Population Covered By The Guidance

This pathway provides guidance on the imaging investigation of a fetus with suspected intra-uterine growth restriction (IUGR), and the role of imaging in the management of confirmed IUGR.

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Date of next review: September 2021
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Quick User Guide

Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points. Clicking on the **PINK** text box will bring up the full text. The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

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<th>SYMBOL</th>
<th>RRL</th>
<th>EFFECTIVE DOSE RANGE</th>
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<td><img src="image" alt="Symbol" /></td>
<td>Minimal</td>
<td>&lt; 1 millisieverts</td>
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<tr>
<td><img src="image" alt="Symbol" /></td>
<td>High</td>
<td>&gt;10 mSv</td>
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Pathway Diagram
Intrauterine Growth Restriction (Suspected)

Gestation?

1st and 2nd trimester

Ultrasound: The fetus is in a cephalic presentation. The placenta is situated on the posterior uterine wall, clear of symmetrical:
- Incorrect dating
- Constitutionally small
- Aneuploidy
- Syndromes
- TORCH infections
- Severe maternal disease

2nd trimester

IUGR may be detected on 18-20 week scan

Serial growth scans with umbilical artery Doppler studies

Assess for causes & investigate appropriately, particularly if symmetrical:
- Incorrect dating
- Constitutionally small
- Aneuploidy
- Syndromes
- TORCH infections
- Severe maternal disease

AC < 10th centile or flattening of growth

Ultrasound at 24-28 weeks with umbilical artery Doppler studies

Normal diastolic flow

Reduced diastolic flow (↑ Umbilical artery pulsatility index)

Close monitoring (minimum fortnightly):
- Growth scans
- Fetal Doppler studies including MCA/Ductus venosus Doppler

Close monitoring:
- Growth scans
- Fetal Doppler studies including MCA/Ductus venosus Doppler

If parameters remain normal, delivery may be delayed until 37 weeks. If growth becomes static consider delivery after 34 weeks

Absent or reversed diastolic flow

Urgent admission. Decision to deliver should be based on clinical judgement

Image Gallery

Note: These images open in a new page

1a

Intrauterine Growth Restriction

Image 1a,b,c (Ultrasound, 33 weeks gestation): The fetus is in a cephalic presentation. The placenta is situated on the posterior uterine wall, clear of...
Measurements: Biparietal diameter 78mm, Head circumference 283mm, Abdominal circumference 266mm, Femur length 58mm. Estimated fetal weight 1625g +/- 237g. Amniotic fluid volume is normal (Amniotic Fluid Index = 12cm).

On Doppler imaging, there is reverse end diastolic flow in all sections of the umbilical artery evaluated.

Image 1d (Fetal Biometry Chart, 33 weeks gestation): The above measurements are all below the 3rd percentile.

Teaching Points

- Small for gestational age (SGA) is defined as an estimated fetal weight (EFW) on a customised growth chart less than the 10th centile for gestation. Most SGA fetuses are small but healthy, however a proportion will be considered to have intrauterine growth restriction (IUGR). IUGR occurs when the fetus fails to reach its genetic growth potential due to a pathological reason or an event in utero causing placental dysfunction
  - The abdominal circumference is usually the first measurement to become reduced. A growth restricted fetus may have a discrepancy between head and abdominal circumference but may not meet the criteria for SGA
- Several risk factors for IUGR have been identified, and screening with growth scans at 24-28 weeks may be considered in high-risk pregnancies
- Fundal symphysis height (FSH) should be measured and plotted regularly in all pregnancies from 24 weeks. Ultrasound examination is required to confirm SGA/IUGR suspected from abnormal measurements. If FSH is unreliable, e.g. due to obesity or large fibroids, then serial growth ultrasounds are recommended for monitoring
- Conventional and Doppler ultrasonography are used to assess fetal wellbeing in conjunction with clinical examination. Depending on gestation cardiotocography (CTG) monitoring may also be used
- Recommendations on timing of fetal surveillance intervals and delivery vary
- Delivery is indicated when risk of fetal death or morbidity is greater than the risk of prematurity

Intrauterine Growth Restriction (IUGR)

- A small for gestational age (SGA) fetus refers to a fetus with an estimated fetal weight or abdominal circumference below the 10th percentile. 1 50-70% of SGA fetuses are constitutionally small but healthy, with fetal growth appropriate for maternal size and ethnicity. 2 A proportion of SGA fetuses will have IUGR, although these may be difficult to differentiate. IUGR occurs where a pathological process has inhibited pre-programmed genetic growth potential, however this can be more difficult to define in practice and many different definitions exist in the literature 3
  - The use of customised growth charts to define SGA have shown promise in better
prediction of perinatal outcomes, however there is a lack of direct comparative evidence 
SGA and IUGR are associated with adverse fetal outcomes including acidosis, stillbirth, oligohydramnios, low birth weight, and adverse events during labour including fetal distress 
IUGR is often suspected by poor maternal weight gain or when fundal height is less than expected for gestational age. Very early IUGR may also be detected during a routine 18-20 week anatomical ultrasound scan.
Confirmation of accurate gestational age is the first step when IUGR is suspected. A dating ultrasound in the first trimester is the most accurate way to determine gestational age. However, if the earliest ultrasound was between 13 and 24 weeks, the ultrasound EDD should be used instead of the last menstrual period (LMP) if LMP is irregular or uncertain.
Current evidence has not demonstrated benefit from routine ultrasound screening for IUGR, however women with strong risk factors for IUGR may warrant increased surveillance with serial growth ultrasounds and Doppler studies.
Risk factors for IUGR include:

- Maternal factors and medical history:
  - Maternal age >40
  - Constitutionally small mother
  - Maternal or paternal SGA
  - Smoking >11/day
  - Cocaine use
  - Maternal disease including: diabetes, vascular disease, chronic hypertension, renal disease
  - Antiphospholipid syndrome

- Previous pregnancy history
  - Previous stillbirth
  - Previous birth of SGA baby

- Current pregnancy complications
  - Pre-eclampsia
  - Severe pregnancy induced hypertension
  - Low maternal weight gain
  - Heavy bleeding (threatened miscarriage)
  - Echogenic fetal bowel

IUGR may also be caused by fetal conditions. Further investigation should be considered, especially in the absence of another identifiable cause in the history and in very early onset SGA.

References

Date of literature search: August-September 2018

The search methodology is available on request. Email

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document


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19. Shah PS. Paternal factors and low birthweight, preterm, and small for gestational age


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