

Intrauterine Growth Restriction

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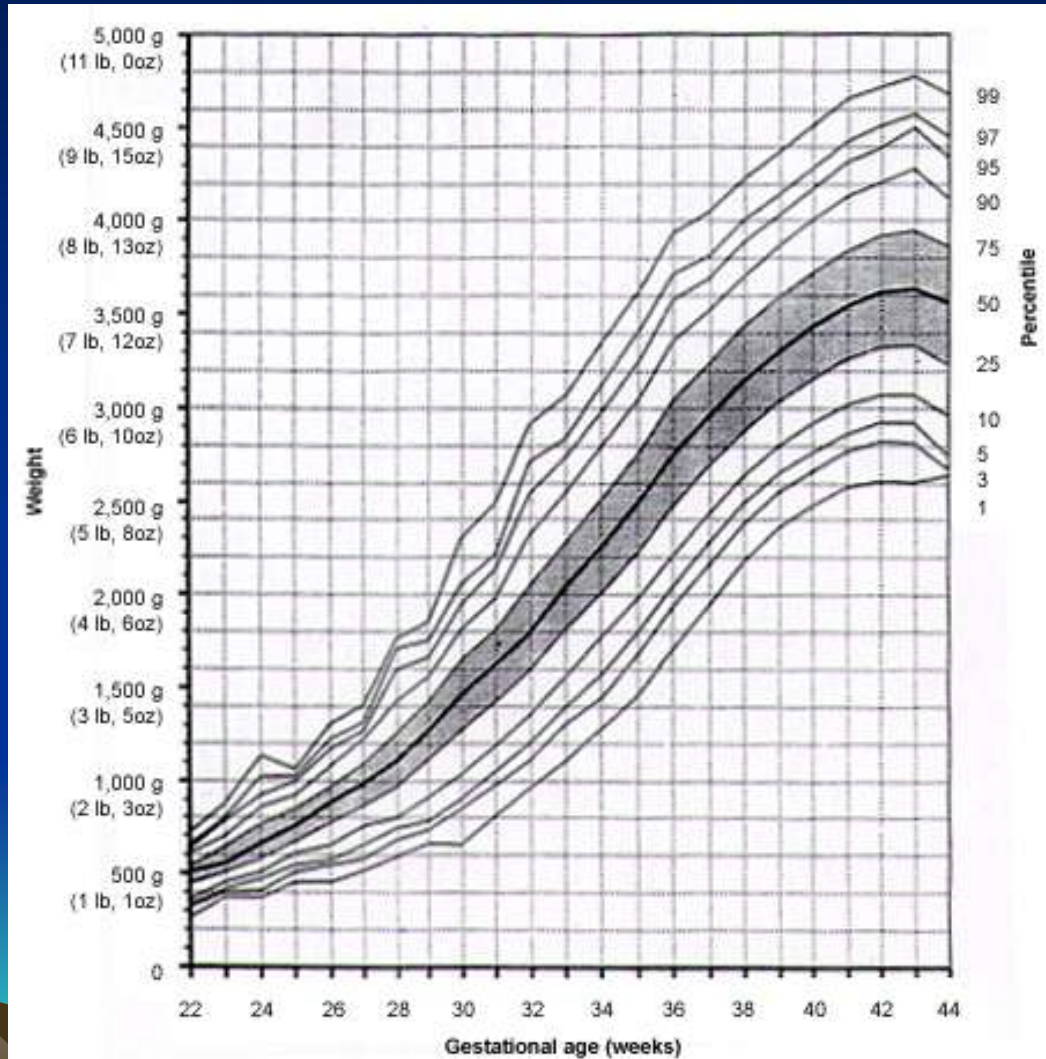


Definition

A growth retarded foetus is a foetus whose estimated weight is below the 10th percentile for its gestational age and whose abdominal circumference is below the 2.5th percentile. At term, the cut-off birth weight for IUGR is 2,500 g.

Approximately 70% of foetuses with a birth weight below the 10th percentile for gestational age are constitutionally small. In the remaining 30% the cause of IUGR is pathologic.

foetal Weight Percentiles Throughout Gestation



Incidence

The incidence of intrauterine growth restriction (IUGR) is around 5% in the general obstetric population. However, some variations do exist depending on the population studied.

Perinatal outcome largely depends on birthweight. Infants less than 2,500 g at term have a perinatal mortality rate 5-30 times greater than that of infants whose birth weights are at the 50th percentile. The mortality rate is 70 to 100 times higher in infants who weigh less than 1,500 g.

Etiology

I-Maternal disorders.

- 1-Hypertensive disorders of pregnancy.
- 2-Cardiac disease class III and IV.
- 3- Diabetes with vascular lesions.
- 4-Connective tissue disorders.
- 5-Sickle cell anaemia.
- 6-Infections such as cytomegalovirus, rubella, herpes and toxoplasmosis.
- 7-Metabolic disorders. e.g. phenylketonuria.
- 8-Antiphospholipid syndrome.
- 9-Poor maternal nutrition, low socioeconomic status and substance abuse.

Etiology (Cont.)

II-Placental Causes:

1-Insufficiency as in cases of Unexplained elevated maternal alpha fetoprotein level, Preeclampsia or it may be Idiopathic.

2-Abnormal placentation e.g. Abruptio placentae, Placenta praevia, Infarction, Circumvallate placenta, Placenta accreta, Hemangioma.

III-foetal causes. E.g. genetic such as trisomy 13, 18 & 21, Triploidy, some cases of Turner's syndrome, malformations and multiple gestation.

Classification

IUGR is usually classified as symmetric and asymmetric:

1-Symmetric growth restriction: accounts for 20% of IUGR fetuses (head and body affected). It is mainly due to genetic disease or infection and it implies a fetus whose entire body is proportionally small with normal ponderal index, normal head/abdomen and femur/ abdomen ratios.

It has a complicated neonatal course and poor outcome.

Classification (Cont.)

2-Asymmetric growth restriction: accounts for 80% of IUGR cases (head spared). It is mainly due to placental insufficiency. The undernourished foetus directs most of its energy to vital organs such as the brain & heart. The foetus has a normal head size but a small abdominal circumference (decreased liver size), weak scrawny limbs (decreased muscle mass) and wrinkled thin skin (decreased subcutaneous fat). The birthweight is below the 10th percentile and is usually below 2500 g with a low ponderal index.

The baby frequently develops neonatal complications such as hypoglycaemia, hyperbilirubinemia, hypocalcaemia & necrotizing enterocolitis.

Classification (Cont.)

If the insult causing asymmetric GR is sustained long or severe enough, the foetus may lose the ability to compensate & become symmetrically GR.

There are 3 stages for foetal cellular growth: cellular hyperplasia (first 16 weeks), concomitant hyperplasia & hypertrophy (16–32 weeks), and cellular hypertrophy (32 weeks to term). Early SGA (genetic/infection) occurs when early foetal cellular hyperplasia is impaired producing a proportionate decrease in all foetal organs. By contrast, late SGA (placental insufficiency) is associated with a growth restricted foetus who is adapted to the intrauterine hostile environment by redistributing blood flow to the vital organs of brain, heart and placenta, thereby preserving head circumference.

Complications

I-Antepartum:

1-Stillbirth: more common after 35 weeks.

2-Oligohydramnios: due to decreased urine production caused by redistribution of blood flow with preferential shunting to the brain.

3-Intrapartum foetal acidosis: occurs in 40% of IUGR fetuses.

Complications (Cont.)

II-Neonatal :

1- Meconium aspiration syndrome.

2-Persistent foetal circulation.

3-Hypoxic ischemic encephalopathy.

4-Hypoglycemia.

5-Hypocalcemia due to relative hypoparathyroidism and increased calcitonin caused chronic asphyxia & increased phosphorus level resulting from increased tissue catabolism.

Complications (Cont.)

- 6-Hyperviscosity syndrome: due to chronic hypoxic stimulation of the foetal hematopoietic system.
- 7-Deficient temperature control due to deficient energy stores and small subcutaneous fat layer.

Diagnosis

I-History:

- 1-Medical history: may point to one of the etiologic factors such as a medical problem, attacks of bleeding, history of drugs or poor nutrition.
- 2-Obstetric history: prior delivery of a GR foetus is a risk factor for recurrence. The recurrence risk was found in one study to be 29% if the first pregnancy was affected, and 44% if two pregnancies have been affected.
- 3-Past history: mothers who were themselves growth restricted at birth & those who have a sister who has had an IUGR pregnancy.

Diagnosis (Cont.)

II-Clinical:

1-Poor maternal weight gain is not a sensitive index for foetal growth.

2-Fundal height is less than the period of amenorrhea. It is inaccurate in obese and thin women, nulliparas with strong abdominal muscles, multiparas with flaccid abdominal wall, malpresentations such as breech and transverse lie.

Diagnosis (Cont.)

- 3-Symphysis fundal height measurement with the women supine with extended leg, empty bladder & uterus relaxed. The fundus of the uterus should be found by palpation caudally from the xiphisternum and the distance to the upper edge of PS measured by a nonelastic tape along the uterine axis which should not be corrected if deviated from the midline.
- 4-Reduced liquor and small foetus on examination.

III-Biochemical screening: it was found that if alpha-fetoprotein is found raised in the absence of foetal anomaly, the risk of IUGR increases 5-10 times.

Diagnosis (Cont.)

IV-Ultrasound biometry: diagnosis of SGA would rely on biometry.

1-Biparietal diameter:

-Slow growth profile.

-Late flattening profile: more likely to be associated with IUGR.

2-Abdominal circumference: the best single measurement. A normal AC rules out the possibility that the foetus is small.

3-Estimated foetal weight.

Diagnosis (Cont.)

- 4-Serial measurements of growth velocity (2 and 3) are superior to single estimates of AC or EFW in the prediction of FGR. However, if used especially when the interval between the scan is < 2 weeks, it may lead to high false positive results.
- 5-Estimated gestational age: useful only if reliable.
- 6- Head to abdomen ratio.
- 7-Femur to abdomen ratio.
- 8-foetal ponderal index.
- 9-AC growth rate.

Diagnosis (Cont.)

Abnormal biophysical tests (V & VI) are more indicative of FGR than SGA.

V-Doppler ultrasound:

May be useful in differentiating small and healthy foetus from true growth retarded foetus. Small foetus size in the presence of normal umbilical artery velocimetry is considered a benign condition. Hypoxaemic foetus may develop reduced middle cerebral artery resistance, reduced blood flow in the ductus venosus/inferior vena cava.

In more severe cases, pulsatile umbilical venous flow may be seen indicating foetal acidaemia & risk of intellectual impairment.

Diagnosis (Cont.)

VI-Biophysical profile

VII-Karyotyping

Management

1-Accurate dating is essential for making the diagnosis of IUGR. The best parameter for reliable dating is a sure date for the last menstrual period in a woman with regular cycles. The alternative is assessment by an ultrasound examination performed between 8-13 weeks of gestation.

Ultrasound dating is only accurate to about 3 weeks when it is performed at term. An error that is commonly made is to change a patient's due date on the basis of a 3rd trimester ultrasound. Doing so can result in failure to recognize IUGR.

Management (Cont.)

2- General lines:

- Treat any maternal disease.
- Stop smoking and substance abuse.
- Improve maternal nutrition.
- Advise more bed rest.

3-Tests to assess foetal wellbeing and growth:

- Daily foetal movement count.
- Growth scans every 3 weeks.
- Ultrasonographic assessment of the amount of amniotic fluid.
- Non stress test: frequency varies from once weekly to daily testing. A CST or biophysical profile are used as backup tests.

Management (Cont.)

4-Timing of Delivery:

- At 34 weeks or more: If tests for foetal wellbeing are normal & foetal growth is adequate, continue foetal surveillance and deliver at term.
- At less than 34 weeks: If no foetal growth is noted or severe oligohydramnios is detected, assess foetal lung maturity. Deliver if lungs are mature; otherwise, administer corticosteroids to enhance foetal lung maturity and reassess. Delivery is mandatory if tests for foetal wellbeing is abnormal.

Management (Cont.)

Delivery is indicated at any time if the end diastolic flow is absent or reversed and other surveillance are abnormal.

Delivery is also indicated in the presence of absent/reversed flow regardless of biophysical tests at a gestational age of 34 weeks or more.

Management (Cont.)

5-Labor and delivery:

- Delivery should be in a well equipped hospital with neonatal IC facilities.
- Administer epidural analgesia.
- During first stage of labour, continuous EFM is performed.
- Try amnioinfusion in cases of non-reassuring foetal heart rate, low amniotic fluid index and meconium stained liquor.
- Use ventouse or forceps to minimize 2nd stage. C.S. is indicated whenever there is evidence for deteriorating foetal status.
- Instruct the patient regarding adequate technique for bearing down.
- Examine the placenta by a pathologist to identify the cause.

Prognosis

- The worst is for IUGR due to congenital infections or chromosomal abnormalities.
- IUGR babies suffering intrapartum asphyxia are more likely to suffer neurologic problems at childhood compared to AGA babies.
- The length of the insult is more important than its severity in terms of somatic growth and neurologic development.
- The probability of developmental problems is lower when there is a catch-up growth during the first 6 months of life.

Thank you

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