcomes
- Can usually be monitored as outpatients
- No data to base indications for hospitalization
- Consider hospitalization when more frequent testing is indicated (ie. absent/reverse doppler flow)
- Consider hospitalization with concurrent conditions
- Make decisions on case-to-case basis

Management : Interventions

Antenatal Steroids

Administer Betamethasone

May transiently improve blood flow

Maternal Interventions

Nutritional supplementation, oxygen therapy, ASA, bedrest and anticoagulation does not appear to change outcomes

Timing of Delivery

- Depends on etiology, gestational age, and antenatal fetal surveillance
- Multidisciplinary approach (NICU, MFM)
- Maximize growth
- Minimize the risk of fetal/neonatal mortality

Timing of Delivery

Normal umbilical artery doppler

- - 3rd to 10th percentile- Delivery at 38- 39 weeks gestation
- - less than 3rd percentile- Delivery at 37 weeks gestation

Abnormal Umbilical Artery Doppler

- Based on severity of findings and gestational age
- Decisions are individualized

Route of Delivery

- Vaginal delivery preferred route (ie. NST/BPP normal)
- Ok to induce, even with unfavorable cervix
- Persistent reversed flow of UA- give option for Cesarean section

Intrapartum Management

- Continuous intrapartum monitoring in labor
- Frequency of cesarean delivery for non-reassuring fetal heart rate tracing is increased
- Abnormal Doppler velocimetry increases risk of Fetal Heart Rate abnormalities

Perinatal Morbidity and Mortality

- Increased risk of IUFD, neonatal morbidity, and neonatal death
- Fetal weights less than 5th percentile- 2.5 percent risk of stillbirth
- Prognosis worsens with early onset FGR and absent of reversed end diastolic flow
- Increased risk of premature birth

Neonatal Complications

- Hypoglycemia
- Hyperbilirubinemia
- Hypothermia
- Intraventricular Hemorrhage
- Necrotizing Enterocolitis
- Seizures
- Sepsis
- Respiratory Distress Syndrome
- Neonatal Death

Long Term Sequela

- Obesity
- Metabolic Dysfunction
- Insulin Sensitivity
- Type 2 Diabetes
- Cardiovascular Disease
- Renal Disease
- Long term Cognitive Dysfunction

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