بسم الله الرحمن الرحيم
IUGR & Amniotic fluid abnormality

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Lec. 12
What is the deference between IUGR & SGA?

**SGA** ➔ < 10th centile for the population, which means it is at the lower end of the normal distribution ie. Constitutionally small but have reached their full growth potential

**IUGR** ➔ Failure of the fetus to achieve the expected weight for a given gestation
What are the causes of IUGR?

- Maternal medical conditions
- Chromosomal anomalies & aneuploidy
- Genetic & Structural anomalies
- Exposure to drugs & toxins
- Primary placental disease
- Extremes of maternal age
- Low socioeconomic status
- Infections
- Multiple gestation
Which maternal medical conditions result in IUGR?

- HPT
- PET
- DM with vascular involvement
- SLE
- Anemia
- Sickle cell disease
- Antiphospholipid syndrome
- Renal disease
- Malnutrition
- Inflammatory bowel disease
- Intestinal parasites
- Cyanotic pulmonary disease
How does the placenta play a role in the development of IUGR?

- Abnormalities in placental development & trophoblast invasion ➔ Idiopathic or due to maternal disease eg SLE, PET, DM, HPT
- Chronic partial abruption
- Placental infarcts
- Placenta previa
- Chorioangioma
- Circumvallate placenta
- Placental mosaicism
- Twin to twin transfusion Syndrome
What infections result in IUGR?

5-10% of IUGR

Congenital infections:
- CMV
- Rubella
- Herpes
- Varicella zoster
- Toxoplasmosis
- Malaria
- Listeriosis
Which drugs can result in IUGR?

- Alcohol
- Cigarette smoking 3-4X
- Heroin & cocaine
- Methotrexate
- Anticonvulsants
- Warfarin
- Antihypertensives /β-blockers
- Cyclosporin
What are the genetic disorders that can result in IUGR?

- Down’s syndrome T21
- Trisomy 13,18
- Turner syndrome
- Neural tube defects
- Achondroplasia
- Osteogenisis imperfecta
- Abdominal wall defects
- Duodenal atresia
- Renal agenesis/ Poter’s S

15% of IUGR

- Symmetric IUGR
- AFV/ Doppler ➔ N
- Structural abnormalities
- Maternal age
- Nuchal translucency
- Biochemical screening results

Features suspicious of trisomy
Why does multiple pregnancy result in IUGR?

• Placental insufficiency / inadequate placental reserve to sustain N growth of > one fetus
• Twin to twin transfusion syndrome
• Anomalies
• ↑ with higher order gestations
• ↑ monozygotic twins
Fetal growth has been divided into three phases.

- 1- cellular hyperplasia
- 2- hyperplasy & hypertrophy
- 3- hypertrophy

↑ cell size
↑ fat deposition
↑ fetal weight as much as 200 G.r. per week.
An early insult due to:
- chemical
- viral
- aneuploidy

Symmetrical

Proportionate reduction in head & body

↓ Cell size
↓ Cell num.
A late pregnancy insult such as placental insufficiency would affect cell size.
What are the types of IUGR?

1-Symmetric – 20%

• Proportionate decrease in many organ weights including the brain
• Deprivation occurs early
• The fetus is more likely to have an endogenous defect that preclude N development
• U/S biometry ➔ All measurements BPD, FL, AC ➔ ↓
Types of IUGR

2-Asymmetric IUGR—80%

• Relative sparing of the brain

• Deprivation occurs in the later half of pregnancy

• The infant is more likely to be N but small in size due to intrauterine deprivation

• U/S biometry ➔ BPD, FI ➔ N, AC ➔ ↓
Why IUGR often associated with oligohydramnios?

- ↓ blood flow to the lungs ➔ ↓ pulmonary contribution to amniotic fluid volume
- ↓ blood flow to the kidneys ➔ ↓ GFR ➔ ↓ urine output
- It is present in 80-90% of IUGR fetuses
How to evaluate a case of IUGR?

1-History:
- Current preg
  - LMP, preg test, quickening
  - APH, abruptio placentae, & fetal movements
- Previous obstetric Hx particularly looking for IUGR, & adverse outcome
- Medical Hx: connective tissue diseases, thrombotic events & endocrine disorders
- Hx of recent viral illness
- Drug Hx
- Family Hx of congenital abnormalities & thrombophilias
EXAMINATION

• Symphysis fundal height in cm = gest age in wks after 24 wk
• Sensitivity ⇒ 46-86% in detecting IUGR
• A difference of more than 2cm requires fetal assessment
• Oligohydramnious may be detected on palpation

U/S

• Fetal biometry ⇒ for dating then serial measurements
• Anomaly scan
• AF index
• Doppler ⇒ umbilical artery resistance index, MCA
• Repeat tests every 1-2 wks
Invasive fetal testing

- Amniocentesis or placental biopsy/ fetal blood sampling
  - for karyotyping if aneuploidy is suspected
  - for viral studies if infections suspected
- Carries the risks of infection, PROM, Preterm labor

Retrospective tests

- Maternal blood tests for CMV, Rubella, Toxo
  - Metabolic disorders
  - Thrombophilia
- Placenta should be sent for HP
- Postmortem examination
The constitutionally small fetus

- A fetus growing parallel to the lower centiles through out preg
- Anatomically N
- AFV ➔ N
- Doppler ➔ N
Management

Once a SGA is suspected, intensive effort should be made to determine if GR is present and if so, its type and etiology.
In the presence of sonographically detectable anomalies, cordocentesis may be performed for karyotyping.
Prompt delivery is likely to afford the best outcome for the GR fetus.
In the presence of significant oligohydraminos most fetus will be delivered if G.A has reached $\geq 34$ wk.
Such often tolerate labor less than AGA and C/S is indicated for intrapartum fetal compromise.
Importantly

Uncertainly about the diagnosis of GR should preclude intervention until fetal lung maturity is assured.
GR. REMOTE FROM TERM

before 34 wk
Normal
Amniotic volume
Normal
fetal surveillance

Observation

Sono is repeated at interval 2-3 wk
Pregnancy is allowed to continue until fetal maturity is achieved.
At times amniocentesis for assessment of pulmonary maturity may be helpful in clinical decision making.
There is no specific treatment that will ameliorate the condition.
Many clinicians advised a program of modified rest in the lateral recumbent position in which c.o.p and placental perfusion is maximized.
Optimal management of the preterm GR fetus remain undefined.
Mortality and morbidity in GR fetuses were determined by GA and birth weight and not by abnormal fetal testing.
LABOR AND DELIVERY
FHR MONITORING
GR is the result of insufficient placental function.

↓ A.f ➔ cord compression

breech presentation

↑ c/s
Prolonged symmetrical FGR is likely to be followed by slow growth after birth.
The asymmetrically GR is more likely to catch up after birth.
Complications of IUGR

• Maternal complications ➔ due to underlying disease
  ➔ ↑ risk of CS
• Fetal complications ➔ Stillbirth, hypoxia/acidosis, malformations
• Neonatal complications ➔ Hypoglycemia, hypocalcemia, Hypoxia & acidosis, hypothermia, meconium aspiration, Polycythemia, hyperbilirubinemia, sepsis, low APGAR score congenital malformations, apneic spells, intubation sudden infant death syndrome
• Long term complications ➔ Lower IQ, learning & behavior Problems, major neurological handicap ➔ seizures, cerebral Palsy, mental retardation, HPT
• Perinatal mortality 1.5-2X
Oligohydramnions and polyhydramnions
PHYSIOLOGY OF AMNIOTIC FLUID

- **Early pregnancy:** composition of AF similar to ECF. Transfer of water across amnion and through fetal skin.
- **By second trimester:** fetus begins to urinate, swallow, and inspire AF → During last 2/3 of pregnancy, AF is principally comprised of fetal urine.
## NORMAL AMNIOTIC FLUID VOLUME

<table>
<thead>
<tr>
<th>Weeks Gestation</th>
<th>Fetus (g)</th>
<th>Amniotic Fluid (ml)</th>
<th>Placenta (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>100</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>28</td>
<td>1000</td>
<td>1000</td>
<td>200</td>
</tr>
<tr>
<td>36</td>
<td>2500</td>
<td>900</td>
<td>400</td>
</tr>
<tr>
<td>40</td>
<td>3300</td>
<td>800</td>
<td>500</td>
</tr>
</tbody>
</table>
Amniotic fluid is the clear, yellowish fluid that surrounds and protects the fetus in the uterus.
DEFINITIONS:

- **Polyhydramnios:**
  Defined as excessive amount of amniotic fluid of 2000 ml or more (AFI of > 25 cm or the deepest vertical pool of > 8 cm).

- Amniotic Fluid Index = largest vertical pocket in 4 quadrants.
Polyhydramnios is excessive amniotic fluid surrounding the fetus.
Types

1. Mild hydramnios (80%):
   a pocket of amniotic fluid measuring 8 to 11 cm.

2. Moderate hydramnios (15%):
   a pocket of amniotic fluid measuring 12 to 15 cm.

3. Severe hydramnios (5%) - twin-twin transfusion syndrome:
   a pocket of amniotic fluid measuring 16 cm or more.
Causes of polyhydramnios

- **Fetal malformation:**
  - GIT: esophageal/duodenal atresia, tracheoesophageal fistula.
  - CNS: anencephaly (↓swallowing, exposed meninges, no antidiuretic hormone).
  - Twin-twin transfusion → fetal polyuria.

- Hydrops fetalis: congestive heart failure, severe anaemia or hypoproteinemia → placental transudation

- Diabetes mellitus (osmotic diuresis).

- Idiopathic.
Diagnosis of polyhydramnios

- **Symptoms:**
  - dyspnea.
  - edema.
  - abdominal distention
  - preterm labour.

- **Ultrasound:**
  - excessive amniotic fluid.
  - fetal abnormalities.

- **Abdominal examination:**
  - ↑uterus than expected.
  - difficult to palpate fetal parts.
  - difficult to hear fetal heart sound.
  - ballotable fetus.
management

- Bed rest, diuretics, water and salt restriction: ineffective.
- Hospitalization: dyspnea, abdominal pain or difficult ambulation.
- Endomethacin therapy:  
  - impairs lung liquid production/enhances absorption.
  - ↓ fluid movement across fetal membranes.
* complications: premature closure of ductus arteriosus, impairment of renal function, and cerebral vasoconstriction. So not used after 35 weeks
OLIGOHYDRAMNIOS
DEFINITION

- **Oligohydramnios:**

  Defined as reduced amniotic fluid i.e. amniotic fluid index of 5 cm or less or the deepest vertical pool < 2 cm.
Causes of oligohydramnios:

1. **Fetal causes:**
   - Renal cause (57%):
     - Renal agenesis (Potter’s syndrome).
     - Polycystic kidney.
     - Urethral obstruction (atresia/posterior urethral valve).
   - Fetal growth restriction.
   - Fetal death.
   - Postterm pregnancy.
   - Preterm premature rupture membranes.
2. **Maternal causes:**
   - Uteroplacental insufficiency.
   - Preeclampsia.

3. **Placental causes:**
   - twin-twin transfusion.

4. **Drug causes:**
   - Prostaglandin synthase inhibitor as NSAID.

5. **Idiopathic**
Complications of oligohydramnios:

- In early pregnancy:
  - Amniotic adhesions or bands→ amputation/death.
  - Pressure deformities (club feet).
  - Pulmonary hypoplasia:
    - Thoracic compression.
    - No breathing movement.
    - No amniotic fluid retain.
  - Flattened face.
  - Postural deformities.
In late pregnancy:

- Fetal growth restriction.
- Placental abruption.
- Preterm labour.
- Fetal distress.
- Fetal death.
- Meconium aspiration.
- Labour induction/CS.
 Diagnosis:
- Fundal > date.
- AF I < 5CM, DVP < 2.
- IUGR: abdominal circumference < 10th centile.
- Doppler abnormalities
- Congenital fetal anomalies.

 Management:
- Treat the cause (pprom, preeclampsia).
- Assess fatal wellbeing (U/S/CTG/Doppler/BPP).
- Vesicoamniotic shunting (urethral obstruction).
- Amnioinfusion (no ↓ in fetal death).
THANK YOU