FGR

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• Fetal growth restriction (FGR, also called intrauterine growth restriction [IUGR]) is the term used to describe a fetus that has not reached its growth potential because of environmental factors. The **origin** of the problem may be fetal, placental, or maternal, with significant overlap among these entities.

•This is ***important*** because these ***fetuses are at increased risk of adverse perinatal outcome***. In addition, FGR appears to be ***an antecedent to some adult-onset disorders, including hypertension, hyperlipidemia, coronary heart disease, and diabetes mellitus (Barker hypothesis)***

•The most common obstetric definition of FGR is based on sonography: an estimated fetal weight below the 10th percentile for gestational age

• When a small fetus is detected, it can be difficult to ***distinguish between the fetus that is constitutionally small versus growth restricted.***
• It is also difficult to ***identify the fetus that is not small but growth restricted relative to its genetic potential***. Making the correct diagnosis is not always possible prenatally but is important ***prognostically and for estimating the risk for recurrence.***

- The most common obstetric definition of FGR is an estimated weight below the 10^{th} percentile for gestational age in the second half of pregnancy , although other definitions employing a variety of criteria have been advocated (eg, $<5^{th}$ percentile, $<3^{rd}$ percentile)

- ***Accurate information*** regarding ***gestational age*** is critical to the diagnosis of FGR

- IT is important to distinguish FGR from SGA

SGA babies are due to constitutional factors and placental function is NL.

We have overlap between these two entities but it is important to distinct them because of different management

•These babies are usually small due to constitutional factors and are usually associated with normal placental function.

•There is considerable overlap between these two definitions: an IUGR baby is usually SGA, but not necessarily so and not all SGA babies are IUGR. A distinction between the two is important clinically as they have different causes and implications and often require different management

we recommend ***risk assessment*** for impaired fetal growth and ***serial fundal height measurements at each prenatal visit***, to employ interventions to reduce the morbidity and mortality associated with this problem

Causes of and risk factors for fetal growth restriction

- ***MATERNAL***
- ***FETAL***
- ***PLACENTAL***

MATERNAL

- Preeclampsia
- Multiple gestation
- Chronic hypertension
- Chronic kidney disease
- Pregestational diabetes mellitus
- Systemic lupus erythematosus and antiphospholipid syndrome
- Cyanotic heart disease
- Chronic pulmonary disease
- Malabsorbtive dis./malnutrition
- Sickle cell disease
- Uterine malformations
- Misuse of alcohol, cigarettes, and/or drugs (eg, heroin, cocaine)
- Heavy first trimester antepartum bleeding

FETAL

- *Fetal genetic abnormalities*
- *Fetal infection*
- *Fetal structural anomaly*

Teratogens

PLACENTAL

- *Ischemic placental disease*
- *Abruptio placenta &infarction*
- *placental PREVIA*
- *placental mosaisem*

- The diagnosis of FGR is based on ***discrepancies between actual and expected sonographic biometric measurements for a given gestational age.***

- ***Traditionally, it has been defined as <10th percentile weight for gestational age on a singleton growth curve,*** as this establishes the diagnosis as being small for gestational age (SGA).

• In our practice, when a fetus<10th percentile weight for gestational age is identified, ***we monitor fetal growth and fetal physiology over time.***

•A normal growth trajectory, normal Doppler velocimetry of the umbilical artery, and normal amniotic fluid volume suggest a constitutionally small fetus or minimal fetal impact from uteroplacental insufficiency.

Characteristics that support a diagnosis of a ***constitutionally small fetus*** include modest smallness (ie,

1. estimated weight between the 5th and 10th percentiles),
2. normal growth velocity across gestation,
3. normal physiology (ie,
4. normal amniotic fluid volume and
5. umbilical artery Doppler),
6. abdominal circumference growth velocity above the lowest decile, and
7. appropriate size in relation to maternal characteristics (height, weight, race/ethnicity), which have a major influence on fetal growth potential.

Customized growth curves:

Customized growth curves account for nonpathologic maternal factors that affect birth weight. Estimated fetal weight is plotted on a customized growth curve that ***reflects the specific fetus's growth potential*** based on the ***mother's height, prepregnancy weight, parity, and ethnicity,*** all strong contributors to birth weight . ***This approach may more reliably distinguish those fetuses who are truly growth restricted and at increased risk of morbidity and mortality from those who are small but normal.***

Fetal survey

- A detailed fetal anatomic survey
- fetal echocardiogram
- Fetal genetic studies

A detailed fetal anatomic survey should be performed in all cases since approximately 10 percent of FGR is accompanied by congenital anomalies and 20 to 60 percent of malformed infants are small for gestational age .

Anomalies associated with FGR include

A. omphalocele,
B. gastroschisis,
C. diaphragmatic hernia,
D. skeletal dysplasia, and
E. some congenital heart defects

A fetal echocardiogram is indicated if results of an expert ultrasound examination suggest any uncertainty that the heart is normal.

Information from the maternal history and from a customized growth curve and assessment of amniotic fluid volume may improve diagnostic performance by helping to distinguish between the constitutionally small fetus, the growth-restricted fetus, and the fetus that is not small but not achieving its growth potential

Findings on ***Doppler velocimetry of the umbilical artery*** are insensitive diagnostically but predictive of outcome .

it is reasonable to assume that a small fetus with a normal growth curve over three weeks, normal amniotic fluid volume, and normal Doppler velocimetry is at low risk of FGR and complications associated with FGR, especially in the absence of risk factors for FGR, whereas ***the small fetus with a lagging growth curve, oligohydramnios, and maternal risk factors for FGR is probably affected and at high risk of complications if Doppler velocimetry is abnormal***

Fetal genetic studies:

- ***Early (<24 weeks), (<5th percentile), symmetrical FGR.***

- ***Major fetal structural abnormalities.***

- No structural abnormalities but presence of ***soft ultrasound markers associated with an increased risk of aneuploidy,*** such as thickened nuchal fold/choroid plexus cyst and abnormal hand positioning.

•the finding of symmetrical FGR prior to 24 weeks of gestation is associated with a high risk of aneuploidy.

•After 24 weeks, we does not screen for fetal genetic abnormalities if anatomy is normal and FGR is asymmetric (the etiology is most likely a maternal or placental disorder, and pregnancy termination is generally not an option)

Work-up for infection

- When infection is ***suspected clinically*** because of ***maternal history, physical examination or fetal ultrasound findings***, ***maternal serum should be examined for seropositivity (and evidence of acute infection if positive).***

Infections associated with FGR include ***cytomegalovirus, toxoplasmosis, rubella, and varicella.***

Amniotic fluid DNA testing can also be performed for specific infections, when indicated by the clinical setting.

• Sonographic markers for fetal infection are often nonspecific, but include echogenicity and calcification of the brain and/or liver, and ***hydrops***.

•Malaria in pregnancy can also cause FGR.

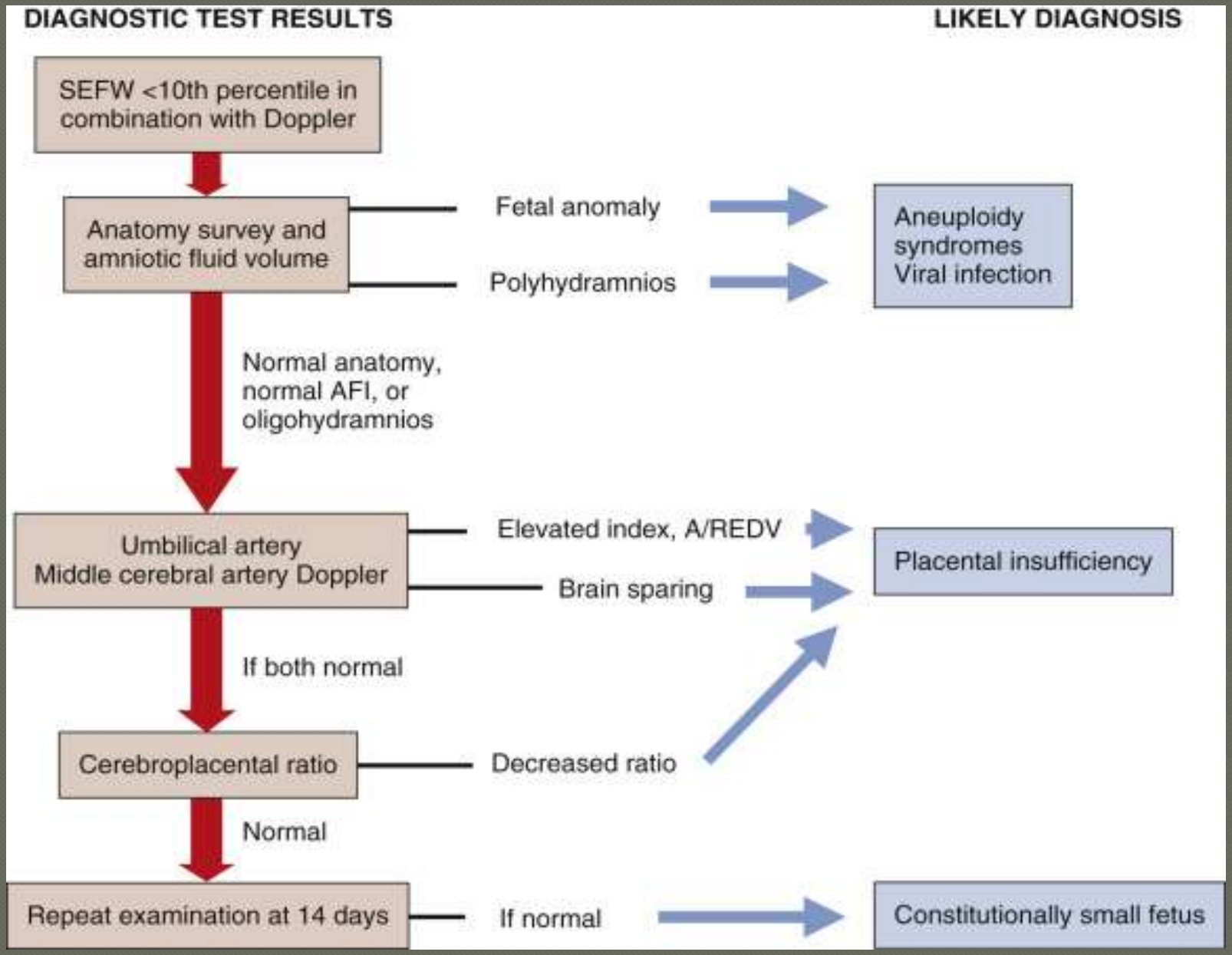
Assessment for ***inherited thrombophilic disorders is not recommended,*** as evidence for an association between the inherited thrombophilias and FGR is weak .

However, ***antiphospholipid syndrome, an acquired thrombophilia, is clearly associated with FGR.***

Table 6 Consensus-based definitions for early and late fetal growth restriction (FGR) in absence of congenital anomalies

Early FGR: *GA < 32 weeks, in absence of congenital anomalies*	*Late FGR:* *GA ≥ 32 weeks, in absence of congenital anomalies*
AC/EFW < 3rd centile *or* UA-AEDF	AC/EFW < 3rd centile
Or 1. AC/EFW < 10th centile *combined with* 2. UtA-PI > 95th centile *and/or* 3. UA-PI > 95th centile	*Or at least two out of three of the following* 1. AC/EFW < 10th centile 2. AC/EFW crossing centiles >2 quartiles on growth centiles* 3. CPR < 5th centile *or* UA-PI > 95th centile

*Growth centiles are non-customized centiles. AC, fetal abdominal circumference; AEDF, absent end-diastolic flow; CPR, cerebroplacental ratio; EFW, estimated fetal weight; GA, gestational age; PI, pulsatility index; UA, umbilical artery; UtA, uterine artery.


DIAGNOSTIC TEST RESULTS
LIKELY DIAGNOSIS
SEFW <10th percentile in combination with Doppler
Anatomy survey and amniotic fluid volume
Fetal anomaly
Polyhydramnios
Aneuploidy syndromes Viral infection
Normal anatomy, normal AFI, or oligohydramnios
Umbilical artery Middle cerebral artery Doppler
Elevated index, A/REDV
Brain sparing
Placental insufficiency
If both normal
Cerebroplacental ratio
Decreased ratio
Normal
Repeat examination at 14 days
If normal
Constitutionally small fetus

THANKS FOR ATTENTION