Small for gestational age (SGA)

Synonym: light for date babies

What is SGA?

Small for gestational age (SGA) refers to an infant born with a birth weight less than the 10th centile. Severe SGA refers to an infant born with a birth weight less than the 3rd centile.[1] They fall into three groups:

- Babies whose growth at all gestational ages has been low. They are SGA but otherwise healthy. 50-70% of SGA fetuses are constitutionally small, with fetal growth appropriate for maternal size and ethnicity.[1]

- Growth is normal in the early part of pregnancy but slows in utero by at least two measurements (normally from ultrasound assessments). This is due to intrauterine growth restriction (IUGR). The newborn baby has a wasted appearance with little subcutaneous fat and a greater risk of complications.

- Non-placenta mediated growth restriction - eg, structural or chromosomal anomaly, inborn errors of metabolism or fetal infection.

The terms IUGR and SGA are often used synonymously. However, there is a difference in meaning:[2]

- The SGA definition is based on the cross-sectional evaluation (either prenatal or postnatal) and this term has been used for those neonates whose birth weight is less than the 10th percentile for that particular gestational age or two standard deviations below the population norms on the growth charts. The definition considers only the birth weight without any consideration of the in-utero growth and physical characteristics at birth.

- IUGR is a clinical definition and applies to neonates born with clinical features of malnutrition and in-utero growth restriction, irrespective of their birth weight percentile.

A baby may not be SGA but may still be considered to have had IUGR if they have features of in-utero growth restriction and malnutrition at the time of birth. Therefore, neonates with a birth weight less than the 10th percentile will be SGA but not be considered to be IUGR if there are no features of malnutrition. A neonate with a birth weight greater than the 10th percentile will be considered to be IUGR, in spite of not being SGA, if the infants have features of malnutrition at birth.

Risk factors[1]

Maternal factors can affect placental transfer of nutrients - eg, low pre-pregnancy weight, under-nutrition, substance abuse or severe anaemia. Medical conditions can affect placental implantation and vasculature and hence transfer - eg, pre-eclampsia, autoimmune disease, thrombophilias, renal disease, diabetes and essential hypertension. See also the separate Intrauterine Growth Restriction article for more information.

Risk assessment

All women should be assessed at booking for risk factors for an SGA fetus/neonate to identify those who require increased surveillance. Risk assessment must always be individualised, taking into account previous medical and obstetric history and current pregnancy history.

Minor risk factors

- Maternal age ≥35 years.
- IVF singleton pregnancy.
- Nulliparity.
- BMI <20.
- BMI 25-34.9.
- Smoker - 1-10 cigarettes per day.
- Low fruit intake pre-pregnancy.
- Pregnancy interval <6 months.

- Pregnancy interval ≥60 months.

Major risk factors

- Maternal age >40 years.
- Smoker - ≥11 cigarettes per day.
- Paternal or maternal SGA.
- Cocaine use.
- Daily vigorous exercise.
- Previous SGA baby.
- Previous stillbirth.
- Chronic hypertension.
- Diabetes with vascular disease.
- Renal impairment.
- Antiphospholipid syndrome.
- Heavy bleeding similar to menses.
- Pregnancy associated plasm protein-A (PAPP-A) <0.4 multiples of the median (MOM).

Fetal echogenic bowel has been shown to be independently associated with a neonate with SGA and fetal death.

SGA diagnosis[1]

- Abdominal palpation has limited accuracy for the prediction of an SGA neonate and thus should not be routinely performed in this context.
- Serial measurement of symphysis fundal height (SFH) is recommended at each antenatal appointment from 24 weeks of pregnancy as this improves prediction of an SGA neonate.
- SFH should be plotted on a customised chart rather than a population-based chart as this may improve prediction of an SGA neonate.

- Women with a single SFH which plots below the 10th centile or with serial measurements which demonstrate slow or static growth by crossing centiles should be referred for ultrasound measurement of fetal size.
- Women in whom measurement of SFH is inaccurate (for example, BMI >35, large fibroids, hydramnios) should be referred for serial assessment of fetal size, using ultrasound.

Management of SGA

A review found that effective interventions are available for reducing the occurrence of SGA fetuses and preventing related perinatal mortality. Some interventions are effective in all women, while others target specific comorbidities.

The most effective interventions to prevent the SGA fetus were antiplatelet agents such as aspirin before 16 weeks in women at risk of pre-eclampsia, and progesterone therapy for prevention of preterm birth.

For the prevention of perinatal mortality in high-risk women, antiplatelets and antenatal corticosteroids were found to be effective interventions.[3]

The following is an account of the recommendations provided in the Royal College of Obstetricians and Gynaecologists (RCOG) guideline.

Antenatal[1]

- Women who have a major risk factor should be referred for serial ultrasound measurement of fetal size and for assessment of well-being with umbilical artery Doppler from 26-28 weeks of pregnancy.
- Women who have three or more minor risk factors should be referred for uterine artery Doppler at 20-24 weeks of gestation.
- In high-risk populations, uterine artery Doppler at 20-24 weeks of pregnancy has a moderate predictive value for a severely SGA neonate.
- In women with an abnormal uterine artery Doppler at 20-24 weeks of pregnancy, subsequent normalisation of flow velocity indices is still associated with an increased risk of an SGA neonate. Therefore, repeating uterine artery Doppler is of limited value.

- Women with an abnormal uterine artery Doppler at 20-24 weeks (pulsatility index >95th centile) and/or notching should be referred for serial ultrasound measurement of fetal size and for assessment of well-being with umbilical artery Doppler commencing at 26-28 weeks of pregnancy.
- Women with a normal uterine artery Doppler do not require serial measurement of fetal size and serial assessment of well-being with umbilical artery Doppler unless they develop specific pregnancy complications - eg, antepartum haemorrhage or hypertension. However, they should be offered a scan for fetal size and umbilical artery Doppler during the third trimester.
- Serial ultrasound measurement of fetal size and assessment of well-being with umbilical artery Doppler should be offered in cases of fetal echogenic bowel.

Investigations that are indicated in SGA fetuses

- Offer referral for a detailed fetal anatomical survey and uterine artery Doppler by a fetal medicine specialist if severe SGA is identified at the 18- to 20-week scan.
- Karyotyping should be offered in severely SGA fetuses with structural anomalies and in those detected before 23 weeks of gestation, especially if uterine artery Doppler is normal.
- Serological screening for congenital cytomegalovirus (CMV) and toxoplasmosis infection should be offered in severely SGA fetuses.
- Testing for syphilis and malaria should be considered in high-risk populations.
- Uterine artery Doppler has limited accuracy to predict adverse outcome in SGA fetuses diagnosed during the third trimester.

Interventions to be considered in the preterm SGA fetus

- Women with an SGA fetus between 24+0 and 35+6 weeks of gestation, where delivery is being considered, should receive a single course of antenatal corticosteroids.

Optimal method and frequency of fetal surveillance in SGA

- In a high-risk population, the use of umbilical artery Doppler has been shown to reduce perinatal morbidity and mortality. Umbilical artery Doppler should be the primary surveillance tool in the SGA fetus.
- When umbilical artery Doppler flow indices are normal it is reasonable to repeat surveillance every 14 days. More frequent Doppler surveillance may be appropriate in a severely SGA fetus.
- When umbilical artery Doppler flow indices are abnormal (pulsatility or resistance index >+2 standard deviations above the mean for gestational age) and delivery is not indicated, repeat surveillance twice each week in fetuses with end-diastolic velocities present and daily in fetuses with absent/reversed end-diastolic frequencies.
- Cardiotocography (CTG) should not be used as the only form of surveillance in SGA fetuses.
- Interpretation of the CTG should be based on short-term fetal heart rate variation from computerised analysis.
- Ultrasound assessment of amniotic fluid volume should not be used as the only form of surveillance in SGA fetuses.
- Interpretation of amniotic fluid volume should be based on the single deepest vertical pocket.
- Biophysical profile should not be used for fetal surveillance in preterm SGA fetuses.
- In the preterm SGA fetus, middle cerebral artery (MCA) Doppler has limited accuracy to predict acidaemia and adverse outcome and should not be used to time delivery.
- In the term SGA fetus with normal umbilical artery Doppler, an abnormal MCA Doppler (pulsatility index <5th centile) has moderate predictive value for acidosis at birth and should be used to time delivery.
- Ductus venosus Doppler has moderate predictive value for acidaemia and adverse outcome.
- Ductus venosus Doppler should be used for surveillance in the preterm SGA fetus with abnormal umbilical artery Doppler and used to time delivery.

The optimal gestation to deliver the SGA fetus

- In the preterm SGA fetus with umbilical artery absent or reversed end-diastolic velocity (AREDV) detected prior to 32 weeks of gestation, delivery is recommended when DV Doppler becomes abnormal or umbilical vein pulsations appear, provided the fetus is considered viable and after completion of steroids. Even when venous Doppler is normal, delivery is recommended by 32 weeks of gestation and should be considered between 30-32 weeks of gestation.
- If MCA Doppler is abnormal, delivery should be recommended no later than 37 weeks of gestation.
- In the SGA fetus detected after 32 weeks of gestation with an abnormal umbilical artery Doppler, delivery no later than 37 weeks of gestation is recommended.
- In the SGA fetus detected after 32 weeks of gestation with normal umbilical artery Doppler, a senior obstetrician should be involved in determining the timing and mode of birth of these pregnancies.
- Delivery should be offered at 37 weeks of gestation.

How the SGA fetus should be delivered

- In the SGA fetus with umbilical artery AREDV, delivery by caesarean section is recommended.
- In the SGA fetus with normal umbilical artery Doppler or with abnormal umbilical artery pulsatility index but end-diastolic velocities present, induction of labour can be offered but rates of emergency caesarean section are increased and continuous fetal heart rate monitoring is recommended from the onset of uterine contractions.
- Early admission is recommended in women in spontaneous labour with an SGA fetus in order to instigate continuous fetal heart rate monitoring.
- Continuous electronic fetal monitoring should be offered.[4]
- There is currently no evidence to support immediate delivery.[5] [6]

Prognosis[2]

The prognosis for SGA babies depends on whether they are constitutionally small, are small because of IUGR, or are SGA due to non–placenta mediated growth restriction (eg, structural or chromosomal anomaly, inborn errors of metabolism or fetal infection). Constitutionally normal babies with SGA usually have an excellent prognosis assuming there is no other health problem and the prognosis for babies with non–placenta mediated growth restriction will depend on the underlying condition.

IUGR babies are prone to complications after birth, including perinatal asphyxia, meconium aspiration, persistent pulmonary hypertension, hypothermia, hypoglycaemia, hyperglycaemia, hypocalcaemia, polycythaemia, jaundice, feeding difficulties, feed intolerance, necrotising enterocolitis, late-onset sepsis and pulmonary haemorrhage.

IUGR babies also have an increased risk of neuro-behavioural abnormalities, poor growth and increased susceptibility to adult-onset diseases in infancy and adolescence, including obesity, metabolic syndrome, type 2 diabetes and cardiovascular disease.

See the separate Problems in Small Babies article for further information.

Small for gestational age prevention[1]

- Antiplatelet agents may be effective in preventing SGA birth in women at high risk of pre-eclampsia, although the effect size is small.
- In women at high risk of pre-eclampsia, antiplatelet agents should be commenced at, or before, 16 weeks of pregnancy.
- There is no consistent evidence that dietary modification, progesterone or calcium prevents birth of an SGA infant. These interventions should not be used for this indication.
- Interventions to promote smoking cessation may prevent delivery of an SGA infant. The health benefits of smoking cessation indicate that these interventions should be offered to all women who are pregnant and smoke.

- Antithrombotic therapy appears to be a promising therapy for preventing delivery of an SGA infant in high-risk women. However, there is insufficient evidence, especially concerning serious adverse effects, to recommend its use.

Morbidity

See the separate Premature Babies and their Problems article.

Further reading

- Saving Lives Improving Mothers' Care - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2017-19; MBRRACE-UK, Nov 2021

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