INTRAUTERINE GROWTH RESTRICTION

AIM

- To inform clinicians of the screening, management and obstetric birth considerations for pregnancies complicated with fetal intrauterine growth restriction (IUGR).
- To provide a quick reference flowchart for antenatal diagnosis and management of IUGR.

BACKGROUND INFORMATION

50-70% of the Small-for-Gestation Age (SGA) fetuses are constitutionally small but healthy. Approximately 10-15% of SGA fetuses are classified to be 'true' IUGR cases, and another 5-10% are associated with chromosomal/structural anomalies, or chronic intrauterine infection.

A fetus is considered to have intrauterine growth restriction when the ultrasound fetal measurements, particularly the abdominal circumference or serial weight measurements, are below what is considered normal for that age and gestation. This is usually below the 5th or 10th centile when compared to the normal growth and gestational age by ultrasound measurements. The IUGR infant has not reached their genetic growth potential due to a pathological reason or event in utero causing placental dysfunction. The IUGR fetus is associated with an increased risk of perinatal mortality and morbidity and long term health consequences for survivors. Current evidence suggests long term consequences for IUGR infants are that they are prone to heart disease, type 2 diabetes, strokes, hypertension and even osteoporosis later in life.

The Growth Restriction Intervention Trial (GRIT) concluded that generally if the fetus is less than 31 weeks gestation it is best to delay delivery if there is uncertainty about need for intervention, rather than immediate delivery. Evidence to date indicates that by delivering the fetus early to pre-empt severe hypoxia and acidosis does not reduce adverse outcomes.

Umbilical artery (UA) Doppler measurement is a tool used to identify if the SGA fetus is affected by placental dysfunction which occurs with the IUGR fetus. With worsening severity of placental insufficiency there is higher placental resistance which can lead to absent or reversed end-diastolic flow velocities. This is associated with poorer perinatal outcomes and mortality. Fetal circulatory redistribution due to placental insufficiency leads to abnormal Doppler indices in the cerebral and umbilical arteries providing valuable information to assist decision making regarding timing of birth. Doppler abnormalities have been shown to deteriorate before biophysical profile scores (BPS) in the preterm fetus with IUGR prior to 32 weeks gestation.

In 2013, identification of babies with IUGR birthed >40wks forms Indicator 8 for clinical audit. See: Indicator 8: IUGR, in RANZCOG/ACHS Obstetric Clinical Indicators 2011.
CAUSES AND RISKFACTORS FOR IUGR \(^3,11\)

<table>
<thead>
<tr>
<th>Maternal</th>
<th>Fetal</th>
<th>Placental</th>
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</thead>
<tbody>
<tr>
<td>Hypertensive disorders</td>
<td>Aneuploidy</td>
<td>Anatomical conditions</td>
</tr>
<tr>
<td>Autoimmune disease</td>
<td>Malformations</td>
<td>Vascular conditions</td>
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<tr>
<td>Certain medications</td>
<td>Abnormal genetic imprinting syndromes</td>
<td>Chromosomal conditions</td>
</tr>
<tr>
<td>Severe malnutrition, anaemia</td>
<td>Viral or protozoan infections</td>
<td>Morphological abnormalities</td>
</tr>
<tr>
<td>Maternal lifestyle e.g. smoking, alcohol abuse, substance abuse</td>
<td>Preterm birth</td>
<td>Multiple gestation</td>
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**KEY POINTS**

1. An accurate expected delivery date (EDD) is a critical component to allow monitoring, assessment and optimal timing of delivery.
2. Management of the IUGR fetus must include a balance of the risks of intra-uterine chronic hypoxia with preterm delivery and its associated risks.
3. Fetal Doppler studies provide the most accurate non-invasive assessment for placental function. Absent or reversed UA Doppler’s are associated with poor perinatal outcome and high perinatal mortality. \(^12\)

**SCREENING AND DIAGNOSIS**

Screening and diagnosis for IUGR includes \(^13\):

1. Accurate determination of the gestational age.
2. Abdominal palpation to determine fundal height during each antenatal visit.
4. Ultrasound examination of a suspected SGA fetus.
5. Assessment of fetal well-being when an SGA fetus or IUGR fetus is diagnosed. This includes biophysical profile (BPP), Doppler studies, and cardiotocography monitoring (CTG) depending on gestation.

**DETERMINATION OF GESTATIONAL AGE**

A dating ultrasound in the first trimester provides the most accurate method to determine gestational age. \(^13\) If the earliest ultrasound was between 13 and 24 weeks of pregnancy and the last menstrual period (LMP) is certain, with regular menstruation, and there is a difference of less than 10 days between LMP & ultrasound, use the LMP estimate. \(^14\) If the LMP is uncertain or irregular menstruation, use the ultrasound EDD. \(^14\)

**ABDOMINAL PALPATION**

- The ability to detect fetal weight by palpation is limited. \(^9\) If there is suspicion of SGA, or IUGR, management should be discussed with the obstetric team. A follow up ultrasound examination may be required. \(^9,13\)
- Document a management plan on the MR 004 ‘Obstetric Special Instruction Sheet’, after consultation with the Obstetric team if a SGA or IUGR fetus is suspected from palpation.

**SYMPHYSIS-FUNDAL MEASUREMENTS**

- See Clinical Guideline Measuring Fundal Height with a Tape Measure.
- If SGA or IUGR is suspected by abnormal fundal-symphysis measurements, ultrasound examination may be required after obstetric team consultation.
ULTRASOUND EXAMINATION
If there is suspicion of SGA or IUGR ultrasound examination should be performed to assess:

- Biometry – assessment of growth requires at least 2 measurements two weeks apart.\(^1\) Three weeks apart reduces false positive rate.\(^9\)
- Doppler studies – Doppler studies are a valuable tool to differentiate the SGA fetus that is healthy, and the true IUGR fetus.\(^1,9\)
- Amniotic Fluid Volume (AFV)
- Fetal well-being – Biophysical profile (BPP)
- Anatomy examination - if an anatomy scan has not been done or is unavailable, this scan is required to exclude fetal anomalies, and fetal aneuploidy.\(^3,15\)

MANAGEMENT

1. Frequency of fetal surveillance is assessed at each visit, and the management plan is adjusted by the Obstetric team according to the fetal and maternal clinical condition.
2. Antenatal surveillance may be conducted with antenatal clinic visits and by outpatient review in the Maternal Fetal Assessment Unit (MFAU). If the maternal or fetal clinical condition requires more intensive surveillance in-patient hospitalisation should be considered in consultation with the team Obstetrician.
3. All ultrasound examinations, CTGs, and BPP must be reviewed and documented by the Registrar or Consultant prior to discharge of a woman.
4. Document the assessment and test results at each visit to MFAU on the Maternal Fetal Assessment Outpatient form MR 226.

ASSESS FOR CAUSES OF IUGR

1. Review the medical and pregnancy history to determine the cause of the IUGR e.g. accurate delivery date, normal anatomy scan, and if any history of infection.\(^15\)
2. Ensure a ‘hard copy’ of the antenatal testing and the results are available in the medical records.

ULTRASOUND SURVEILLANCE

1. *Amniotic fluid volume (AFV) and Doppler studies*
   - If normal at the initial visit: continue fortnightly assessment of AFV and UA/ MCA Doppler studies.\(^9\)
   - If abnormal at the initial visit:
     - If end diastolic velocities (EDV) present/ pulsatility index (PI) or resistance index (RI) >2SD: Arrange twice-weekly assessment of AFV and Doppler studies, or more frequent surveillance if the clinical condition requires closer monitoring.\(^9\)
     - If absent / reversed end diastolic velocities (AREDV): Repeat UA and DV Doppler daily.\(^9\) Discuss with Obstetric Consultant/ refer for fetal medicine specialist opinion.\(^9\)

2. *Fetal Biometry- Abdominal circumference (AC) and estimated fetal weight (EFW):*
   - If normal Doppler, arrange fetal biometry fortnightly.\(^9,15\)
   - If abnormal Doppler, arrange weekly.\(^9\)

CTG MONITORING
If the gestation is more than 32 weeks:

- Arrange a weekly CTG in MFAU on the woman’s Obstetric Team day on duty in the antenatal clinic.
- If abnormal AFI or Doppler’s arrange bi-weekly CTG monitoring in MFAU.
- If abnormal Doppler with AREDV attend daily CTG.\(^9\)
If the gestation is less than 32 weeks gestation discuss with the Registrar and Consultant if CTG monitoring is required.

**ANTICIPATED PRETERM BIRTH**

- Consider a course of corticosteroids if pre-term birth < 34 weeks gestation is anticipated.\(^1,9\)
- Arrange Paediatric consultation if the gestation is less than 32 weeks.

**TIMING OF DELIVERY**

Delivery is indicated when risk of fetal death or morbidity is greater than the risk of prematurity.

**IUGR with end diastolic flow**

- If other surveillance findings and maternal condition are normal delivery may be delayed until 37 weeks.\(^9\)
- Recommend birth >34weeks if:
  - Static growth over 3-4 weeks
  - MCA Doppler PI <5\(^{th}\) centile
    - Consider steroids if caesarean birth.\(^9,16\)

**IUGR associated with absent or reversed flow**

- Admit for close surveillance.\(^16\).
- Administration of steroids is recommended if preterm birth expected <34\(^{th}\) weeks, if the clinical condition allows time.\(^7\) See KEMH 'Use of corticosteroids'.
- If other surveillance results are abnormal delivery is indicated.\(^9,16\)

**INTRAPARTUM MANAGEMENT**

- Early admission in spontaneous labour.\(^9\)
- Apply continuous CTG monitoring from onset of uterine contractions.\(^9\)
- Caesarean birth is recommended in the IUGR fetus with UA AREDV.\(^9\)
- Induction of labour can be offered where normal UA Doppler or abnormal UA PI with EDV present.\(^9\)
REFERENCES (STANDARDS)

National Standards – Standard 9 Recognising and Responding to Clinical Deterioration
Legislation - Nil
Related Policies – B 2.20.1 MFAU Quick Reference Guideline to Confirmed IUGR
Other related documents – Nil

RESPONSIBILITY

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<tr>
<th>Policy Sponsor</th>
<th>Nursing &amp; Midwifery Director OGCCU</th>
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<tr>
<td>Initial Endorsement</td>
<td>July 2009</td>
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<td>Last Reviewed</td>
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ANTENATAL CLINIC FLOWCHART FOR DIAGNOSIS & MANAGEMENT OF IUGR

**ASSESS**
- Risk factors at booking
- SFH at every visit

Are measurements small for dates? AND/OR Are IUGR risk factors present? (1 major or 3 minor)

NO
- Check gestational age correct (dating scan)
- Review anatomy scan/FTS/possible causes
- Discuss with obstetric team if measuring small for dates
- Document plan in antenatal record & MR 004 Obstetric Instruction Sheet

DIAGNOSE
- Arrange ultrasounds
  - AFI / Dopplers / fetal biometry / BPP
  - Anatomy (if not already performed)

Routine care
- AC or EFW <10th centile? OR Serial ultrasound indicate IUGR?

MANAGE
- Serial ultrasounds
- Schedule ultrasounds & antenatal visits same day

NORMAL
- UA Doppler
  - Fortnightly
    - UA Doppler
    - MCA Doppler
    - AC & EFW

ABNORMAL
- UA Doppler
  - Weekly AC & EFW
  - PI or RI >2SD, EDV present
  - Twice weekly
    - UA Doppler
    - CTG >32/40

AREDV
- Daily
  - UA Doppler
  - DV Doppler
  - CTG >32/40

Birth
- Offer by 37 weeks - timing d/w consultant
- Recommended by >34wks if:
  - Static growth over 3-4wks
  - MCA Doppler PI <5th centile
  - Consider steroids if CS birth & appropriate

Birth
- Recommended by 32 weeks – after steroids
- Consider 30-32wks
- Recommended <32wks after steroids if:
  - Abnormal DV Doppler & CTG
  - >24 wks & EFW >500g

Intrapartum
- Early admission in labour & Continuous CTG
- Caesarean birth recommended if UA Doppler AREDV
- IOL offered if normal UA Doppler or abnormal UA PI with EDV present, though increased rates of CS birth

**Abbreviations:**
- AC: abdominal circumference
- AFI: amniotic fluid index
- AREDV: absent/reversed end diastolic velocities
- BPP: biophysical profile
- CS: caesarean section
- CTG: cardiotocography
- DV: ductus venosus
- d/w: discuss with
- EFW: estimated fetal weight
- FTS: first trimester screen
- IUGR: intrauterine growth restriction
- MCA: middle cerebral artery
- PI: pulsatility index
- RI: resistance index
- SD: standard deviation
- UA: umbilical artery

This flowchart represents minimum care & should be read in conjunction with the full guideline. Additional care should be individualised dependent on condition changes & co-morbidities.