DETECTION AND MANAGEMENT OF WOMEN WITH FETAL GROWTH RESTRICTION IN SINGLETON PREGNANCIES

Fetal growth restriction (FGR) is associated with stillbirth, neonatal death and perinatal morbidity and an increased risk of adverse health outcomes into adulthood. Improving the detection and care of pregnancies with FGR is an important strategy to reduce adverse outcome and is relevant to all maternity care providers.

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KEY MESSAGES

- Improving detection of FGR is an important strategy to reduce stillbirths.
- Risk assessment for FGR should be undertaken in early pregnancy and at each antenatal visit (see algorithm).
- Where modifiable risk factors for FGR exist, provide advice and support to women (e.g. smoking cessation)\(^1\).
- For low risk women, measure symphyseal fundal height (SFH) using a standardised technique. Plotting serial SFH measures on a growth chart may help to identify FGR.
- Where the SFH measures <10th centile or where static or slow growth is suspected, ultrasound assessment of fetal biometry should be considered\(^2\).
- In women at increased risk for FGR and/or pre-eclampsia, consider commencing low dose aspirin (100-150mg nocte) prior to 16 weeks’ gestation.
- Obstetric medical opinion should be sought for ongoing management when FGR is suspected\(^3,4\).
- The following investigations are commonly used for the diagnosis and management of suspected FGR: ultrasound assessment of fetal biometry, amniotic fluid volume, umbilical artery Doppler and Cardiotocography and raising maternal awareness of reduced fetal movements.
- When planning the birth of a fetus with suspected FGR, care should be individualised taking into consideration the woman’s preferences, health, gestational age, fetal condition, mode of birth, intrapartum monitoring and access to appropriate neonatal services.
- The national FGR educational program for clinicians is recommended for all maternity services.
- Clinical audit and feedback are key drivers of practice change and should be undertaken to enhance best practice for FGR\(^5\).
1 Purpose of the position statement

The purpose of this position statement is to improve perinatal outcomes through better antenatal detection and management of pregnancies with FGR. These recommendations have been derived from a literature review including multiple international SGA/FGR guidelines5–10.

2 Definitions

FGR is best defined as a fetus that has not reached its growth potential. In practice, small for gestational age (SGA) is often used as a proxy for FGR (see Table 1). However, not all SGA fetuses are growth restricted, and some growth restricted fetuses are not SGA11. There are also differences between early and late FGR12, which are detailed in Table 2.

Table 1: Definitions relating to FGR

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal Growth Restriction (FGR)</td>
<td>A fetus that has not reached its growth potential.</td>
</tr>
<tr>
<td></td>
<td>(in practice, small for gestational age (SGA) is often used as a proxy for FGR)</td>
</tr>
<tr>
<td>Small for gestational age (SGA)</td>
<td>Estimated fetal weight/birthweight &lt;10th centile</td>
</tr>
<tr>
<td>Severe FGR</td>
<td>SGA &lt;3rd centile is often used as a proxy for severe FGR</td>
</tr>
<tr>
<td>Early FGR</td>
<td>FGR &lt;32 weeks gestation</td>
</tr>
<tr>
<td>Late FGR</td>
<td>FGR &gt;32 weeks gestation</td>
</tr>
</tbody>
</table>

Table 2: Early vs Late FGR, Adapted from Figueras et al12.

<table>
<thead>
<tr>
<th></th>
<th>Early FGR</th>
<th>Late FGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation</td>
<td>&lt;32 weeks</td>
<td>≥32 weeks</td>
</tr>
<tr>
<td>Prevalence13</td>
<td>0.5 – 1%</td>
<td>5 – 10%</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>Strong association</td>
<td>Weak association</td>
</tr>
<tr>
<td>Placental pathology</td>
<td>Strong association</td>
<td>Weak association</td>
</tr>
<tr>
<td>Relation to SGA</td>
<td>Often SGA &lt;10th centile</td>
<td>Not always SGA</td>
</tr>
<tr>
<td>Umbilical artery Dopplers</td>
<td>Often Abnormal</td>
<td>Normal or abnormal</td>
</tr>
<tr>
<td>Detection14</td>
<td>Often are readily detectable</td>
<td>Challenging to detect</td>
</tr>
<tr>
<td>Clinical consequences14</td>
<td>Risks of prematurity, high mortality and morbidity</td>
<td>Associated with increased mortality and morbidity</td>
</tr>
</tbody>
</table>
Risk factor assessment

Risk assessment for FGR can be undertaken by healthcare providers prior to conception, in early pregnancy, and at each antenatal visit through inquiry about:

1. maternal characteristics and medical history
2. previous obstetric history
3. risk factors that may arise in pregnancy

It is good practice to inform women about FGR at their booking visit and, where there is a diagnosis of FGR, ongoing communication on the management of FGR throughout the pregnancy. Where modifiable risk factors for FGR exist, provide advice and support to women (e.g. smoking and drug/alcohol cessation).

Antenatal surveillance for FGR may be modified according to a woman’s individual risk factors and this is detailed in the Risk Assessment Algorithm for FGR (Figure 1) at each antenatal visit.

Women can be stratified into three groups depending on their existing or newly arising risk factors for FGR. Consider low dose aspirin (100-150mg nocte) to commence prior to 16 weeks’ gestation for women at increased risk of FGR. Frequency of ultrasound surveillance for suspected FGR should be based on FGR risk factors, prior history and the woman’s preferences.

Symphyseal fundal height (SFH) measurement

Measurement of symphyseal fundal height (SFH) can be undertaken every 2-4 weeks starting from 24 weeks gestation. In women with high BMI, or who have uterine fibroids that are unsuitable for SFH measurement, serial ultrasound can be considered for assessment of fetal growth.

The limitations of SFH measurement in the detection of FGR are well described. A standardised approach to SFH measurement may reduce inter and intra-observer error. One widely accepted approach to SFH measurement includes measuring from the fundus to the superior margin of the symphysis pubis, using a non-elastic tape measure with numbers facing downwards.

Serially plotting SFH measurements on a growth chart may assist in the detection of FGR. Consider ultrasound assessment when a SFH measurement is <10th centile, or if there is clinical suspicion of static or slowing growth on serial SFH measurements.

Diagnosis and management of FGR

Accurate gestational age dating is important in the assessment of fetal size. The following investigations are commonly used for the diagnosis and management of suspected FGR.

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Description</th>
<th>Suggestive of FGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal biometry by ultrasound</td>
<td>• Abdominal circumference (AC)</td>
<td>EFW or AC &lt;10th centile and/or reduced growth velocity of EFW or AC</td>
</tr>
<tr>
<td></td>
<td>• Head circumference (HC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Biparietal diameter (BPD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Femur length (FL)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Estimated fetal weight (EFW)</td>
<td></td>
</tr>
<tr>
<td>Amniotic fluid volume (AFV)</td>
<td>Measured by the single deepest vertical pocket (DVP) of amniotic fluid</td>
<td>DVP &lt;2cm</td>
</tr>
</tbody>
</table>

Table 3: Common investigations for diagnosis and management of suspected FGR
**Umbilical artery Doppler (UAD)**

Measures resistance to blood flow in the umbilical artery and placenta

**UAD Pulsatility or Resistance Index (PI or RI)**

> 95th centile, absent or reverse end diastolic flow (AREDF)

**Cardiotocography (CTG)**

Continuous recording of fetal heart rate and uterine activity

**Abnormal CTG trace**

**Enquiry about fetal movements**

Ask each woman to identify her baby’s normal pattern of movements

Maternal concern about decreased fetal movements (strength and/or frequency). Seek obstetric medical opinion for ongoing management when FGR is suspected.

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### Birth planning

When planning the birth of a baby with suspected SGA/FGR, the aim is to achieve the maximum maturity possible where it is safe to do so. Benefits of early birth to reduce stillbirth need to be carefully weighed against the risk of intervention for the baby at a given gestation. Care should be individualised and woman-centred, using decision aids where possible. The following points should be considered and discussed:

- Woman/family preferences
- Maternal condition
- Gestational age, EFW and fetal condition
- Mode of birth
- Intrapartum monitoring
- Access to appropriate neonatal services

### Placenta

The major underlying cause of FGR is placental in origin. Early onset FGR is often associated with maternal vascular malperfusion (MVM) of the placenta resulting in placental infarction or poor early placentation.

Rarer causes of placental pathology associated with FGR include: massive perivillous fibrin deposition (maternal floor infarction) and chronic intervillositis, both of which have high recurrence rates in subsequent pregnancies.

Compared to early onset FGR, the incidence of placental pathology in late onset FGR occurs less often.

It is recommended that the placentae of suspected SGA/FGR babies be sent for histopathology. The findings of which may support the clinical findings and influence subsequent pregnancy care.

### Neonatal management

The clinical diagnosis of FGR in the neonate can be as challenging as it is antenatally. Care of the newborn with SGA/FGR should include monitoring and maintenance of oxygenation, temperature and blood glucose levels.

Paired cord blood gases can be undertaken to assess acid base status at birth.

In the care of the preterm growth restricted neonate, consider specific issues relating to prematurity such as lung disease, increased risk of infection, neurological complications and necrotising enterocolitis.
Subsequent pregnancy care

The birth of a baby with FGR is a major risk factor for FGR in a subsequent pregnancy. Where possible, the underlying cause for FGR should be investigated to assess for recurrence risk. This includes review of placental histopathology and any investigations undertaken for FGR before and after birth.

Where SGA/FGR has been associated with stillbirth or severe long term adverse outcomes, consider additional parental psychosocial support in a subsequent pregnancy.

Prior to a subsequent pregnancy is an opportunity to address modifiable risk factors for FGR e.g. smoking cessation, optimising pre-existing medical conditions and weight reduction if obese.

Consider low dose aspirin (100-150mg nocte) in addition to serial ultrasound assessment in a subsequent pregnancy for women who have had previous FGR.

Education and clinical audit

Improving the detection and management of SGA/FGR is an opportunity to improve health outcomes. Educational programs for maternity care providers have been shown to improve the detection of SGA/FGR and reduce stillbirth rates in the UK.

Clinical audit and feedback is a key driver of practice change. Clinical case audit of best practice recommendations for SGA/FGR enables monitoring of practice change and evaluation of the impact on health outcomes including false positive and false negative findings.

Benchmarking practice across services identifies variation upon which to focus to improve outcomes. In Australia, the national core maternity indicator for SGA/FGR is the proportion of babies born at or after 40 weeks gestation who weighed less than 2750g at birth.

Evidence gaps

Further high-quality studies are required to improve practice and health outcomes. Current evidence gaps in FGR research include:

- Placental biomarker and ultrasound screening for FGR
- Routine third trimester ultrasound to detect FGR
- Population vs customised growth charts in predicting FGR morbidity and mortality
- Interventions to reduce FGR
- Optimal frequency of fetal surveillance in suspected FGR
- Screening and management using a risk factor-based approach
- Systematic review of neonatal growth charts

Working group

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## Risk Assessment for FGR at Booking and at Each Antenatal Visit

### Level 1

**No FGR risk factors identified**
- More than 50% of FGR cases occur in women without identifiable risk factors

### Level 2

**Risk factors for FGR**
- Age >35 years
- Nulliparity
- IVF singleton pregnancy
- Aboriginal or Torres Strait Islander ethnicity
- Substance use: smoking, drugs
- BMI >30
- Previous late (>32 weeks) FGR/SGA and/or pre-eclampsia
- Papp A <0.4 MoM

**Antenatal complications e.g.**
- Suspected FGR/SGA by SFH or USS (e.g. slow growth, static growth, <10th centile)
- Pre-eclampsia
- Antepartum haemorrhage
- Congenital infection

**Unsuitable for SFH measurements**
- BMI >40
- Large uterine fibroids

### Level 3

**High risk of early FGR**
- Previous early (<32 weeks) FGR/SGA and/or pre-eclampsia
- Previous stillbirth with FGR/SGA
- Maternal medical conditions (e.g., antiphospholipid antibody syndrome, renal impairment, chronic hypertension, diabetes with vascular disease)

### Establishing the frequency and timing of ultrasound

- Review existing or newly arising risk factors
- Where facilities and expertise exist, consider Uterine Artery Doppler at 20-24 weeks
- Consider low dose aspirin (100-150mg nocte) to commence prior to 16 weeks gestation
- Level A/B ACM* consultation and referral guidelines
- Frequency of ultrasound surveillance based on number of FGR risk factors, prior history and service capability (consider ultrasound of fetal size and wellbeing at 28–30 and 34–36 weeks gestation)

### Serial USS 2-4 weekly from 24 weeks until birth

- Where facilities and expertise exist, consider Uterine Artery Doppler recommended at 20-24 weeks
- Consider low dose aspirin (100-150mg nocte) to commence prior to 16 weeks gestation
- Level B/C ACM* consultation and referral guidelines

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Adapted from: Adapted by PSANZ/Stillbirth CRE 2018 from Royal College of Obstetricians and Gynaecologists. The Investigation and Management of the Small-for-Gestational-Age fetus, 2013. Maternal/paternal SGA, low fruit intake and excessive daily exercise are not readily ascertainable.

*a Australian College of Midwives

References

4. RANZCOG. Maternal suitability for models of care, and indicators for referral within and between models of care, 2015.
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