CLINICAL PRACTICE GUIDELINE

Small for Gestational Age and Intrauterine Growth Restriction: Management of

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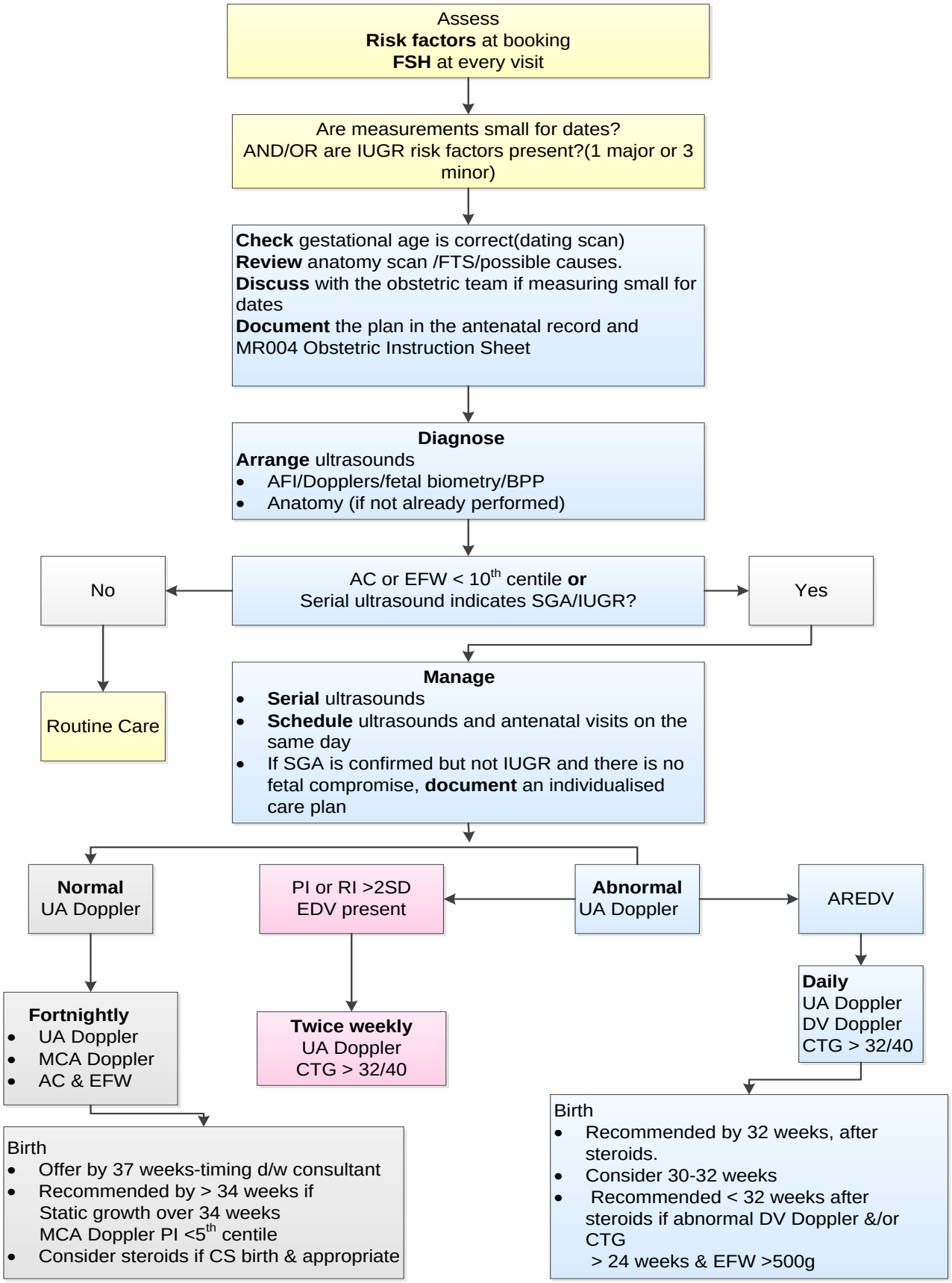
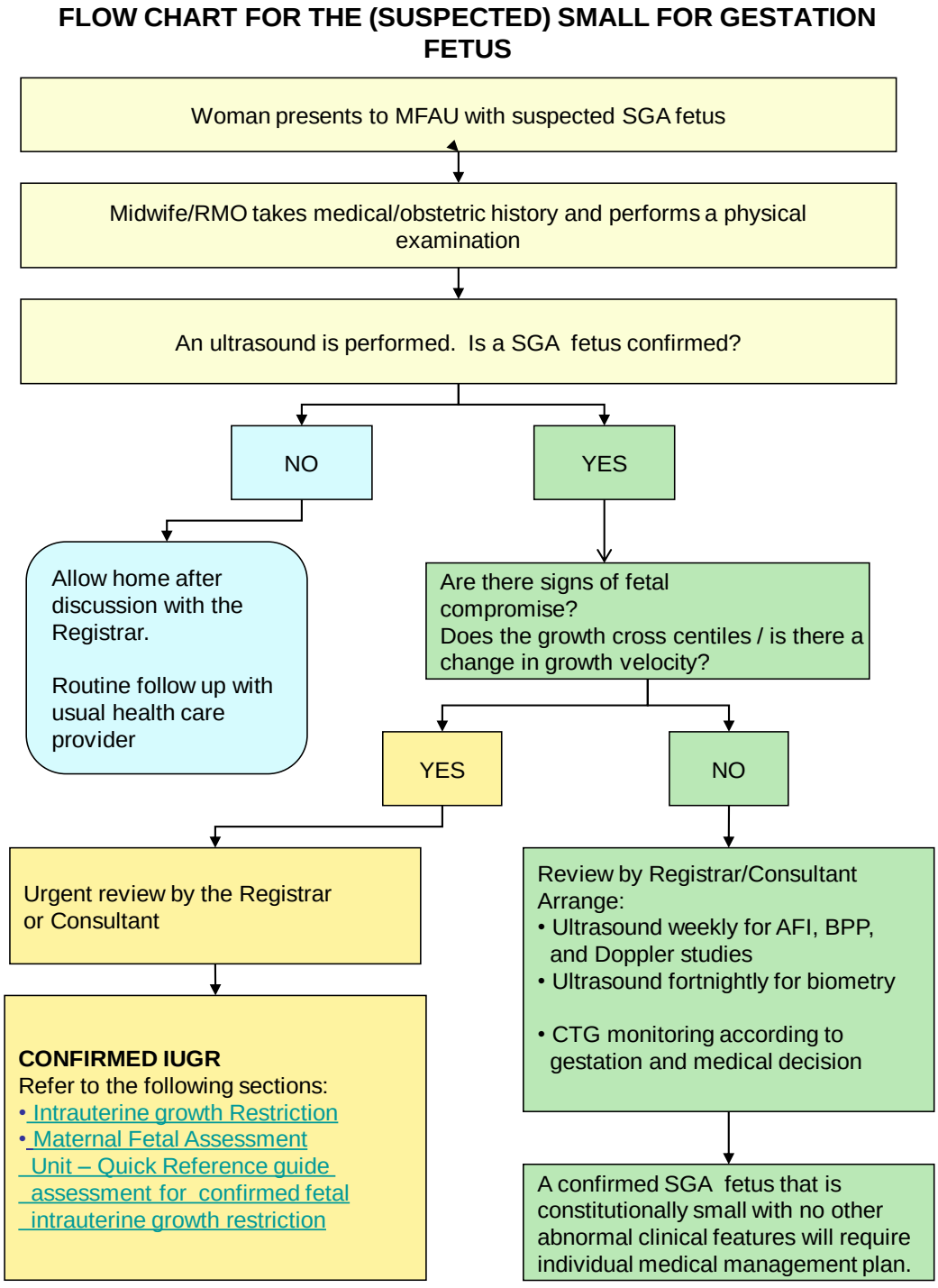
Contents

Antenatal Clinic Flowchart for Diagnosis & Management of IUGR

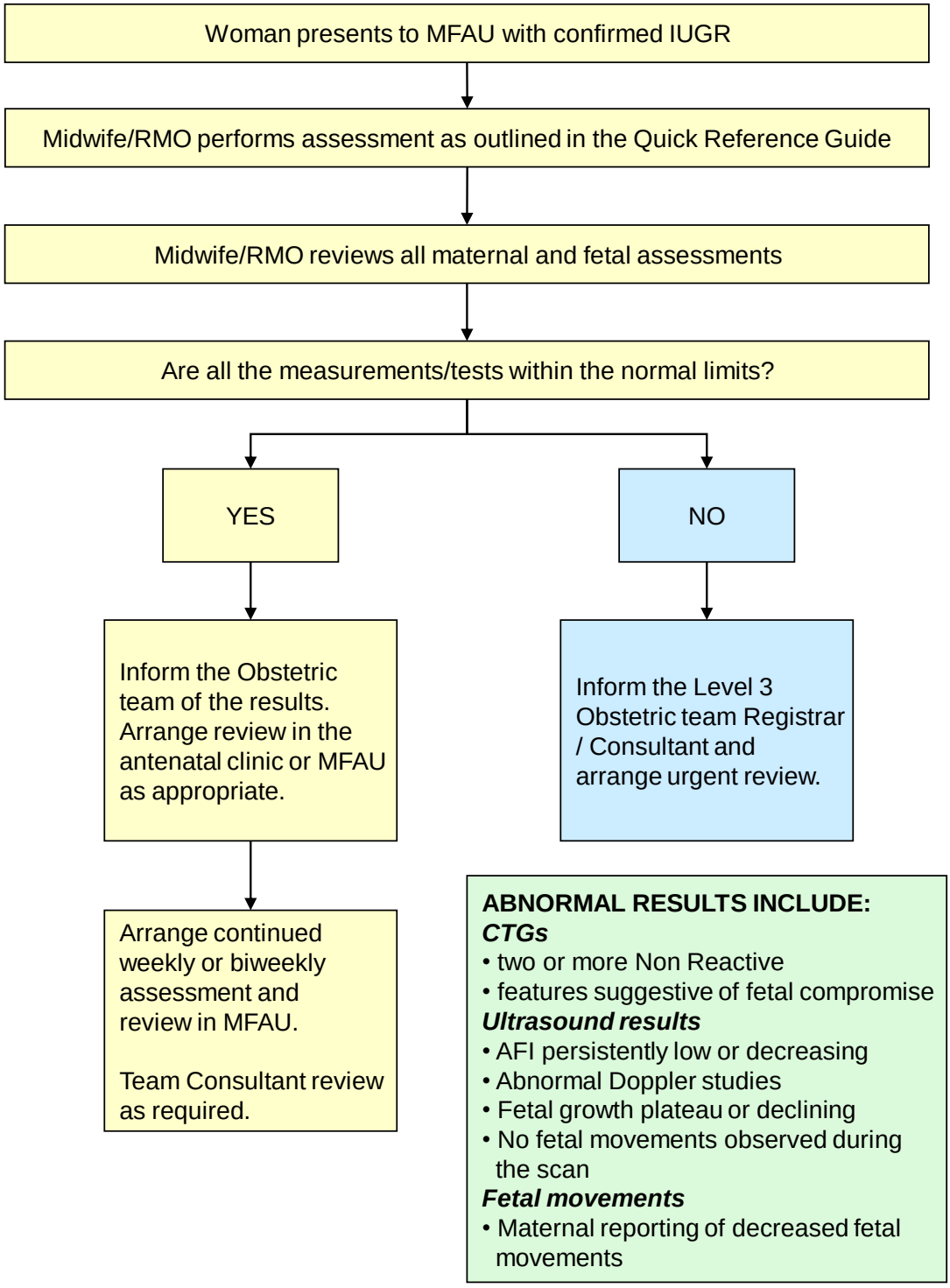


Flow chart for **Suspected** SGA



Flow chart for **Confirmed** IUGR

FLOW CHART FOR MANAGEMENT OF CONFIRMED INTRA-UTERINE GROWTH RESTRICTION



Suspected small for gestational age fetus: MFAU QRG

Criteria for Referral

Antenatal women for whom there is clinical suspicion of a suspected 'small for gestational age' (SGA) fetus at or more than 24 weeks gestation.

Assessment

1. Confirm the gestational age by the woman's dating ultrasound or last menstrual period dates. Ensure a copy of the ultrasound report is available in the medical records.
2. Review the result of the First Trimester and Second Trimester Screen if available. Ensure a copy of the result is in the woman's medical records.
3. Document the medical and obstetric history. Note any risk factors that may contribute to a SGA fetus.
4. Palpate the abdomen as appropriate to determine:
   - Symphysis fundal height
   - Lie
   - Presentation
5. Arrange an ultrasound scan for fetal biometry, amniotic fluid index (AFI), umbilical artery (UA) Doppler velocities.
6. On confirmation of SGA diagnosis:
   - If more than 32 weeks gestation, commence cardiotocography (CTG) monitoring.
   - If less than 32 weeks gestation discuss with Registrar or Consultant if CTG monitoring is required.

Subsequent Visits for <u>Confirmed</u> SGA

Ultrasound and CTG monitoring management will be altered according to the clinical picture and the medical management plan.

See the section on Intrauterine growth restriction for antenatal management of the SGA fetus confirmed as intrauterine growth restricted.

Ultrasound Assessment

Fortnightly ultrasound assessment for biophysical profile, AFI and UA Doppler velocities.

- Increased to twice weekly if abnormality in UA Doppler, or daily if absent/reversed end diastolic velocity.
- Fortnightly fetal biometry.
- Increased to weekly if UA Doppler abnormality.

CTG monitoring

The frequency of CTG monitoring will depend on the fetal gestation and clinical picture.

Management

- Inform the obstetric team of all results before the woman is discharged home. A management plan is formulated prior to discharge.
- Document test results and management plan for future follow-up management in MFAU and the antenatal clinic.
- Attempt where possible to arrange appointments in MFAU to coincide with the antenatal clinic appointments. This allows review of the results by her team during clinic appointments.
- The frequency of antenatal clinic appointments will depend on the clinical picture and medical consultation
- Consider administering Betamethasone if pre term birth is anticipated.

Intrauterine growth restriction (IUGR)

Aim

To inform clinicians of the screening, management and obstetric birth considerations for pregnancies complicated with fetal intrauterine growth restriction (IUGR).

Background Information

50-70% of the Small-for-Gestation Age (SGA) fetuses are constitutionally small but healthy[1]. 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.[2]

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.[3] This is usually below the 5th or 10th centile when compared to the normal growth and gestational age by ultrasound measurements.[4] The IUGR infant has not reached their genetic growth potential due to a pathological reason or event in utero causing placental dysfunction.[5] The IUGR fetus is associated with an increased risk of perinatal mortality and morbidity and long term health consequences for survivors.[2, 6, 7] 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.[4]

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.[2, 8]

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.[9] 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.[1, 7] Fetal circulatory redistribution due to placental insufficiency leads to abnormal Doppler indices in the cerebral and umbilical arteries[10] 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.[10]

In 2013, identification of babies with IUGR birthed >40wks formed Indicator 8 for clinical audit. See: Indicator 8: IUGR, in RANZCOG/ACHS Obstetric Clinical Indicators 2011.

Causes and risk factors for IUGR [3, 11]

Maternal	Fetal	Placental
Hypertensive disorders	Aneuploidy	Anatomical conditions
Autoimmune disease	Malformations	Vascular conditions
Certain medications	Abnormal genetic imprinting syndromes	Chromosomal conditions
Severe malnutrition, anaemia	Viral or protozoan infections	Morphological abnormalities
Maternal lifestyle e.g. smoking	Preterm birth	
alcohol abuse, substance abuse	Multiple gestation	

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.
3. Fundal symphysis height measurements.
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.
6. Crossing centiles or a change in growth velocity.

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.

Fundal - Symphysis 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.[9, 15]

Management

1. Frequency of fetal surveillance is assessed at each visit, and management plan adjusted by Obstetric team according to 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 ≤ 36+6 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 <5th 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[16] expected ≤36+6 weeks, if the clinical condition allows time[17]. See guideline Corticosteroids: Use of
- 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]

Small for gestational age fetus

AIM

- To inform clinicians of the assessment and pregnancy management of the woman with a suspected small for gestational age fetus.

Background Information

The term 'small for gestational age '(SGA) refers to the fetus that has failed to reach a specific biometry or estimated weight threshold by a specific gestational age.[1, 2] It is estimated that 50-70% of fetuses born weighing less than the 10th centile for gestational age are constitutionally small, with the growth appropriate for the parental size and ethnicity. The outcome is usually associated with normal placental function and normal outcomes. SGA fetuses with a birth weight less than the 50th centile for gestational age have a greater likelihood of intrauterine growth restriction (IUGR).[1]

SGA fetuses are at greater risk for stillbirth, birth hypoxia, neonatal complications, impaired neurodevelopment, and possibly Type 2 diabetes and hypertension in adult life, although the high incidence of adverse perinatal outcomes maybe contributed to the IUGR foetuses in this group. The majority of term SGA infants have no appreciable morbidity or mortality.[2]

Biometric tests used to assess fetal size assist diagnosis of SGA, while biophysical tests are used to detect fetal wellbeing and are more indicative of IUGR.[2] The use of the customised fundal height chart has been demonstrated to improve the accuracy to predict a SGA fetus, but ultrasound measurements of the abdominal circumference and estimated fetal weight provide the most accurate way to predict SGA.[2] Symphysis fundal height (SFH) measurements may improve sensitivity and specificity for predicting SGA, whilst abdominal palpation alone has limited accuracy for identification of a SGA fetus[2]. The impact on perinatal outcomes of SFH measurement, compared to abdominal palpation, is uncertain with a Cochrane systematic review finding only one controlled trial that showed SFH measurements did not significantly change perinatal outcomes.[3] Continuation of SFH measurement at each antenatal appointment has been recommended.[2, 3]

Assessment of fetal growth, abdominal circumference (AC) and estimated fetal weight (EFW), requires two ultrasound measurements at least three weeks apart, which will differentiate normally growing fetuses from those with IUGR.[2] More frequent scanning may be required by the Obstetric team where awareness of EFW would assist in obstetric management, for reasons other than SGA diagnosis. [2] Routine biometry is not justified in third trimester as it does not reduce the risk of SGA and does not improve perinatal outcomes[2]. Measurements only provide limited information to assist decision making for management for timing of delivery. Associated antenatal surveillance techniques assist in clinical judgement for timing of delivery. These techniques differentiate between a SGA fetus with a predicted normal outcome, and the fetus which is growth restricted resulting in adverse perinatal morbidity and mortality.[1, 2] Umbilical artery (UA) Doppler measurements can identify if a confirmed SGA fetus is affected by placental dysfunction, with end-diastolic flow velocity results providing valuable information on risk for perinatal mortality and morbidity.[1, 2, 4]

Key Points

1. SGA describes the fetus that has failed to reach the normal biometric weight by a specific gestational age. This does not always indicate a fetus is growth restricted.
2. The use of ultrasound biometry and biophysical tests can assist differentiation between the SGA with no expected perinatal morbidity or mortality risk, and the IUGR fetus with predicted poor perinatal outcomes.
3. To evaluate fetal growth over time at least two subsequent measurements two weeks apart should be performed.[5] A three week interval further reduces false positive results.[2]
4. Management is individualised according to gestation, fetal wellbeing and any compounding maternal or fetal health factors.[2]

Diagnosis

Most methods to detect SGA require an accurate estimation of gestation as a prerequisite.

Methods to detect SGA include:

- Measurement of symphysis pubis fundal height –recommended at each antenatal appointment from 24 weeks to improve prediction of SGA fetus[2].
- Abdominal palpation – has a limited diagnostic ability to predict the SGA fetus.[2] If a SGA fetus is suspected, diagnosis should be supplemented by ultrasound biometry.
- Ultrasound biometry (AC or EFW <10th centile).
- Biophysical tests.

Management

At booking identify those needing increased monitoring:

- Where SFH is less accurate (large uterine fibroids, >BMI) = serial growth ultrasounds[2].
- One major or three minor risk factors present (see below).[2]

Consider preventative interventions in high risk groups (smoking cessation advice, antiplatelet agents in women at high risk of pre-eclampsia).[2]

Risks for IUGR/SGA:

- Maternal age >35, **>40** [2]
- Nulliparity[2]
- BMI[2] <20
- IVF single pregnancy[2]
- **Daily vigorous exercise**[2]
- **Low fruit intake pre-pregnancy**[2]
- **Low maternal weight gain**[2]

- **Previous stillbirth**[2]
- **Pre- eclampsia**[2] (previous pregnancy or **this pregnancy)**
- **Maternal or paternal SGA**[2]
- Pregnancy interval (<6months or >60months) [2]
- **Heavy bleeding**[2] **(threatened miscarriage), unexplained APH**[2], or Placental abruption[2]
- **Echogenic fetal bowel**[2]
- Caffeine >300mg/day in third trimester[2]
- **PAPP- A < 0.4 MoM**[2]
- **Smoking**
- Multiple pregnancy

Assess for causes of the SGA and/or the IUGR fetus

- **Constitutionally small mothers**[2, 6, 7]
- Poor maternal nutrition leading to a malnourished and underweight mother[6, 7]
- **Previous birth of an SGA baby** increases risk in a subsequent pregnancy[2, 6]
- Fetal structural abnormalities and congenital malformations[6-8]
- Fetal chromosomal abnormalities[6-8]
- Multiple pregnancy - a twin pregnancy is associated with a 10% increased chance of IUGR[6, 8]
- Life style factors e.g. smoking[2, 6, 8] **(>11/day)**[2], alcohol and substance abuse[7, 8] **(cocaine)**[2]
- Fetal infections e.g. cytomegalovirus, malaria, parvovirus, rubella[6-8]
- Maternal disease or disorders e.g. **pregnancy induced hypertension**[2, 6] (mild/ **severe**); **diabetes**[2]; **vascular disease**[2]**; chronic HTN**[2]
- Disorders of cartilage and bone[7]
- Teratogens[7]
- **Renal disease**[2, 7]
- Chronic hypoxia[7]
- Placental and cord abnormalities[7, 8]
- **Antiphospholipid Antibody Syndrome**[2, 7]

Note: Factors in bold represent major risk factors for IUGR

Fetal Surveillance

Ultrasound scans

1. If severe SGA identified on anatomy scan (from external results), arrange detailed anatomical ultrasound and uterine artery Doppler[2] with fetal medicine sonographer.

- Offer karyotyping in severe SGA with structural anomalies, those before 23 weeks gestation, particularly if UA Doppler normal[2]

2. Arrange ultrasound assessment if a SGA fetus is **suspected** – biometry, amniotic fluid index (AFI), umbilical artery (UA) Doppler velocities, and fetal wellbeing.
3. If SGA is **confirmed** organise serial assessment of fetal size and umbilical artery (UA) Doppler[2]:
    - Weekly ultrasounds including AFI and UA Doppler's. UA Doppler is the primary surveillance tool in SGA[2].
        - If **normal** UA Doppler flow: may be repeated every 14 days
        - More frequently in severe SGA
        - If **abnormal** UA Doppler flow indices and birth not indicated repeat
            - Twice weekly if *end-diastolic* velocities present
            - Daily if *absent/reversed* end-diastolic frequencies).[2]
    - Fortnightly fetal biometry and fetal well-being.
4. In the *preterm* SGA fetus with *abnormal* UA Doppler, the Ductus venous Doppler should be used to assist in timing birth.[2]
5. In the *term* SGA fetus with *normal* UA Doppler, the middle cerebral artery (MCA) Doppler should be used to assist in timing birth. [2]

Cardiotocograph monitoring (CTG)

- If SGA is confirmed perform a CTG if the fetus is > 32 weeks gestation.
- If SGA is confirmed and the fetus is < 32 weeks gestation – discuss management with the obstetric team Consultant if CTG monitoring is required in correlation with ultrasound findings.
- Frequency of follow-up CTG monitoring in MFAU will be weekly or bi-weekly depending on the biophysical profile and the UA Doppler studies. The Consultant or Senior Registrar will make this decision.
- The CTG should be used in conjunction with other fetal monitoring for the SGA fetus [2].

Medical review and antenatal care

SGA IS <u>NOT</u> CONFIRMED

If the ultrasound examination does not confirm SGA:

- Discuss with the team registrar or Consultant.
- Allow routine follow-up with the usual health care provider.

CONFIRMED SGA

1. Abnormalities of ultrasound examination or CTG monitoring should have urgent review by the Consultant or the Senior Registrar.

2. Document a management plan on the MR 004 'Obstetric Special Instruction Sheet'.
3. Organise ultrasound follow-up appointments in the Maternal Fetal Assessment Unit (MFAU).
4. Organise CTG monitoring according to gestation and medical management plan.
5. Arrange obstetric team antenatal clinic appointments weekly for medical review. Ideally the appointments should be made to coincide with appointments in MFAU.
6. If SGA is confirmed but serial ultrasound biometry and UA Doppler do not indicate IUGR or fetal compromise an individualised management plan should be documented.

CONFIRMED IUGR

1. If IUGR is diagnosed refer to Section Intrauterine Growth Restriction
2. Consider administration of corticosteroids if pre-term delivery is anticipated.[2]

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Related WNHS policies, procedures and guidelines

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