Fetal Growth Restriction (FGR)

Definition and Epidemiology

- **Small for gestational age (SGA):** Estimated fetal weight (EFW) or birthweight <10th centile.
- **Fetal growth restriction (FGR):** A pathological restriction of fetal growth due to placental, maternal, or fetal causes.

- Not all SGA fetuses are growth-restricted; many are constitutionally small. So FGR is not synonymous with SGA

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- FGR is associated with increased perinatal morbidity, mortality, and long-term adult disease (hypertension, type 2 diabetes).

Classification

By onset

- **Early-onset FGR:** <32 weeks (usually caused by placental insufficiency, abnormal Dopplers)
- **Late-onset FGR:** ≥32 weeks (often subtle caused byplacental dysfunction)

By pattern

- **Symmetrical FGR:** Proportionate reduction in size (chromosomal anomalies, infections)
- **Asymmetrical FGR:** Brain-sparing with reduced abdominal circumference (uteroplacental insufficiency)

Aetiology

Fetal factors

- Chromosomal abnormalities
- Genetic syndromes
- Congenital infections (TORCH)

Maternal factors

- Hypertension and pre-eclampsia
- Diabetes with vascular disease
- Smoking, alcohol, cocaine
- Malnutrition
- Autoimmune disease (e.g. antiphospholipid syndrome)

Placental factors

- Inadequate trophoblastic invasion
- Placental infarction
- Abnormal cord insertion
- Monochorionic twin complications

Pathophysiology (Placental Insufficiency)

- Reduced uteroplacental perfusion → chronic fetal hypoxaemia
- Fetal adaptive response: redistribution of cardiac output (brain-sparing)
- Reduced renal perfusion → oligohydramnios
- Progressive hypoxia → acidaemia → intrauterine fetal death if untreated

Pregnancies at risk of FGR

-Multiple pregnancies .
-History of FGR in previous pregnancy.
-Current heavy smokers.
-Current drug users.
-Women with underlying medical disorders like :
-hypertension;
-diabetes;
-cyanotic heart disease;
-antiphospholipid syndrome.
-Pregnancies where the symphysis–fundal height is less than expected.

Screening and Diagnosis :

- Accurate dating by first-trimester CRL
- Routine symphysis–fundal height measurement plotted on customised charts
- Ultrasound biometry if SFH abnormal or risk factors present
- Diagnosis of FGR requires:
  - EFW or AC <10th centile **and**
  - Evidence of placental dysfunction (abnormal Doppler or reduced growth velocity)

Role of Doppler Ultrasound

Umbilical artery (primary tool)

- Normal → low resistance
- Absent end-diastolic flow (AEDF) → severe placental disease
- Reversed end-diastolic flow (REDF) → very high perinatal risk

Middle cerebral artery (MCA)

Reduced PI (**Pulsatility Index**) indicates brain-sparing

Cerebroplacental ratio (CPR)

Low CPR predicts adverse outcome, especially in late-onset FGR

Because in late-onset FGR (≥32 weeks):

- Umbilical artery Doppler is often **normal**
- Placental dysfunction is **subtle**
- CPR becomes the **most sensitive marker** of fetal compromise

Ductus venosus

- Used mainly in early-onset severe FGR to guide timing of delivery
- The **ductus venosus reflects cardiac function and fetal acid–base status**
- DV abnormalities occur **late**, just before fetal decompensation
- Therefore, DV Doppler helps decide **when to deliver**, not to diagnose FGR

Surveillance of FGR

- **EFW <10th centile with normal Doppler:**
  - Growth scan every 2–3 weeks
  - Umbilical artery Doppler every 1–2 weeks
- **Abnormal UA Doppler:**
  - Increased frequency of Doppler

Management Principles

- **Surveillance**
  - Serial ultrasounds and Doppler to monitor growth and fetal status.
  - Frequency depends on severity and Doppler abnormalities. Early-onset requires closer intervals.
- **Maternal Optimization**
  - Manage maternal conditions (e.g., treat hypertension, control diabetes, improve nutrition).
  - Smoking cessation and avoidance of harmful substances.
- **Timing of Delivery**

Guideline principles emphasize balancing risks of prematurity vs ongoing intrauterine compromise:

- Consider delivery when Doppler and biophysical profiles suggest deteriorating fetal condition.
- Early delivery (<34 weeks) often involves **antenatal corticosteroids** and neuroprotective strategies.

◇ **Corticosteroid & Preventive Therapies**

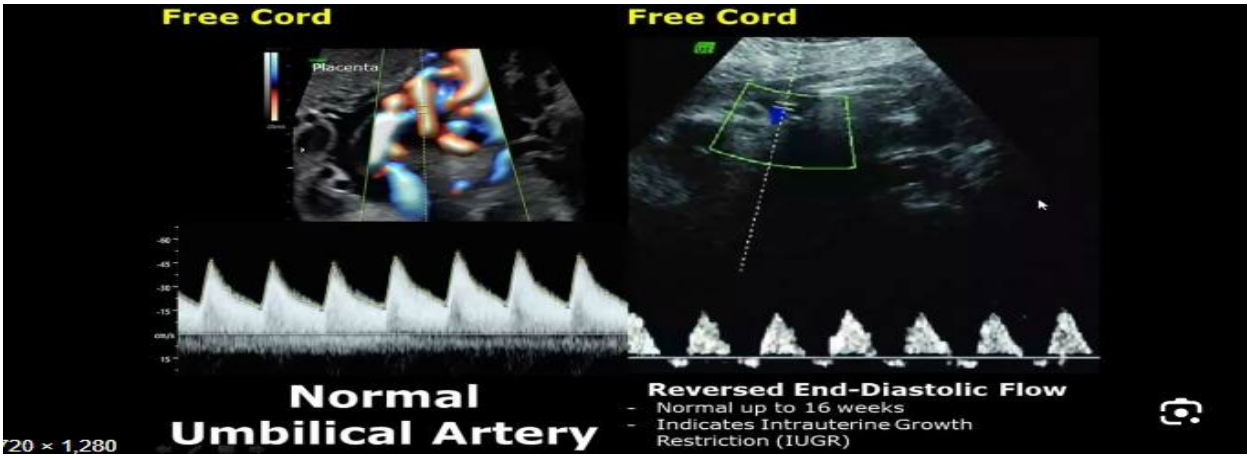
- In preterm IUGR, corticosteroids improve lung maturity.
- Low-dose aspirin before 16 weeks for high-risk women may reduce placental insufficiency risk.

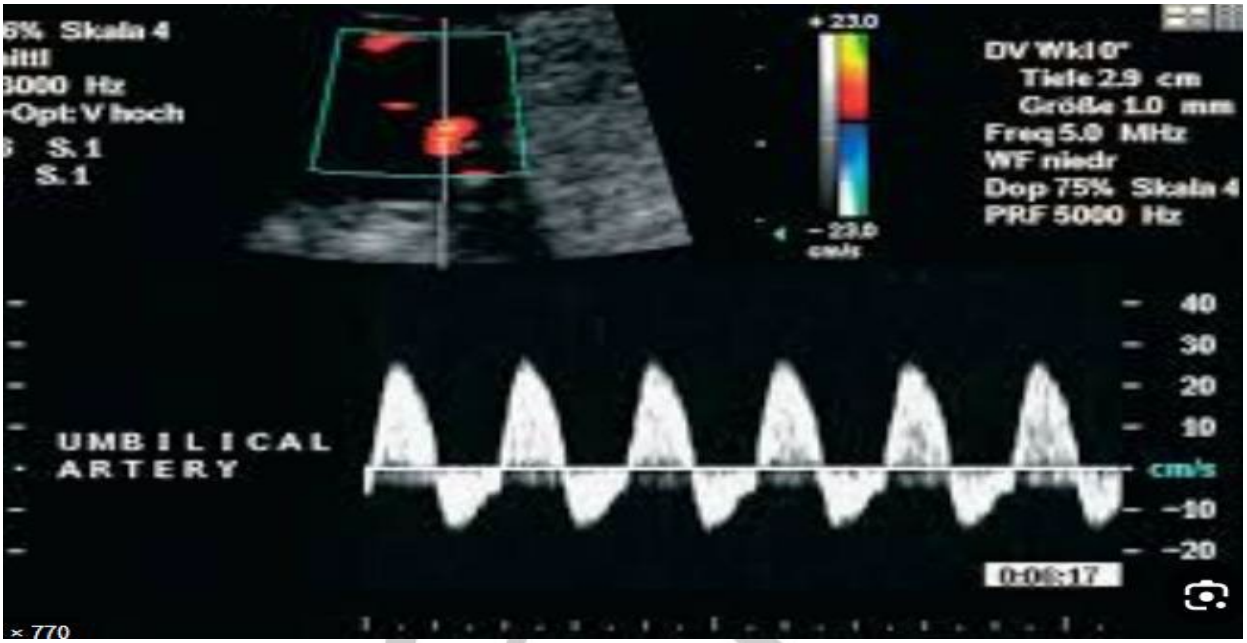
Complications & Outcomes

- Increased risk of stillbirth, preterm birth, and neonatal morbidity.
- Hypoxia, acidosis, low Apgar, NICU admission.

Prognosis

- Depends on gestational age, severity, and cause
- Placental FGR survivors often show postnatal catch-up growth
- Increased long-term risk of cardiovascular and metabolic disease


Free Cord
Placenta
Free Cord
Normal
Umbilical Artery
Reversed End-Diastolic Flow
- Normal up to 16 weeks
- Indicates Intrauterine Growth Restriction (IUGR)
720 × 1,280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