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.

Date reviewed: September 2018

Date of next review: September 2021

Published: April 2019

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.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>RRL</th>
<th>EFFECTIVE DOSE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symbol]</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Minimal</td>
<td>&lt; 1 millisieverts</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Low</td>
<td>1-5 mSv</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Medium</td>
<td>5-10 mSv</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>High</td>
<td>&gt;10 mSv</td>
</tr>
</tbody>
</table>

Pathway Diagram
DIAGNOSTIC IMAGING PATHWAYS - INTRAUTERINE GROWTH RESTRICTION (SUSPECTED)

Gestation?

1st and 2nd trimester

- Ultrasound at 24-28 weeks with umbilical artery Doppler studies
- IUGR may be detected on 18-20 week scan

3rd trimester

- Serial growth scans with umbilical artery Doppler studies
- AC < 10th centile or flattening of growth

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

Normal diastolic flow

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

Reduced diastolic flow (↑ Umbilical artery pulsatility index)

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

Absent or reversed diastolic flow

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

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

Note: Recommendations on timing of fetal surveillance intervals and delivery vary

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. 4,5 However there is a lack of direct comparative evidence 6

- SGA and IUGR are associated with adverse fetal outcomes including acidosis, stillbirth, oligohydramnios, low birth weight, and adverse events during labour including fetal distress 7-9
- 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. 10 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 11
- Current evidence has not demonstrated benefit from routine ultrasound screening for IUGR, 12,13 however women with strong risk factors for IUGR may warrant increased surveillance with serial growth ultrasounds and Doppler studies 14-16
- Risk factors for IUGR include:
  - Maternal factors and medical history:
    - Maternal age >40 17
    - Constitutionally small mother
    - Maternal 18 or paternal SGA 19,20
    - Smoking >11/day 21
    - Cocaine use 22
    - Maternal disease including: diabetes, 23 vascular disease, 23 chronic hypertension, 24 renal disease 25
    - Antiphospholipid syndrome 26
  - Previous pregnancy history
    - Previous stillbirth 27
    - Previous birth of SGA baby 27
  - Current pregnancy complications
    - Pre-eclampsia 27
    - Severe pregnancy induced hypertension 24
    - Low maternal weight gain 28
    - Heavy bleeding (threatened miscarriage), 29 unexplained antepartum haemorrhage
    - Echogenic fetal bowel 30
- 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


14. Royal College of Obstetricians and Gynaecologists. Green-top guideline no. 31. The investigation and management of the small-for-gestational-age fetus. 2014. (Guideline) View the reference


19. Shah PS. Paternal factors and low birthweight, preterm, and small for gestational age
36. Alfirevic Z, Stampalija T, Dowswell T. **Fetal and umbilical Doppler ultrasound in high-risk pregnancies.** Cochrane Database Syst Rev. 2017;6:Cd007529. (Level I evidence) View the reference


47. Alfirevic Z, Stampalija T, Medley N. **Fetal and umbilical Doppler ultrasound in normal pregnancy.** Cochrane Database Syst Rev. 2015(4):Cd001450. (Level I evidence) View the reference


Information for Consumers

<table>
<thead>
<tr>
<th>Information from this website</th>
<th>Information from the Royal Australian and New Zealand College of Radiologists’ website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consent to Procedure or Treatment</td>
<td>Radiation Risk of Medical Imaging During Pregnancy</td>
</tr>
<tr>
<td>Radiation Risks of X-rays and Scans</td>
<td>Radiation Risk of Medical Imaging for Adults and Children</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>Ultrasound</td>
</tr>
<tr>
<td>Ultrasound (Doppler)</td>
<td>Transvaginal Ultrasound</td>
</tr>
</tbody>
</table>

Copyright

© Copyright 2015, Department of Health Western Australia. All Rights Reserved. This web site and its content has been prepared by The Department of Health, Western Australia. The information contained on this web site is protected by copyright.

Legal Notice

Please remember that this leaflet is intended as general information only. It is not definitive and The Department of Health, Western Australia can not accept any legal liability arising from its use. The information is kept as up to date and accurate as possible, but please be warned that it is always subject to change

File Formats

Some documents for download on this website are in a Portable Document Format (PDF). To read these files you might need to download Adobe Acrobat Reader.