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# Fetal Growth Abnormalities

## Objectives:

- define macrosomia and fetal growth restriction.
- describe the etiologies of abnormal growth.
- list methods of detection for fetal growth abnormalities.
- describe the management of fate growth abnormalities.
- listed the associated morbidities and mortalities of fetal growth abnormalities

Refrences: hacker and moor + kaplan and APGO video + 433 team.

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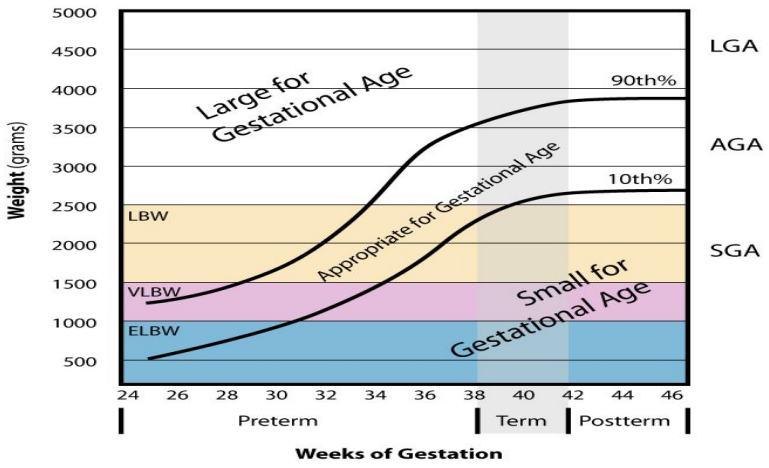
# Intrauterine Growth Restriction:

**Common Definition of (IUGR):** Fetus with estimated fetal weight (EFW) <5–10%ile for gestational age. This assumes the fetus is not growing to its genetic potential.

**Birth Weight Definition of (IUGR):** <2,500 grams (5 lb, 8 oz). Clearly, neonatal morbidity and mortality are affected by lowering birth weight. However, 70% of these fetuses are constitutionally small.




**The significance** is to identify infants who are at risk of implications "morbidity and mortality".
Alteration of fetal growth may have "short-term" and "long-term" implications.
Short-term: Lack of adequate reserve to continue intrauterine or even undergo the stress of labor.
Long-term: Cardiovascular disease, insulin resistance, and Obesity.

| TYPES OF Intrauterine Growth Restrictions | |
|---|---|
| **Early –Onset "symmetric"** Growth Restriction (<32 w) | **Late-Onse "Asymmetric"** Growth Restriction (>32 w) |
| "Growth secondary to **hyperplasia**" Thus irreversible.<br>associated maternal factor:<br>Infection, Smoking, multiple pregnancies, chronic maternal<br>the commonest infection associated with IUGR is cytomegalovirus (CMV).<br>- Mother may have complained of flu-like illness -<br>Fetus has sonographic findings compatible with CMV (e.g. microcephaly and cerebral calcification).<br><br>**The principle differential diagnosis is:**<br>(a)**Chromosomal** abnormality or some other genetic problem<br>(b)**Congenital** infection<br>(c)**Uteroplacental** dysfunction | "Growth secondary to **hypertrophy**" Thus reversible.<br>More amenable to the restoration of fetal size with adequate nutrition.<br><br>Most likely cause is uteroplacental insufficiency, often associated with the development of pre-eclampsia. |

| TYPES OF presenting Intrauterine Growth Restrictions | |
|---|---|
| **Symmetric IUGR**<br>• Head and abdomen both small<br>• Etiology: Fetal **(decreased growth potential)**<br>• Decreased growth potential<br>• All ultrasound parameters[1] **are smaller than expected.**<br>• Workup: detailed sonogram, karyotype, and screen for fetal infections.<br>• Antepartum tests are usually normal. | **Asymmetric IUGR**<br>• Head normal; abdomen small<br>• Etiology: Maternal + Placental **(Decreased placental perfusion)**<br>•Amniotic fluid index is often decreased, "especially if uteroplacental insufficiency is severe".<br>• Monitoring is with serial sonograms, non-stress test, AFI, biophysical profile, and umbilical artery Dopplers |

| | |
|---|---|
| Fetal Causes: **"Symmetric"** | aneuploidy ( T21, T18, T13); infection (TORCH/also could be malaria.), structural anomalies (congenital heart disease, neural tube defects, ventral wall defects).<br>Increased nuchal translucency is associated with aneuploidy and anomalies |
| Placental Causes: **"Asymmetric"** | primary placental disease (chorioangioma, mosaicism) or infarction, abruption,TTTS, velamentous cord insertion. |
| Maternal Causes: **"Asymmetric"** | hypertension (chronic, preeclampsia), small vessel disease (SLE, Chronic DM1), malnutrition, tobacco> 10 cigarettes/ day is significant, alcohol, street drugs, antiphospholipid syndrome[2], Infections (viral, protozoal), Teratogen exposure. |

## Risks on fetus:

**Intrapartum:** fetal heart rate abnormalities, C-sec. , Low Apgar scores, Cord blood acidemia.
**Neonatal:** Polycythemia, Hyperbilirubinemia, Hypoglycemia, Hypothermia, Apneic episodes.
**Long term:** Largely dependent on the etiology of the IUGR and the gestational age at delivery, a Lifelong increased risk of cardiovascular disorders, insulin resistant, obesity.

## Diagnosis:

- ➔ The **key screening tool** for fetal growth disorders in low-risk women is the assessment of uterine size by fundal height measurement and clinical palpation of estimated fetal weight. "Not accurate".
- ➔ **Ultrasonography** is **the gold standard to assess fetal weight** (by the growth parameters).
  - Biparietal diameter (BPD) "alone assess fetal size".
  - Head circumference (HC) • Femur length (FL) • Abdominal circumference(AC)

  all together are an estimate of fetal weight
- ➔ Umbilical artery Doppler velocimetry
  Abnormal umbilical Doppler (absent or reversed end diastolic flow) can help predict fetuses at increased risk of poor fetal outcome.
- ➔ Uterine artery systolic /diastolic (S/D): evaluate the fetal-placental circulation, as placental resistance increases the diastolic flow decreases, therefore, there is an increase in S/D ratio.

[1] Biparietal diameter (BPD) "assess fetal size". BPD + head circumference (HC), abdominal circumference (AC), and femur length (FL) are an estimate of fetal weight.
[2] If had a prior IUGR infant, low-dose aspirin (81 mg/day) in early pregnancy may reduce the likelihood of recurrent IUGR.

**Absent / reversed end-diastolic flow predicts worse prenatal outcomes** and its usually an indicator for delivery.

➔ middle cerebral artery (MCA Doppler): its refluxes fetal adaptation this is because the fetus always tries to spare the brain circulation. when there is a decrease in placental perfusion, there is an increase in MCA flow.

## Management:

An important part of preventive medicine is to anticipate the risk for women with a prior infant with IUGR, and to consider interventions before a woman plans her next pregnancy. Improving nutrition and stopping smoking are two approaches that should improve fetal growth.

## ANTEPARTUM CARE.

### NOTE THAT :

- the goal is to expedite delivery before compromise and after lung maturation; This requires regular **fetal monitoring** with a twice-weekly **nonstress test (NST) and biophysical profile.**

### Fetal monitoring:

Monitoring the growth-restricted fetus involves serial fetal measurement

Abdominal circumference - Amniotic fluid index - Cardiotocography - Doppler ultrasound

*Fetuses with absent end-diastolic flow are **hypoxaemic**, these changes may appear up to 5 weeks before demise

*Reversed end-diastolic flow is suggestive of preterminal compromise; the fetus may die within 1-2 days if not delivered.

**Fetal monitoring -> normal.** DO **Ultrasonography** ->

a) **normal** growth, no clinical intervention.

b) **abnormal** strongly suggests IUGR -> delivery is indicated at gestational ages of 34 weeks. assess Pulmonary maturity by amniocentesis, but If severe oligohydramnios -> delivery should be strongly considered without assessment of lung maturity. These fetuses are at great risk of asphyxia, and the stress associated with IUGR usually accelerates fetal pulmonary maturity.

c) **ambiguous** (equivocal for IUGR -> bed rest (w/ kick counting), fetal surveillance, and serial U/S measurements at 3-weekly intervals are indicated to avoid preterm delivery.

### Amniotic Fluid Index:

Fetal urine production is significantly lower in the SGA fetus than in the AGA fetus. Decreased renal perfusion results in oligohydramnios

### Biophysical Profile:

1. Breathing
2. Tone
3. Movement
4. Amniotic fluid volume
5. Cardiotocography

   * Requires about 40 mins observation of fetal breathing movements. (Takes time not for every fetus only suspected IUGR)

   * A persistently abnormal biophysical score is associated with the absence of end-diastolic flow.

IUGR per se is not a contraindication to induction of **labor**, but there should be a low threshold to perform a cesarean delivery because of the poor capacity of the IUGR fetus to tolerate asphyxia.

**After birth**; **a)Examine:** to rule out the possibility of congenital anomalies and chronic infections. **b)Monitor:** **blood glucose levels** because the fetuses do not have adequate hepatic glycogen stores, and hypoglycemia is a common finding. Furthermore, **hypothermia** is not uncommon in these infants. **Respiratory distress syndrome** is more common in the presence of fetal distress because fetal acidosis reduces surfactant synthesis and release.

## NOTE THAT :

- the goal is to expedite delivery before compromise and after lung maturation.
- The timing of delivery should be based on the results of the antenatal testing, fetal growth pattern, dopplers, and gestational age. .

# B: Macrosomia

Fetus with estimated fetal weight (EFW) >90–95%ile for gestational age. (EFW) ⍰ 4000-4500 grams.

### Causes:

**Maternal:** History of macrosomia pregnancy, increase in pregnancy weight gain, multiparity, prolonged gestation, gestational diabetes, overt diabetes , obesity.
**Fetal:** Male, beckwith-widemann syndrome.

### Risks:

**Maternal:** Postpartum hemorrhage, vaginal or perineal laceration, operative delivery, C-sec, Pelvic floor injury.
**Fetal:** Shoulder dystocia, clavicular fracture, lower Apgar score, obesity later in life.
**Neonatal:** NICU admission, hypoglycemia, Erb palsy.

### Diagnosis:

Fundal height measurement and clinical palpation of estimated fatal weight “however still poor”.
U/S used to rule it macrosomia out, “associated with a significant error in macrosomia”.

### Management:

Elective cesarean (**if EFW >4,500 g in diabetic mother** or **>5,000 g in nondiabetic mother**)
Not induction of labor cz may result in increased cesarean delivery rate due to failure of induction.

# Case

A 20 year-old G2P1 African-American woman is referred to you from her family physician for an obstetrics consultation. She is **currently 35 0/7** weeks based on a certain LMP with regular 28 day cycles. At her last prenatal visit, **her fundal height measured 30 cm**. In taking her history about her prior delivery, she tells you that she delivered 3 weeks before her due date, but that her baby was small, weighing 2400 grams. She does not report any other pregnancy complications. **She smokes** 2 packs of cigarettes a day and has **gained 8 pounds during this pregnancy.**
Physical Exam: **BP 110/70**; fundal height is 30 cm. Fetal heart tones are present

Obstetrical Ultrasonography Report:
Fetal number: Single
Position: Cephalic
Placenta: Anterior
Amniotic fluid volume: Normal

Fetal biometry:
BPD: 82.9 mm = 33.3 ± 3.1 weeks
HC: 299.7 mm = 33.2 ± 3.0 weeks
AC: 274.0 mm = 31.5 ± 3.0 weeks
FL: 58.0 mm = 30.3 ± 3.0 weeks
Humerus: 51.2 mm = 29.9 ± 2.8 weeks
Estimated fetal weight = 1700 ± 308 grams, **less than the 10th percentile** at 34.9 weeks
Fetal Anatomy: Normal
Umbilical artery Doppler Flow: S/D ratio = 2.66 (normal)

**1. How do you interpret the ultrasound?**

• Based on the sonographic findings of parameters, “smaller than anticipated” the fetus qualifies for a diagnosis of IUGR.

**2. What can you tell the patient is the possible etiology of the IUGR?**

• Maternal Factors:
§ Medical conditions (hypertension, renal disease, diabetes, vascular/autoimmune disease)
§ Substance use and abuse (tobacco, alcohol, cocaine)
§ Infections (viral, protozoal)
§ Teratogen exposure
• Fetal Factors:
§ Small constitutional size
§ Genetic & structural abnormalities
§ Multifetal gestation
• Placental Factors:
§ Primary placental disease (chorioangioma, mosaicism)
§ Abnormal placentation (previa, abruption, hematoma)

**3. The patient asks you why the fetal growth problem was not detected earlier. What are the methods to screen and diagnose fetal growth disorders?**

• A review of the pregnant patient's medical and obstetrical history is needed to determine whether she is at risk for abnormal fetal growth. Fetal anatomic survey will also screen for fetal and placental findings.

• **The key screening tool for fetal growth disorders in low risk women is** assessment of uterine size by fundal height measurement. However, fundal height assessment is not accurate as a diagnostic tool.

• Ultrasonography is the gold standard to assess fetal weight.

• Umbilical artery doppler velocimetry: (absent or reversed end diastolic flow) can help predict fetuses at increased risk of poor fetal outcome

**4. What would you tell the patient are the potential consequences of IUGR?**

• The primary concern regarding IUGR is an increase in perinatal morbidity and mortality. The risk of stillbirth is dependent on gestational age and the primary etiology. In addition, both intrapartum and neonatal complications may increased, depending on the gestational age at delivery.

• Intrapartum:

§ Increased risk of fetal heart rate abnormalities

§ Cesarean delivery

§ Low Apgar scores

§ Cord blood acidemia

• Neonatal:

§ Polycythemia

§ Hyperbilirubinemia

§ Hypoglycemia

§ Hypothermia

§ Apneic episodes

• Longterm:

§ Lifelong increased risk of cardiovascular disorders

**5. How would you approach managing this patient?**

• Once IUGR is suspected/confirmed, **serial sonographic assessments to monitor fetal growth is indicated every few weeks.**

• If the pregnancy is remote from term, periodic antenatal fetal testing is indicated (Biophysical profile **[BPP], modified BPP, Non-stress test,** are all acceptable)

• The timing of delivery should be based on the results of the antenatal testing, fetal growth pattern,
dopplers, and gestational age.