
بسم الله الرحمن الرحيم

fetal growth restriction

Evaluation and management

Dr kh.Nasri
Ob&gyn specialist/perinatalogist
Assistant Professor of Arak university

Definition

- Intrauterine growth retardation (SGA) occurs when the unborn baby is below the 10th weight percentile for a population or customized standard

- Failure of the fetus to reach growth potential : stillbirth, neonatal death and perinatal morbidity

Classification

Newer Classification: -

1. **Normal small fetuses-** have no structural abnormality, normal umbilical artery & liquor but wt., is less.They are not at risk and do not need any special care.

2. **Abnormal small fetuses-** have chromosomal anomalies or structural malformations.

3. **Growth restricted fetuses-** are due to impaired placental function.Appropriate & timely treatment or termination can improve prospects.

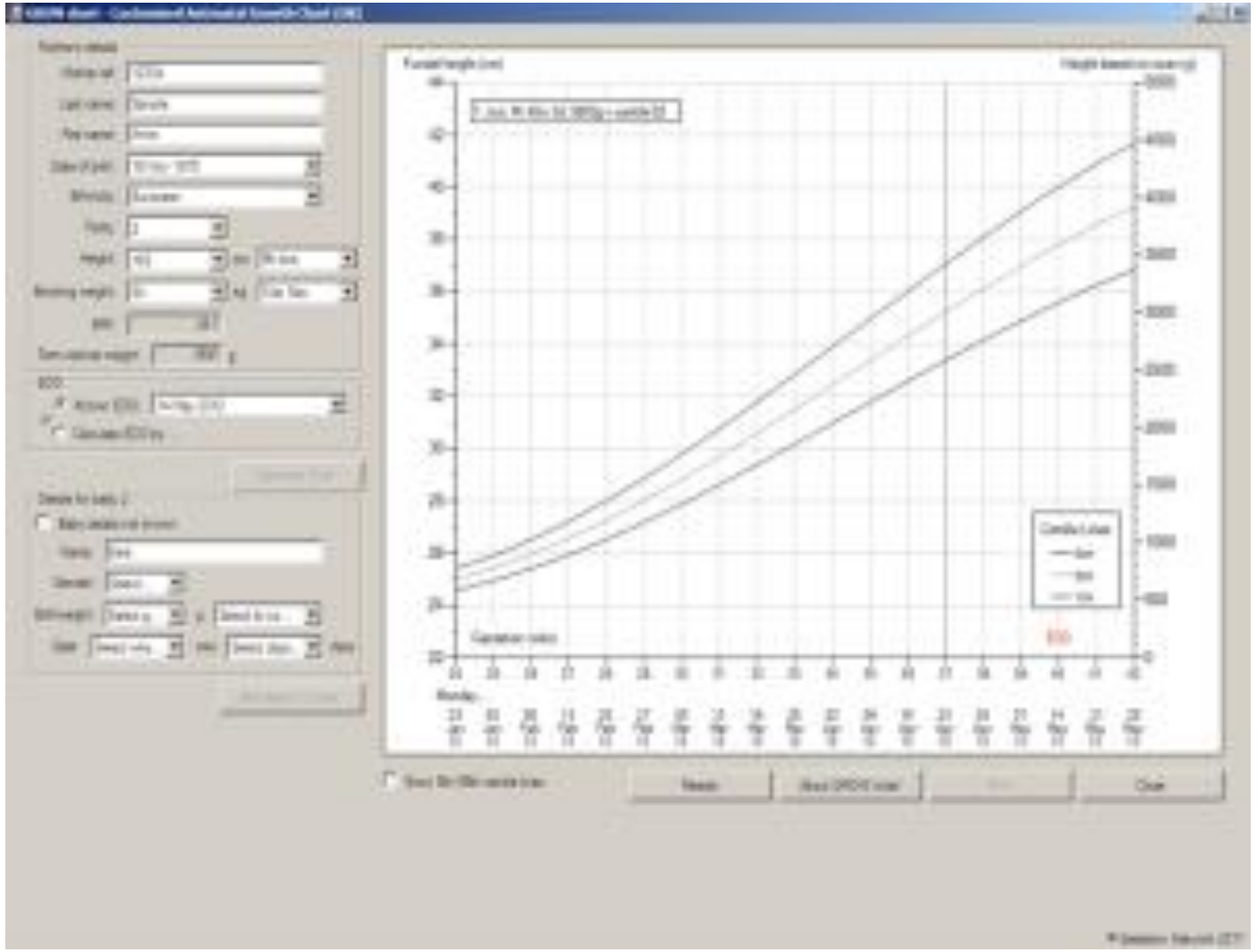
FETAL GROWTH EVALUATION

-FH assesment:sensitivity 60-85%

-positive predictive value 20-80%

1. Mother semi-recumbent, with bladder empty.

Plot on customised chart, record in notes



All guidelines highlight

the importance of an accurate assessment of gestational age to determine whether the pregnancy is complicated by FGR or is possibly misdated.

Definition of FGR on ultrasound

EFW <10th customized centile, or AC <10th · AC <5th

EFW <3rd centile, abnormal UA, uterine artery, MCA or CPR

oligohydramnios or reduced interval growth

Change in AC of <5 mm over 14 d

Early FGR : Delphi consensus

Early FGR: GA < 32 weeks, in absence of congenital anomalies.

1. *AC/EFW < 3rd centile or UA-AEDF*

or

2. *AC/EFW < 10th centile combined with*
   - ✓ *UtA-PI > 95th centile*

   and/or
   - ✓ *UA-PI > 95th centile .*

Late FGR: Delphi consensus

Late FGR: GA ≥ 32 weeks, in absence of congenital anomalies

- **AC/EFW < 3rd 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 centile**
3. **CPR < 5th centile or UA-PI > 95th centile**

در سن بارداری کمتر از ۳۲ هفته	در سن بارداری مساوی یا بیشتر از ۳۲ هفته
- اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۳٪ یا فقدان جریان خون پایان دیاستولی (AEDF) در داپلر شریان نافی - اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۱۰٪ به همراه یکی از موارد زیر: o PI متوسط شریان رحمی بیش از ۹۵٪ یا o PI متوسط شریان نافی بیش از ۹۵٪	- اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۳٪ و یا - وجود حداقل دو معیار زیر: o اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۱۰٪ o کاهش صدک اندازه دورشکم و وزن تخمینی جنین به میزان دو چارک o نسبت PI شریان مغزی میانی به PI شریان نافی (CPR) کمتر از ۵٪ یا PI شریان نافی بیش از ۹۵٪

مدیریت IUGR

مرحله	پاتوفیزیولوژی	معیار (هر کدام از)	ارزیابی (حداقل فاصله زمانی)	زمان ختم بارداری	نوع زایمان
I IUGR	کوچکی شدید و یا نارسایی خفیف جفت	EFW<3rd centile CPR<P5 UA PI>P95 MCA PI<P5 UtA PI>P95	- سونوگرافی بیومتری هر دوهفته یکبار - داپلر هر هفته یکبار - بیوفیزیکال پروفایل دوبار در هفته	۳۷ هفته	القای زایمان
II IUGR	نارسایی شدید جفت	UA AEDV Reverse AoI	-داپلر و بیوفیزیکال پروفایل دو بار در هفته - NST روزانه	۳٤ هفته	سزارین. در صورت زایمان واژینال، مانیتور دائم در تمام مراحل
III IUGR	زوال پیشرفته جنین ، احتمال کم اسیدوز جنین	UA REDV DV PI>p95	-داپلر، بیوفیزیکال پروفایل و cCTG حداقل هر ٤٨-٢٤ ساعت	۳۲ هفته	سزارین
IV IUGR	احتمال بالای اسیدوز جنین و خطر بالای مرگ جنین	DV reverse a flow cCTG<3ms FHR decelerations	مانیتورینگ مستمر ضربان قلب جنین	۲٦ هفته	سزارین

EFW: Estimated Fetal Weight
CPR: Cerebroplacental Ratio
UA: Umbilical Artery
PI: Pulsatility Index
MCA: Middle Cerebral Artery
ADF: Absent Diastolic Flow
AEDF: Absent End Diastolic Flow
DV: Dactus Venosus
UtA: Uterine Artery
AoI: Aortic isthmus Index

Determining the cause

a complete history and physical examination for maternal disorders,

obstetrical imaging and laboratory evaluations to look for fetal and placental etiologies

Fetal survey

A detailed fetal anatomic survey should be performed in all cases since approximately 10 percent of FGR is accompanied by congenital anomalies

Anomalies associated with FGR include omphalocele, gastroschisis, diaphragmatic hernia, skeletal dysplasia, and some congenital heart defects.

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

Fetal genetic studies

- Early (<24 weeks), severe (<5th percentile), symmetrical FGR
- Major fetal structural abnormalities
- No structural abnormalities but presence of **soft ultrasound markers** associated with an increased risk of aneuploidy

Work-up for infection

- cytomegalovirus, toxoplasmosis, rubella, and varicella.

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

antiphospholipid syndrome, an acquired thrombophilia, is clearly associated with FGR

PREGNANCY MANAGEMENT

The optimal management of the pregnancy with suspected growth restriction related to uteroplacental insufficiency **has not been established**

Serial ultrasound evaluation of

- fetal growth,
- fetal behavior biophysical profile [BPP]

- impedance to blood flow in fetal arterial and venous vessels (**Doppler velocimetry**) represent the ***key elements*** *of fetal assessment and* ***guide pregnancy management decisions***

Serial sonograms are obtained at two- to four-week intervals to ascertain the growth velocity

the longer is appropriate for the fetus with mild FGR (eg, EFW near the 10thpercentile, normal amniotic fluid volume, normal Doppler findings

with a shorter interval for the fetus with features of moderate or severe disease (eg, EFW ≤5th percentile, oligohydramnios, abnormal Doppler findings)

Doppler velocimetry

Umbilical artery

- The Society for Maternal-Fetal Medicine suggests umbilical artery Doppler every one to two weeks initially, **and if normal**,
- the interval can be lengthened

- The two-week interval is reasonable:
  - EFW ≥5th percentile
  - normal growth velocity
  - normal AF
  - no maternal risk factors for placental dysfunction

If umbilical artery diastolic flow is present but decreased (pulsatility index >95th percentile)

weekly Doppler to look for progression to absent or reversed flow

Absent or reversed end diastolic flow in the umbilical artery can be a sign of impending fetal cardiovascular and metabolic deterioration

Middle cerebral artery

Cerebroplacental ratio

CPR is the MCA pulsatility index (or resistance index) divided by the umbilical artery pulsatility index (or resistance index).

A low CPR indicates fetal blood flow redistribution (brain sparing) and is predictive of adverse neonatal outcome

the most appropriate threshold CPR value for predicting adverse outcome and the potential role of CPR in management of pregnancies complicated by FGR in late pregnancy require additional study before this ratio can be recommended for routine clinical use in FGR pregnancies

Ductus venosus

absent or reversed flow in the ductus venosus (absent or reversed a wave) or pulsatile umbilical venous flow, are late findings, generally occurring about two weeks after changes are observed in the arterial circulation.

Nonstress test and biophysical profile

the nonstress test with amniotic fluid volume determination

- If the nonstress test is used, amniotic fluid volume assessment should also be performed weekly

the BPP or a combination of both tests is reasonable for monitoring fetal well-being.

the BPP as it evaluates both acute and chronic fetal physiologic parameters,

FGR and oligohydramnios increased risk of perinatal mortality

Conversely, normal amniotic fluid volume is **infrequently** associated with either FGR or **fetal demise**, unless the cause is a congenital malformation or aneuploidy

Frequency

- **If Doppler indices are normal**, this provides strong evidence of fetal wellbeing, especially in the absence of risk factors for, or signs of, uteroplacental insufficiency. **If growth velocity is normal as well, we do not order other antenatal testing (eg, NST, BPP)**

In all other cases of FGR, nonstress tests and BPPs are performed at least weekly

When FGR is associated with

- oligohydramnios,
- preeclampsia,
- decelerating fetal growth,
- severe growth restriction,
- increasing umbilical artery Doppler index, or other concerning findings,
- increase testing **to twice per week** (eg, two BPPs, two nonstress tests, or one NST and one BPP).

For fetuses with absent or reversed diastolic flow, testing is performed daily because these fetuses can deteriorate rapidly

Ambulatory monitoring

Women with pregnancies complicated by FGR may maintain normal activities and are usually monitored as outpatients.

experts consider hospitalization for selected women who need daily or more frequent maternal or fetal assessment (eg, daily BPP score because of reversed diastolic flow).

Decisions about ambulatory versus in-hospital care should be made on a case-by-case basis.

Antenatal steroids

Ideally, one course of antenatal corticosteroids is given between 24 and 34 weeks of gestation in the week before delivery is expected.

Timing is estimated based on multiple factors, including the severity of FGR, Doppler findings, comorbid conditions, and rate of deterioration in fetal status.

Maternal interventions

There is no convincing evidence that any intervention in healthy women improves the growth of growth restricted fetuses.

plasma volume expansion,

low-dose aspirin,

bed rest,

anti coagulation

Use of a phosphodiesterase-5 enzyme inhibitor (eg, tadalafil, sildenafil) or

a statin appeared promising.

In smokers,

an intensive smoking cessation program may be of value and has other pregnancy and health benefits

Low dose aspirin

- recommend low-dose aspirin prophylaxis for women at high risk for preeclampsia.
- Previous pregnancy with preeclampsia, especially early onset and with an adverse outcom
- Multifetal gestation
- Chronic hypertension
- Type 1 or 2 diabetes mellitus
- Chronic kidney disease
- Autoimmune disease (antiphospholipid syndrome, systemic lupus erythematosus)

Timing delivery

time the delivery of the growth restricted fetus based on a combination of factors,

including gestational age,

Doppler ultrasound of the umbilical artery,

biophysical profile score,

ductus venosus Doppler,

and the presence or absence of risk factors for, or signs of, uteroplacental insufficiency.

The goal is to maximize fetal maturity and growth while minimizing the risks of fetal or neonatal mortality and short-term and long-term morbidity.

The greatest challenge related to timing of delivery is in the preterm fetus <32 weeks of gestation.

Morbidity and mortality related to preterm delivery is relatively high before 32 and between 26 and 29 weeks of gestation each day in utero has been estimated to improve survival by 1 to 2 percent

constitutionally small fetus

-Normal UA AND MCA DOPLER

-AFI NORMAL

- BPP weekly or modified BPP twice weekly

-delivery at 39-40 weeks

Abnormal UA+/low MCA

Fetal Surveillance:

- -Serial growth scans (q 2 weeks)
- - BPP twice weekly
- - weekly Doppler (UmA,MCA, ± DV)
- - Deliver at 37 weeks if testing is reassuring?

UmA AEDF
Oligohydramnios

>34 weeks: →DELIVER

-daily biophysical profile scoring (BPP) and ductus venous Dopplerin an attempt to delay delivery until 34 weeks

UmA REDF

>32 weeks: →DELIVER

-daily biophysical profile scoring (BPP) and ductus venous Doppler in an attempt to delay delivery until 32 weeks

- If the BPP or ductus venous Doppler becomes abnormal,
- delivery these pregnancies immediately

Absent or RF in DV

- >26 weeks: DELIVER

- If a course of antenatal corticosteroids has not been administered yet, it is given upon diagnosis of reversed or absent diastolic flow

در سن بارداری کمتر از ۳۲ هفته	در سن بارداری مساوی یا بیشتر از ۳۲ هفته
- اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۳٪ یا فقدان جریان خون پایان دیاستولی (AEDF) در داپلر شریان نافی - اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۱۰٪ به همراه یکی از موارد زیر: o PI متوسط شریان رحمی بیش از ۹۵٪ یا o PI متوسط شریان نافی بیش از ۹۵٪	- اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۳٪ و یا - وجود حداقل دو معیار زیر: o اندازه دور شکم (AC) یا وزن تخمینی جنین کمتر از ۱۰٪ o کاهش صدک اندازه دورشکم و وزن تخمینی جنین به میزان دو چارک o نسبت PI شریان مغزی میانی به PI شریان نافی (CPR) کمتر از ۵٪ یا PI شریان نافی بیش از ۹۵٪

مدیریت IUGR

مرحله	پاتوفیزیولوژی	معیار (هر کدام از)	ارزیابی (حداقل فاصله زمانی)	زمان ختم بارداری	نوع زایمان
I IUGR	کوچکی شدید و یا نارسایی خفیف جفت	EFW<3rd centile CPR<P5 UA PI>P95 MCA PI<P5 UtA PI>P95	- سونوگرافی بیومتری هر دوهفته یکبار - داپلر هر هفته یکبار - بیوفیزیکال پروفایل دوبار در هفته	۳۷ هفته	القای زایمان
II IUGR	نارسایی شدید جفت	UA AEDV Reverse AoI	-داپلر و بیوفیزیکال پروفایل دو بار در هفته - NST روزانه	۳٤ هفته	سزارین. در صورت زایمان واژینال، مانیتور دائم در تمام مراحل
III IUGR	زوال پیشرفته جنین ، احتمال کم اسیدوز جنین	UA REDV DV PI>p95	-داپلر، بیوفیزیکال پروفایل و cCTG حداقل هر ٤٨-٢٤ ساعت	۳۲ هفته	سزارین
IV IUGR	احتمال بالای اسیدوز جنین و خطر بالای مرگ جنین	DV reverse a flow cCTG<3ms FHR decelerations	مانیتورینگ مستمر ضربان قلب جنین	۲٦ هفته	سزارین

EFW: Estimated Fetal Weight
CPR: Cerebroplacental Ratio
UA: Umbilical Artery
PI: Pulsatility Index
MCA: Middle Cerebral Artery
ADF: Absent Diastolic Flow
AEDF: Absent End Diastolic Flow
DV: Dactus Venosus
UtA: Uterine Artery
AoI: Aortic isthmus Index