Group B

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Intrauterine Growth Restriction (IUGR)

I am 27 weeks

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A woman in her first pregnancy attended the antenatal clinic at 34 weeks. On examination, the uterus was felt as small for date, and an ultrasound scan (USS) confirmed 31 weeks gestation. The liquor volume was reported within normal limits, and the umbilical Doppler ultrasound is normal. The woman reported that the baby is active.
Diffrential diagnosis:

- Intrauterine growth restriction
- Inaccurate gestational age
- Constitutionally small fetus
Intrauterine Growth Restriction

The fetus failure to achieve its full potential growth and fetal well-being may be compromised.
Symmetric growth restriction:

describes a fetus whose entire body is proportionately small and tends to be seen with very early onset IUGR and also with chromosomal abnormalities.
Asymmetric growth restriction:

‘head-sparing effect’.

It is seen with an undernourished fetus.

It is most often seen with IUGR secondary to placental insufficiency.
Why it is important to identify IUGR fetus early during pregnancy?
Complications:

- Asphyxia and as consequences be stillborn or HIE (seizures), multiorgan failure in early neonatal period.
- Hypothermia
- Hypoglycaemia
- Hypocalcaemia
- Polycythemia
- Thrombocytopenia
- Infection
- NEC
- CP
Neonatal Outcome

- Head appears large for body
- Birth asphyxia and meconium aspiration common
- Reduced fat stores result in decreased birth weight and contribute to hypothermia

Laboratory studies may reveal:
- Hypoglycemia
- Hypocalcemia
- Polycythemia
- Thrombocytopenia

Neonatal sepsis may complicate IUGR
Adult diseases associated with IUGR!

- HTN
- CAD
- Stroke
- DM
PREDICTION
At booking, women should be assessed for risk factors.
Important points in history taking:

- Date of last menstrual period, sure of dates with regular cycles or any history of prolonged cycles.
- History of using hormonal pills like oral contraceptives just prior to conception.
- An early ultrasound done between 8-14 weeks.
Important points in history taking:

- Personal history
- Past Medical history
- Dietary history
- Socioeconomic history
- Family history
Past obstetric history:

- In a multiparous patient details of previous outcomes regarding birth weights, mode of deliveries.

- Any complications like preeclampsia, abruption, miscarriages, growth restricted babies, intrauterine deaths.
Current pregnancy history:

**First trimester:**

- History of fever with or without rash.
- History of exposure to drugs or radiation.
Current pregnancy history:

Second and third trimester:

- History of poor weight gain, or excessive weight gain as in preeclampsia with swelling of feet and tightening of rings suggesting edema.
- History of abdominal pain, bleeding or leaking per vaginum.
- History of perceiving fetal movements.
Examination & Investigations

How to Diagnose

Clinical Method

Biophysical
By
USG
Ultrasound Doppler Biochemical Marker
SYMPHYSIS FUNDAL HEIGHT

SFH has limited diagnostic accuracy in predicting SGA fetuses, with a sensitivity of only 27% and specificity of 88%.

Serial measurements and use of customized SFH charts may improve sensitivity and specificity.
ULTRASONOGRAPHY
ESTIMATED FETAL WEIGHT

BPD : biparietal diameter

HC : head circumference

abdominal circumference

Femur length
HEAD CIRCUMFERENCE

If fetus is affected by asymmetric IUGR, HC remains larger. Using HC/AC ratio, 85% of IUGR fetuses are detected.
Abdominal circumference

Abdominal circumference (AC) and estimated fetal weight (EFW) show the best specificity, positive and negative predictive value and the lowest false positive and negative values.

They are the most accurate in predicting SGA fetuses.
**Head /Abdomen Ratio**

It is of significant value in identifying FGR Baby with asymmetric H/A ratio.

This ratio is gestational age dependent.

More congenital anomaly in SGA newborn with asymmetric H/A ratio.

**Transcerebellar Diameter /AC Ratio**

**Ponderal Index (PI)**

**FEMUR/ABDOMEN RATIO**
AMNIOTIC FLUID VOLUME

Reduced amniotic fluid volume is often associated with asymmetric IUGR

Amniotic Fluid Index

Mild IUGR – Normal amniotic fluid

Severe IUGR – Oligohydramnios
Doppler Waveform Analysis

- Assess resistance to blood flow

- In normal pregnancies, fetal and maternal arteries show low resistance.

- S/D ratio (systolic/diastolic ratio),

- Resistance index

- Pulsatility index
Doppler vessels to be studied

MATERNAL SIDE
Uterine artery

PLACENTAL SIDE
Umbilical artery

FETAL SIDE
Arterial: mca, fetal artery
Venous: ductus, hepatic, umbilical
UTERINE ARTERIES DOPPLER

High resistance/pulsatility in the uterine artery indicates that the mother is at increased risk of developing early onset pre-eclampsia or having a baby with IUGR; therefore she should be offered extra monitoring in pregnancy.

(A) Uterine artery waveform with diastolic notch, and (B) pulsatility index (PI) above 97th centile.
The identification of abnormal UA flow pattern occurring as a result of fetal adaptation to impaired utero-placental blood flow, is a very useful diagnostic and surveillance tool for FGR fetuses. It helps to distinguish constitutionally small fetuses from growth restricted ones.
Umbilical artery Doppler waveforms: (a) normal; (b) absent end-diastolic flow; (c) reversed end-diastolic flow.
MIDDLE CEREBRAL ARTERIES

Increased diastolic velocity (brain sparing effect or centralisation) is observed in a compromised fetus due to cerebral vasodilatation in response to placental insufficiency.

Normally MCA waveform show minimal or no diastolic flow

Middle cerebral artery Doppler showing increased diastolic flow with possible redistribution to brain in hypoxia.
Ductus venosus Doppler

Venous Doppler changes usually occur late in fetuses with growth restriction when there is fetal acidosis with cardiac function compromise.

Ductus venosus waveforms: (a) normal; (b) reversed a-wave.
Three-dimensional ultrasonography

3-D ultrasound and MRI are being evaluated for diagnosis and management of FGR.

Biophysical Profile [BPP]
Non-stress test [NST]
Amniotic fluid assessment
Cardiotocography [CTG]

These will be performed weekly or more frequently as the severity of the case demands
There are no treatments to reverse IUGR, but early identification and intensive fetal monitoring are the key to managing IUGR. The aim is to continue the pregnancy safely for as long as possible, thereby decreasing the problems associated with prematurity and deliver before the fetus becomes excessively compromised.
Antenatal management

- Adequate bed rest specially in left lateral position to increase uteroplacental blood flow
- Maternal nutritional supplementation with high caloric and protein diets, antioxidants, haematinics and omega 3 fatty acids
- Appropriate therapy for complicating factors likely to produce IUGR
- Avoidance of smoking, alcohol
- Maternal oxygen therapy
- Low dose aspirin in selected cases with history of thrombotic disease, hypertension, preeclampsia
Fetal surveillance

1. Daily fetal movement score
2. Non stress test
3. Biophysical profile
4. Amniotic fluid index
5. Growth parameters
6. Doppler studies

*sonography is usually repeated every 2 weeks
Delivery

Since IUGR fetus is at increased risk of intrauterine hypoxia and intrauterine death, the decision needs to delicately balance the risk to the fetus in utero with continuation of pregnancy and that of prematurity if delivered before term.
Time of delivery

The optimum timing of delivery is determined by:

1. Presence of fetal abnormality
2. Duration of pregnancy
3. Degree of growth restriction
4. Associated complicating factor
5. Degree of fetal compromise
6. Previous obstetric history
7. Availability of NICU
○ **GA >37 weeks**
  ○ Delivery should be done

○ **GA <37 weeks**
  ○ A) uncomplicated mild IUGR
    
    **General treatment**
    
    Placental function may improve
    
    Pregnancy is allowed to continue till at least 37 weeks
B) sever degree of IUGR
➢ If lung maturation is achieved
Presence of phosphatidyl glycerol and L:S ratio at least 2 from amniotic fluid study ...termination

➢ Lung maturation not yet achieved
Problems-prematurity, growth restriction
Preterm IUGR requires highest level of NICU

Betamethasone therapy if < 34 weeks to reduce the incidence of RDS, IVH and death in IUGR
Mode of delivery

-the mode of delivery will be dictated by GA, bishop's score, fetal presentation and fetal tolerance of labor depending on doppler parameters, biophysical profile and maternal complication.

Vaginal delivery

Can be allowed as long as there is no obstetric indication for CS and fetal heart rate is normal
Fetus with major anomaly incompatible with life should also be delivered vaginally

Caesarian section

In all cases of IUGR with features of acidosis CS should be done without trail of labour. these include:

➢ Repetitive late decelerations
➢ Poor biophysical profile
➢ Reversal of end diastolic flow in umbilical artery
➢ Abnormal venous doppler
➢ Blood gas analysis showing acidic PH on cordocentesis
Management of newborn

Those requiring special care are judged by:

- Inability to suckle the breast and to swallow (hypoglycemia)
- Incapacity to regulate temperature within limited range (35.6-37.2°C) (hypothermia)
- Inability to control cardio-respiratory function without cyanotic attacks (RDS)
LITERATURE REVIEW
Intrauterine Growth Restriction: New Insight from the Metabolomic Approach

- Review was done by group of doctors in NICU padua ,italy
- Thrifty phenotype
- B-HCG, PAPP-A, PIGF, SFlt-1 for early placental dysfunction.
- Not alone
SECOND STUDY

The use of biochemical markers in prenatal diagnosis of intrauterine growth restriction

- Longitudinal, prospective study. Amniocentesis was done after 14 week of pregnancy.
- AFP was elevated
- AFP also was inversely related with the severity. Higher in fetuses with IUGR <5th percentile than those with IUGR <10th percentile
- How About IGF-1 and Leptin
THIRD STUDY

Insight on Clinical consequences of Intrauterine growth restricted fetus

- review was performed by group of obstetricians and published in 2019
- Skeletal muscle related complication
- Visfatin, Urinary S100B, neuron-specific enolase
REFERENCES

1-https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6918259/


MANAGEMENT PROTOCOL FOR FETAL GROWTH RESTRICTION (FGR)

Clinical evaluation

- Antenatal assessment of risk factors
  (Age ≥ 35 years, oligohydramnios; Hypertension, renal disease)
- SFH: measurement at each antenatal visit after 24 weeks
- A discrepancy of > 3 cm (In the absence of obesity, multiple pregnancy, fibroid uterus)

USG Diagnosis

- Fetal biometry: BPD, HC, AC, FL
- AC or EFW <10th Centile

FGR

To exclude congenital anomalies, genetic syndromes and infections
To treat underlying pathology (if known)

Fetal surveillance

- DFMCR, CTG, NST
- BPP, Amniotic fluid volume (DVP)

Timing of delivery

<37 weeks
- Umbilical artery (UA), Doppler study
  - Normal
    - Repeat study at interval of 14 days
      - USG (AC, EFW)
      - Doppler (UA, MCA, DV, UV)
  - Abnormal
    - PI/RI > +2 SD
    - End-diastolic velocity (EDV)
      - Present
        - Repeat study
        - USG (AC, EFW) weekly
        - Doppler study: twice weekly
          (UA, UV, DV, MCA)
      - Absent or Reversed (AREDV)
        - Doppler study
          - UA • DV • UV
        - Delivery by 32 weeks

≥37 weeks → Delivery
- Delivery by 37 weeks
- Delivery by 34 0/7 weeks

Medical management

- Increased rest
- Folic acid
- Low dose aspirin (selective)
- Increased fluid intake
- To treat underlying pathology (if any)

Abbreviations

- SFH: Symphys Fundal Height
- EFW: Estimated Fetal Weight
- DFMCR: Daily Fetal Movement Counting Rate
- NST: Non Stress Test
- DVP: Deepest Vertical Pocket
- MCA: Middle Cerebral Artery
- DV: Ductus Venosus
- UV: Umbilical Vein
- PI: Pulsatility Index
- RI: Resistance Index

To administer corticosteroid before preterm delivery
- Availability of NICU facilities
Thank you!