Small for Gestational Age Fetus & Fetal Surveillance - UHL Obstetric Guideline

University Hospitals of Leicester NHS Trust

Trust ref:C38/2017

Contents

1. Introduction and who the guideline applies to:

This guideline is intended for use the use of obstetric, midwifery and ultrasonography staff involved in the antenatal care of women with monitoring fetal growth or caring for a woman with a suspected or confirmed small for gestational age fetus.

Fetal growth restriction (FGR) is the single largest contributing factor to perinatal mortality in non-anomalous fetuses. Advances in antenatal and neonatal critical care have resulted in a reduction in neonatal deaths over the past decade. Antenatal detection of a growth restricted fetus is vital and has been shown to significantly reduce the risk of stillbirth as it enables a decision to be made about the timely delivery of the fetus [(1)].

Key points & changes:

- Some women are classified as OTHER and should have 4 weekly growth scans booked from 28/40 for uterine anomalies, 32/40 for raised BMI and fibroids.
- When a woman or birthing person changes from a low-risk pathway to a serial scan pathway then SFH measurements should stop as the two are not comparable.
- Removed - Sub-optimal growth after 34 weeks gestation may be defined as an estimated fetal weight gain of less than 20g per day over a minimum of 2 weeks.
- If FGR is suspected an assessment of fetal wellbeing should be made including a discussion regarding fetal movements and if required computerised CTG (cCTG).
- A maternal assessment should be performed at each contact
- Incorporated updates from SBL CBv3 in the management algorithm
- Updated management if severe SGA is detected or there is abnormality in the umbilical artery Doppler.

Related UHL documents:

Ultrasound UHL Obstetric Guideline UHLref: B52/2011

Aspirin in Pregnancy UHL Obstetric Guideline UHLref: C36/2011

Magnesium Sulfate for Fetal Neuroprotection UHL Obstetric Guideline UHLref: C3/2015

Preterm Labour Guidance in the Absence of PPROM UHL Obstetric Guideline UHLref: C7/2014

Smoking Cessation for Pregnant Smokers and Partners UHL Obstetric Guideline UHLref: C110/2008

Definition

Small for gestational age (SGA) refers to an infant born with a birth weight less than the 10th centile. Definitions of SGA and severe SGA vary. For the purpose for this guideline, SGA birth is defined as an estimated fetal weight (EFW) of less than the 10th birthweight centile and severe SGA as an EFW of less than the 3rd birthweight centile.

Definition of Fetal Growth Restriction (FGR) in a ***previous pregnancy*** as a risk factor defined as any of the following: (adapted from SBLCBv2 2019)

- birthweight <3rd centile NB. Any previous pregnancies are noted on the GROW chart with the birthweight centile.
- Evidence of placental dysfunction
- birthweight <10th centile with evidence of placental dysfunction as defined below for current pregnancy.

Definition of FGR in a ***current pregnancy*** is defined as either of the following: (SBLCBv3 2023)

- EFW or abdominal circumference (AC) <3rd centile
- EFW <10th centile with evidence of placental dysfunction (either):
  - Abnormal uterine artery Doppler (mean pulsatility index >95th centile) earlier in pregnancy (20 – 24 weeks) and/or
  - Abnormal umbilical artery Doppler (absent or reversed end diastolic flow or pulsatility index >95th centile).

Background

Small fetuses are divided into:
normal (constitutionally) small,

- non–placental mediated growth restriction, for example; structural or chromosomal anomaly, inborn errors of metabolism and fetal infection.
- placental mediated growth restriction.

50-70% of SGA fetuses are constitutionally small, i.e. the fetal growth is appropriate for maternal size and ethnicity. This group of structurally normal SGA fetuses are at increased risk perinatal morbidity and mortality, although the risk is smaller than the growth restricted cohort.

Fetal growth restriction (FGR) in contrast, implies a pathological restriction in the genetic growth potential. As a result, growth restricted fetuses ***may*** manifest evidence of fetal compromise (such as abnormal Doppler studies or reduced liquor volume).

<u>When considering the aetiology of FGR</u>

- Maternal factors can affect placental transfer of nutrients, such as undernutrition, substance misuse or severe anaemia.
- Medical conditions can affect placental implantation and vasculature and hence transfer of nutrients across the placenta, for example; pre-eclampsia, autoimmune disease, thrombophilias, renal disease, diabetes and essential hypertension.
- SGA especially early onset (less than 24 weeks) can be associated with severe placental disease

due to chromosomal, genetic or infective factors such as cytomegalovirus or toxoplasmosis.

Detection:

Clinical examination as a method of screening for fetal size can be unreliable in detecting SGA fetuses. Diagnosis of a SGA fetus usually relies on ultrasound measurement of fetal head circumference, abdominal circumference (AC) and femur length in order for a calculation of estimated of fetal weight to be made. Ultrasound estimations of fetal weight can also have a 10-20% margin of error particularly in estimating the weights of all fetuses including both large and growth restricted fetuses.

2. Recommendations:

2.1 Booking Assessment:

Assess at booking for risk factors for an SGA fetus / neonate to identify those who require increased surveillance.

The Antenatal Core Midwives should carry out a risk assessment on receipt of the hand held notes into the consultant unit. This risk assessment will be made using the algorithm contained in appendix 1.

- **Low Risk**

Women with singleton pregnancies and no risk factors should be identified as LOW RISK and should have serial assessment as a minimum at each routine antenatal appointment of the symphysis fundal height (SFH) from 26-28 weeks until delivery. This should be plotted on the customised growth chart with a cross X. The SFH should be measured in whole centimeters **with a minimum of 14 days** between measurements. Staff should be trained to palpate, measure, plot and interpret measurements appropriately.
Women who attend appointments within 14 days of having had the SFH plotted should still receive an abdominal palpation, without a repeat SFH measurement and findings should be documented as part of the whole clinical assessment.

Classification of increased risk

All women who are assessed as having an increased risk of fetal growth restriction should be classified as either moderate, high risk or other.

- **Moderate Risk**

Women who are classified as moderate risk should be referred for serial ultrasound measurement of fetal size and assessment of wellbeing with umbilical artery Doppler from 32 week gestation (see flow chart page 16)

Women at moderate risk of FGR do not require uterine artery Doppler assessment but are still at risk of later onset FGR so require serial ultrasound assessment of fetal growth at 32 weeks.
Ongoing surveillance for fetal growth should be performed at intervals of at least 14 days, with optimum assessment for growth velocity being 21 – 28 days. For the vast majority of pregnancies in the moderate risk category or in those unsuitable for SFH measurements, an interval of four weeks is appropriate.

- **High Risk**

Women who are high risk should be offered their anomaly scan between 20-week gestation and 20+6 week gestation in order that uterine artery Doppler can be performed at this scan to determine when the first growth scan is required.

Ensure that women who require consultant scan appointments have the relevant request form completed and sent to the fetal medicine department. If already under consultant care, it may be more appropriate to bring an existing appointment forward

- **Other Risk Category**

There are some women who are unsuitable for assessment by SFH and these women are classified as OTHER and should have 4 weekly growth scans booked from 28/40 for uterine anomalies, 32/40 for raised BMI and fibroids. See algorithm (page 16) for further details.

2.2 Further risks factors which may develop in late pregnancy:

Serial ultrasound assessment of fetal size and umbilical artery Doppler should commence if the following complications develop.

- Severe pregnancy induced hypertension
- Pre-eclampsia
- Significant Ante Partum Haemorrhage

2.3 Management of women who have had previous fetal death secondary to placental mediated growth restriction or a previous infant whose birthweight was <10th centile on customised birth weight centile chart

- Women with history as above should have a documented plan of care in their notes, where a care plan is not available; the patient should be referred to a consultant clinic, fetal medicine, or Rainbow clinic.

- Aspirin can be commenced at 150mg once a day at night from 12 weeks (usually following the first scan) until 36/40. Aspirin may be commenced up to 20 weeks, however the earlier aspirin is commenced, the greater the benefit on placental development. Please see Aspirin in Pregnancy UHL Obstetric Guideline for further details.

2.4 Smoking cigarettes in Pregnancy (not vaping).

Women should be asked at their midwife booking history about whether or not they smoke. All women should be asked again at their booking scan (first scan) about whether they are continuing to smoke.

For women who are continuing to smoke cigarettes at their booking scan this is considered to be a moderate risk factor and they should start serial growth scans from 32 weeks every 4 weeks.

Referral to smoking cessation should be offered at every opportunity.

2.5 Low Papp A

Where a low Papp A level <5th centile is identified following first trimester trisomy screening the woman shall be informed in the usual manner and her pregnancy classified as high risk.

- Where possible the anomaly scan should be performed between 20 weeks and 0 days and 20 weeks and 6 days to enable uterine artery Dopplers to be performed. This may necessitate a change in date from the original booking.
- Following this, serial growth scans should be arranged as laid out in the algorithm (page 16).
- Aspirin should be offered as per Aspirin in Pregnancy UHL Obstetric Guideline

2.6 Uterine artery doppler

The majority of cases are associated with abnormal uterine artery Doppler indices or already present estimated fetal weight (EFW) <10th centile in the early third trimester. Thus, uterine artery Doppler can be used in the second trimester (20 – 24 weeks alongside routine fetal anomaly scan) to further determine the risk of placental dysfunction and therefore risk of hypertensive disorders or early onset FGR for women at high risk.
For women with a normal uterine artery Doppler pulsatility index (mean ≤95th centile) the risk of these disorders is low and thus serial scanning for fetal biometry can be commenced in the third trimester. For women in the high risk category the scan interval should be confirmed following the first assessment for fetal growth.

If the uterine artery Doppler is unobtainable (see SOP page 21 for this) and the anomaly scan is completed at first attempt no further appointments should be made to repeat the uterine artery Doppler and growth scans should be commenced at 28 weeks gestation.
If the anomaly scan is incomplete at the first attempt and the woman is being asked to return to complete the anomaly scan then, a second attempt should be made to perform uterine artery Doppler. The algorithm should then be followed.

2.7 Umbilical Artery Doppler.

When defined by customised fetal weight standards 81% of SGA fetuses have a normal umbilical artery Doppler. Outpatient management is safe in this group and it may be reasonable to repeat Doppler surveillance every 14 days. The patient should be asked to report any episodes of reduced fetal movements.

Normal end diastolic flow after 32 weeks does not mean that the fetus is not growth restricted nor that there is no evidence of fetal compromise.

In SGA fetuses with abnormal umbilical artery Doppler where there is not an indication for delivery, the optimal frequency of surveillance is unclear. Until definitive evidence becomes available it is reasonable to repeat surveillance twice weekly in fetuses with end–diastolic velocities present and as advised by the fetal medicine team in fetuses with absent or reversed end–diastolic velocities (AREDV).

2.8 Middle Cerebral Artery Doppler

MAC Doppler may be a more useful test in SGA fetuses detected after 32 weeks of gestation where umbilical artery Doppler is typically normal. Studies suggest an MCA PI (implying cerebral

redistribution) is associated with emergency caesarean section and neonatal admission. Under 32 weeks the Ductus venosus (DV)Doppler is a better predictor of fetal acidaemia.

2.9 Change of scan pathway.

Where a change of pathway is considered to be required, the relevant scan request form will need to be completed with all appropriate details, by the referring professional. Document in the patient records. Complete change of risk assessment pathway form if available and place in hand held and hospital notes

2.10 Requesting USS:

All forms need to be fully completed. Scan forms will be reviewed by the designated staff members before the scan is booked to ensure it complies with UHL guidelines criteria (see back of request form and related guidelines). Antenatal USS forms go to the antenatal clinic manager for review. If a request for an USS is rejected during this review because it does not comply with UHL guidance, the antenatal clinic manager (or designated person) will contact the relevant referring midwife/clinician or fetal medicine consultant obstetrician if further advice needs to be sought. Rejected forms are returned to the referring clinician to contact the Mother to discuss and note an ongoing plan of care.

2.11 Customised charts

Customised charts should be used rather than population based charts to plot symphysial fundal height from 26 – 28 weeks.

Each woman or birthing person will have a customised GROW chart generated following their dating scan. These are generated using the Perinatal Institute Grow App.

The EDD entered into the software will be the one calculated by the dating ultrasound scan. The chart will show the 3rd, 10th, 50th and 90th and 97th centile lines. There is a box in the top left hand corner where the maternal height, weight, BMI, ethnicity and parity will be shown.

A customised centile will be calculated for all previous children; if they were small for gestational age (SGA) or large for gestational age (LGA) this will also be detailed under ‘Previous baby details’.

The charts are currently printed on blue paper placed in the handheld notes. The chart will be fixed into the woman’s or birthing person’s hand-held records by the person generating the chart. A copy should be file in the hospital record to assist telephone consultations.

2.12 Fundal Height measurement

- Serial measurement of SFH is recommended at each antenatal appointment from 26 – 28 weeks of gestation for women who are screened as low risk and suitable for midwife led care.

- Pregnancies that are not suitable for surveillance by fundal height measurement will require ultrasound biometry instead.

- The fundal height measurement should be performed with the woman or birthing person in a semi-recumbent position, with an empty bladder and non-contracting relaxed uterus.

- Both hands should be used to perform an abdominal palpation and after identifying the highest point of the uterine fundus, one hand is left on the fundus.

- A non-elastic tape measure, starting at zero, should then be placed on the highest part of uterine fundus (which might not be midline) and drawn down to the top of the symphysis pubis (midline) and the number read in whole centimeters.

- To avoid bias the tape measure should be used with the cm side hidden and the measurement should be taken once only.

- The result should be plotted on the customised growth chart using a cross (X).

- Serial fundal height measurements should be carried out by a GAP competency assessed professional, 2-3 weekly until delivery.

- Women with a first SFH which plots below the 10th centile or serial measurements which demonstrate slow or static growth or cross a centile should be referred for an ultrasound scan. Indications for a growth scan are:

  - First SFH measurement below 10th centile at 26-28 weeks
  - Static growth : no increase in sequential fundal height measurements
  - Slow growth: *curve not following slope of any curve on the chart.*
    - *NB: The shallowest slope is the 3rd centile and this may be used as a guide as to when to refer for an ultrasound scan.*

- If the SFH detects static growth or drops below the centile curve trajectory, referral must be made for USS. The USS is plotted on the chart; this is a separate measurement and estimates fetal weight only. The SFH measurement which triggered the scan referral becomes the women's new normal and therefore future measurements that show static or reduced growth warrants another scan referral but there needs to be 2 weeks minimum between scans.

- Requests for a growth scan should be made via the antenatal services or medical records for patients in the community. The request forms will be reviewed prior to a scan being booked to ensure they comply with current guidance.

- When a woman or birthing person changes from a low-risk pathway to a serial scan pathway then SFH measurements should stop as the two are not comparable. Women and Birthing persons who are on the moderate or high-risk pathways with serial scans commencing from 32 weeks should have SFH measurements until 32 week, once serial scans commence these SFH measurements should stop

Large for gestational Age

Please see Ultrasound UHL Obstetric Guideline **&** Diabetes in Pregnancy UHL Obstetric Guideline

2.13 USS assessment, accurate plotting, management of results and when to refer

- The estimated fetal weight should be plotted on the customised growth chart using a ruler or set square to ensure accurate plotting

- When performing USS as part of the GROW assessment, the estimated fetal weight should be plotted on the customised chart with a circle (Θ) at the relevant gestation.

- If the Estimated Fetal Weight (EFW) is below 10th centile in a gestation less than 36 weeks, with normal liquor volume, normal umbilical artery Doppler. A midwifery check (BP, urinalysis and document any symptoms) should take place and repeat scan arranged in 2 weeks. The patient should be asked to report any episodes of reduced fetal movements. An obstetric review is required for patients at increased risk of developing fetal growth restriction because of risk factors in the current pregnancy, past medical history or past obstetric history. The consultant-led team will arrange for serial scans and follow up as required

- If the EFW is below 10th centile or there is reduced growth velocity with oligohydramnios and/or abnormal umbilical artery Doppler, the patient will require an obstetric review (ST3 and above with discussion with the consultant) on the same day.

- If the EFW plots between the 10th and 90th centile and is following the centile curve and the liquor volume is normal, the woman will be asked to attend her next antenatal appointment as planned.

- When using two measurements of EFW to estimate growth velocity, they should be at least 2-3 weeks apart to minimize false-positive rates for diagnosing FGR. In the presence of possible FGR growth assessments not less than 14 days are required. More frequent measurements of fetal size may be appropriate where birth weight prediction is relevant to outside of the context of diagnosing SGA/FGR.

- If FGR is suspected an assessment of fetal wellbeing should be made including a discussion regarding fetal movements and if required computerised CTG (cCTG).

- A maternal assessment should be performed at each contact this should include BP measurement using a digital monitor that has been validated for use in pregnancy and a urine dipstick assessment for proteinuria.

- In the presence of hypertension NICE guidance on the use of PIGF/slft1 testing should be followed if available, and document any symptoms. A repeat scan should be arranged in 2 weeks. The patient should be asked to report any episodes of reduced fetal movements.

- An obstetric review is required for patients at increased risk of developing fetal growth restriction because of risk factors in the current pregnancy, past medical history or past obstetric history. The consultant-led team will arrange for serial scans and follow up as required.

- **Cases with gestational age 24 - 34 weeks and an EFW is under the 3rd centile**: If the fetal movements are normal and there is normal liquor and Doppler, pattern of growth will need to be reviewed by appropriate consultant to advice on optimum time of rescanning.

- **Cases with gestational age > 34 weeks and an EFW is under the 3rd centile**: If the fetal movements are normal and there is normal liquor and Doppler, pattern of growth will need to be reviewed by appropriate consultant to advice on optimum time of rescanning and timing for delivery.

- **Cases with an EFW is under the 3rd centile** and abnormal Doppler should be reviewed/discussed with fetal medicine consultant regarding optimum monitoring and time of delivery.

- **Cases that requires early delivery before 34 weeks gestation**, will benefit from meeting neonatal team for counselling.

Echogenic fetal bowel

- If echogenic fetal bowel is detected on routine anomaly scan, the women should be seen and counselled by the fetal medicine midwives and referred for further investigations on the consultant scan list. Serial growth assessment will be required after 28 or 32 weeks gestation depending on the outcome of the uterine artery Dopplers.

Early onset FGR

- Where a fetus below the 10th centile is identified at the anomaly scan (usually between 18 weeks and 21weeks and 0 days) uterine artery Doppler should be performed. Consider referral for a detailed fetal anatomical survey by the fetal medicine team.

- Karyotyping should be considered in severely SGA fetuses with structural anomalies and in those detected before 24 weeks gestation, especially if uterine artery Doppler is normal. Studies have shown that 19% of cases of severe early onset FGR are associated with chromosomal abnormalities.

- Serological screening for congenital cytomegalovirus and toxoplasmosis infection should be offered in severely SGA fetuses. Congenital infection accounts for 5% of cases of early onset FGR.

- Testing for syphilis and malaria should be considered in high-risk populations. Malaria is a significant cause of Low Birth Weight infants worldwide, testing should be considered in those who have travelled from endemic areas.

2.14 Management of the SGA fetus between 24+0 and 36+6 weeks of gestation

Where delivery is being considered, a single course of antenatal corticosteroids should be offered.

Maternally administered magnesium sulfate has a neuroprotective effect and reduces the incidence of cerebral palsy amongst preterm infants <32 weeks.

Management if severe SGA detected or there is abnormality in the umbilical artery Doppler.

If severe SGA is detected or there is abnormality in the umbilical artery Doppler urgent referral to a

senior obstetrician and consideration for a scan on a consultant list if appropriate.

Timing of delivery

- The SBL v1 highlighted that the antenatal detection of growth restricted babies is vital and has been shown to reduce stillbirth risk significantly because it gives the option to consider timely delivery of the baby at risk. However, by seeking to capture all babies at risk, it has potentially also increased interventions in women who are only marginally at increased risk of FGR related stillbirth.

- It is increasingly recognised that some of the risks associated with preterm birth are still apparent at 'early term' gestation, defined as 37 and 38 weeks.

- SBLv2 highlighted the dilemma that early term delivery reduces the risk of a very rare but serious adverse event (stillbirth or neonatal death) while increasing the risk of much more common but less severe adverse events. Decision-making balances the risks of causing mild harm to relatively large numbers of infants in order to prevent serious harm to a relatively small number. For example, at 37 weeks, 10 inductions will lead to one additional baby being admitted for neonatal care, but it will require more than 700 inductions to prevent each perinatal death. Hence, current care is aimed at targeting early term induction to those who are at increased risk of perinatal death. Whilst continuing ultrasound surveillance of biometry and wellbeing in at risk fetuses until delivery.

- Providers with capacity may wish to use assessment of Middle Cerebral Artery (MCA) Doppler pulsatility indices (PI) in addition to umbilical artery Doppler to help identify and act upon potential fetal compromise in later pregnancy (after 34+0 weeks).

- For fetuses with an EFW <3rd centile in later pregnancy delivery should be initiated so that labour and/or delivery should occur at 37+0 weeks' gestation and no later than 37+6 weeks gestation (or earlier if there are other concerning features present depending on the protocol).

- In fetuses with an EFW between the 3rd and 10th centile, other features must be present for delivery to be recommended prior to 39 weeks, (for example, fetal concerns [based on Doppler assessment] or maternal medical conditions or concerns regarding fetal movements). If FGR cannot be excluded, then delivery should be planned from 37 weeks and should be discussed with the mother and an ongoing management plan individualised.

- For all fetuses with an EFW or AC <10th centile where FGR has been excluded, delivery or the initiation of induction of labour should be considered at 39+0 weeks after discussion with the mother. Birth should be achieved by 39+6 weeks. If other risk factors should be present for birth to be recommended prior to 39/40

- For women or birthing people who decline induction of labour or delivery after 39+0 weeks, counselling must include a documented discussion regarding evidence that there is no increase in risk for the baby or for the mother from delivery/induction at 39 weeks and that there is no evidence to determine how fetuses with SGA/FGR should be monitored if pregnancy continues.

Computerised CTG

Computerised CTG is superior to conventional CTG in predicting metabolic academia and early neonatal death. Fetal heart rate (FHR) variation is the most useful predictor of fetal wellbeing in SGA fetuses; a short-term variation < 3 ms (within 24 hours of delivery) has been associated with a higher rate of metabolic acidaemia (54.2% versus 10.5%) and early neonatal death (8.3% versus 0.5%). For further information regarding the use of computerised CTG's please refer to Maternity Assessment Unit UHL Obstetric Guideline and the Antenatal Cardiotocography UHL Obstetric Guideline

Oligohydramnios

Oligohydramnios may be associated with abnormal CTG in labour; a systematic review found an AFI < 5 cm was associated with an increased risk of caesarean section for fetal distress (RR 2.2, 95% CI 1.5–3.4) and an Apgar score < 7 at 5 minutes (RR 5.2, 95% CI 2.4–11.3) but not acidaemia. Therefore **continuous CTG MONITORING IS REQUIRED WITH REGULAR UTERINE CONTRACTIONS**

2.15 Management of the term and near term SGA fetus with umbilical artery Absent or Reversed End-Diastolic Velocity (AREDV)

- In the SGA fetus with normal umbilical artery Doppler or with abnormal umbilical artery PI but end– diastolic velocities present, induction of labour can be offered but rates of emergency caesarean section are increased and continuous fetal heart rate monitoring is recommended from the onset of uterine contractions.

- Compared to appropriate–for–gestational age fetuses, term and near term SGA fetuses are at increased risk of CTG abnormalities in labour, emergency caesarean section for suspected fetal compromise and metabolic acidaemia at delivery. 75-90% of cases with abnormal umbilical artery Dopplers have CTG abnormalities necessitating an emergency caesarean section, therefore delivery by caesarean section is recommended

2.16 Management of the preterm SGA fetus with umbilical artery AREDV

In the preterm SGA fetus with umbilical artery AREDV detected prior to 32 weeks of gestation, delivery is recommended when DV Doppler becomes abnormal or UV pulsations appear, provided the fetus is considered viable and after completion of steroids.

Even when venous Doppler is normal, delivery is recommended by 32 weeks of gestation and should be considered between 30– 32 weeks of gestation.

Delivery is the only intervention available at this time to improve survival. The balance is between prolonging pregnancy to reduce the neonatal stigmata of prematurity against the risk of fetal death.

2.17 Management of the SGA fetus detected after 32 weeks of gestation with an abnormal umbilical artery Doppler.

In the SGA fetus detected after 32 weeks of gestation with an abnormal umbilical artery Doppler,

delivery no later than 37 weeks of gestation is recommended.

GRIT is the largest multicentre randomized controlled trial in the management of fetal growth restriction. Results revealed that perinatal mortality increases from 12% in fetuses with umbilical artery AREDV to 39% when DV PIV is increased (and 41% with absence or reversal of DV A– wave) it would seem reasonable to recommend delivery when the DV Doppler becomes abnormal or UV pulsations are present, provided the fetus is considered viable (usually when gestational age is > 24 weeks and EFW is > 500 g) and after completion of steroids. Based on available evidence it is not known whether delivery should be recommended as soon as the DV PIV becomes abnormal or whether delivery should be deferred until the DV A–wave becomes absent/reversed.

The neonatal mortality rates after 31 weeks are low (4%). Similarly the incidence neurodisability after 31 weeks is low (5%). As an absent or reversed end diastolic velocity in the umbilical artery is associated with fetal death, delivery on this basis should be considered on this finding >30 weeks and recommended no later than 32 weeks.

As there is increased risk of adverse outcomes in term/near term SGA fetuses with increased umbilical artery PI and those with a normal umbilical artery Doppler but reduced MCA PI, delivery should be recommended by 37 weeks of gestation in these pregnancies.

3. Education and Training:

All Obstetricians, Midwives, Sonographers and Maternity Care Assistants involved in care of antenatal women should undergo training using the GROW package yearly

4. Monitoring Compliance

None

5. Key References:

1. “NHS England (2019) Saving Babies Lives version 2” London.
2. Gardosi J, Clausson B, Francis A. The value of customised centiles in assessing perinatal mortality risk associated with parity and maternal size. BJOG 2009; 116:1356- 63.
3. NHS England (June 2023) saving babies lives version three London
4. Gómez O, Figueras F, Fernández S, Bennasar M, Martínez JM, Puerto B (2008). Reference ranges for uterine artery mean pulsatility index at 11-41 weeks of gestation. Ultrasound in Obstetrics and Gynecology: 32(2):128–32. Available from: http://doi.wiley.com/10.1002/uog.5315
5. Mongelli M, Benzie R, Condous G (2016). Average fetal weekly weight gain: a novel measure of growth velocity. Journal of Maternal, Fetal and Neonatal Medicine: 29(4): 676-9.
6. Dall’Asta A, Brunelli V, Prefumo F, Frusca T, Lees CC (2017). Early onset fetal growth restriction.

Maternal Health Neonatology Perinatology: 3(1):2. Available from: http://mhnpjournal.biomedcentral.com/articles/10.1186/s40748-016-0041-x

7. Royal College of Obstetricians and Gynaecologists (2013). RCOG Green-Top Guideline 31: The Investigation and Management of the Small for Gestational Age V3.0 June 2020 Page 13 of 14 Fetus. London: https://www.rcog.org.uk/media/t3lmjhnl/gtg_31.pdf

8. Lees CC, Marlow, N, Wassenaer-Leemhuis A, Arabin B, Bilardo C, Brezinka C, Calvert S, Derks JB, Diemert A, Duvekot J, Ferrazzi E, Frusca T. Ganzevoort W, Hecher K, Martinelli P, Ostermayer E, Papageorghiou AT, Schlembach D, Schneider K, Rigano S (2015). 2 year neurodevelopmental and intermediate perinatal outcomes in infants with very preterm fetal growth restriction (TRUFFLE): a randomised trial. The Lancet: 10.1016/S0140-6736(14)62049-3. NHS England (2019). Saving babies' lives version two. A care bundle for reducing perinatal mortality.

9. Gardosi J, Madurasinghe V, Williams M, Malik A, Francis A. Maternal and fetal risk factors for stillbirth: population based study. BMJ. 2013;346(January): f108. Available from: http://www.bmj.com/content/346/bmj.f108

10. Stock SJ, Ferguson E, Duffy A, Ford I, Chalmers J, Norman JE (2012). Outcomes of elective induction of labour compared with expectant management: population based study. BMJ: 344: e2838.

11. https://perinatal.org.uk/GAPguidance.pdf November 2020 (accessed March 2022)

Related UHL documents:

Ultrasound UHL Obstetric Guideline

Aspirin in Pregnancy UHL Obstetric Guideline

Magnesium Sulfate for Fetal Neuroprotection UHL Obstetric Guideline

Preterm Labour Guidance in the Absence of PPROM UHL Obstetric Guideline

Smoking Cessation for Pregnant Smokers and Partners UHL Obstetric Guideline

6. Key words:

SGA, growth restriction, small for gestational age, risk factors, stillbirth

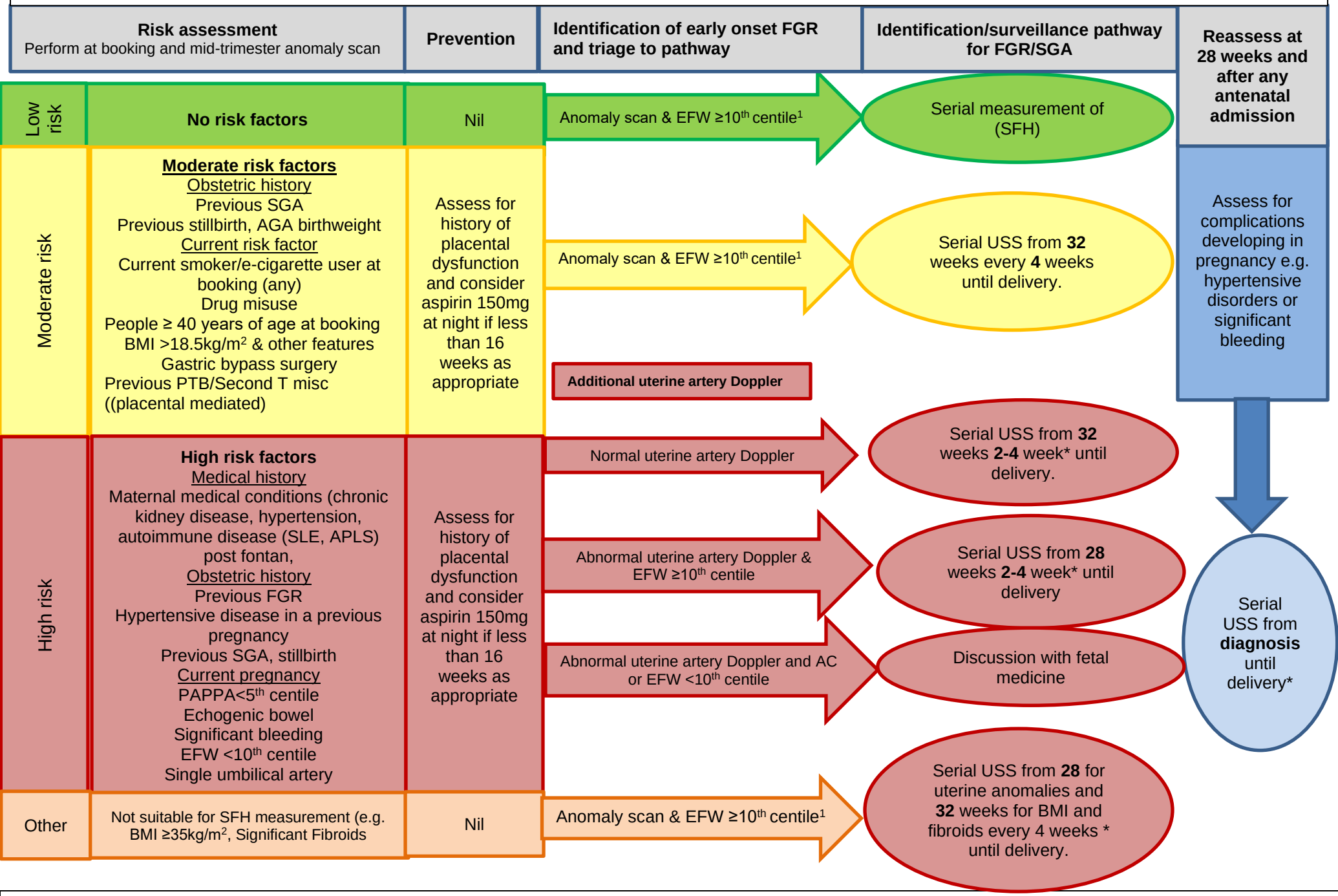
---

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

Contact and review details			
Guideline Lead (Name and Title) R Stringer, Ward Manager Antenatal Services F Siddiqui – Consultant Obstetrician			**Executive Lead** Chief Nurse
Original Authors: F Siddiqui, L Harvey, L Matthews and M Bodley **Details of Changes made during review:**			
Date	**Issue Number**	**Reviewed By**	**Description Of Changes (If Any)**
September – November 2021 **January 2022** **May 2022**	**3**	F Siddiqui – Consultant Obstetrician M Bodley, Ward Manager Antenatal Services Maternity guidelines group Maternity Governance committee Women's' quality & safety board	• Recommendations for women who smoke and low Papp-A results now included • Risk classifications of Low, Moderate & High now included and management specific to these • High risk women are to receive UAD to determine commencement of serial USS • Customised charts now include 3rd & 97th centiles • USS requests are now triaged • Aspirin dose changed and duration of treatment now up to 36/40 • Advice to consider steroids for fetal lung maturation increased from 35+6 to 37-38 weeks
June 2023	**4**		• Clarified SFH assessment following USS referral

November 2023	**5**	Sarah Blackwell – Quality improvement midwife F Siddiqui - Consultant R Stringer - Ward Manager Antenatal Services T Mousa - Consultant	Incorporated updates from SVBL v3 Amended the following from referral pathway algorithm; **Low risk –** Gestation of when to commence SFH measurement **Moderate risk -** Previous SGA - removed (BW ≤10th centile) Consider aspirin 150mg at night if less than 16 weeks (previously 20 weeks) Removed gestations to perform serial USS **High risk -** Removed cyanotic congenital heart disease Added post fontan Removed SGA (BW ≤3rd centile) Replaced <0.41MoM with <5th centile in ref to PAPPA Added Single umbilical artery Removed specific gestations for serial USS **Other -** Removed Fibroid specification largest >6cm Removed Stillbirths individualized through Rainbow or Fetal Medicine Serial USS from 28 weeks (previously 32) Removed statements EFW <10th centile is a high risk factor. *Refer to risk assessment and screening section for advice on scan interval. Use the growth calculation after 34 weeks to confirm adequate increase in EFW if there appears to be a deviation in the growth centile. 10th centile at the screening for early onset FGR stage is based on the Viewpoint calculation. All women who have a fetus that plots on or below the 3rd centile should be referred to fetal medicine for review. Where a fetus plots below the 10th centile a scan should be re-booked in 2 weeks (minimum 14 days between scans)., replaced with 'Serial measurement should be performed as per NICE antenatal guideline Some women are classified as OTHER and should have 4 weekly growth scans booked from 28/40 for uterine anomalies, 32/40 for raised BMI and fibroids. When a woman or birthing person changes from a low-risk pathway to a serial scan pathway then SFH measurements should stop as the two are not comparable. Removed - Sub-optimal growth after 34 weeks gestation may be defined as an estimated fetal weight gain of less than 20g per day over a minimum of 2 weeks. If FGR is suspected an assessment of fetal wellbeing should be made including a discussion regarding fetal movements and if required computerised CTG (cCTG). A maternal assessment should be performed at each contact **Management if severe SGA detected or there is abnormality in the umbilical artery Doppler.** For all fetuses with an EFW or AC <10th centile where FGR has been excluded, delivery or the initiation of induction of labour should be considered at 39+0 weeks after discussion with the mother. Birth should be achieved by 39+6 weeks. If other risk factors should be present for birth to be recommended prior to 39/40 For fetuses with an EFW <3rd centile in later pregnancy delivery should be initiated so that labour and/or delivery should occur at 37+0 weeks' gestation and no later than 37+6 weeks gestation (or earlier if there are other concerning features present depending on the protocol).

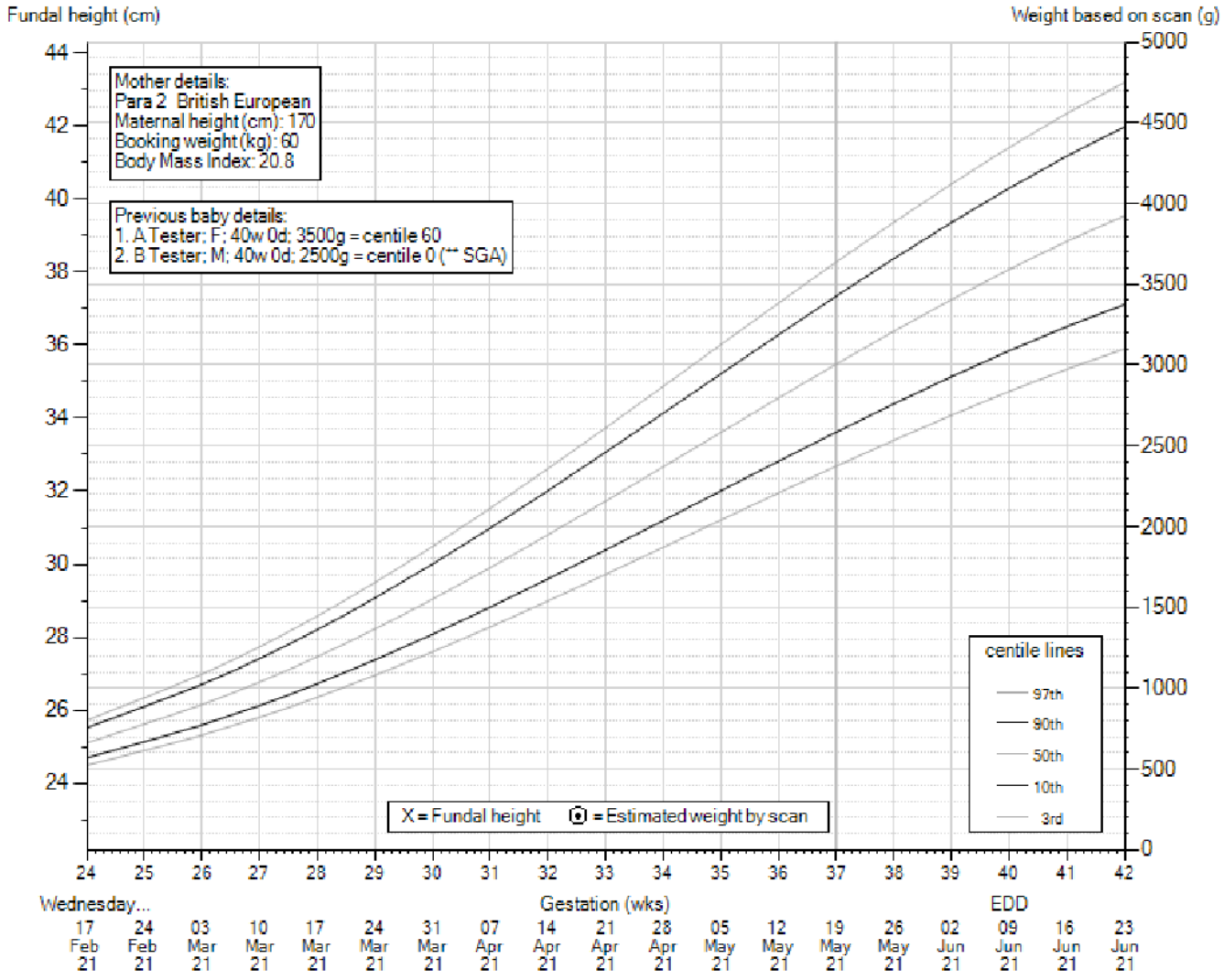
Appendix 1: Algorithm for using uterine artery Doppler as a screening tool for risk of early onset FGR in a singleton pregnancy



*The risk factors listed here constitute those routinely assessed at booking, other risk factors exist and risk assessment must always be individualised taking into account previous medical and obstetric history and current pregnancy history. For women with maternal medical conditions and individuals with disease progression or institution of medical therapies may increase an individual's risk and necessitate monitoring with serial scanning. For women with a previous stillbirth, management must be tailored to the previous history i.e. evidence of placental dysfunction or maternal medical conditions. Consider referral to Rainbow clinic. Serial measurement should be performed as per NICE antenatal guideline.

[1]AC and/or EFW <10th centile at the anomaly scan is a high risk factor. * Refer to risk assessment and identification section for advice on scan interval.

Appendix 2: Example of the generation of a GROW chart


Fundal height (cm)
Weight based on scan (g)
Mother details:
Para 2 British European
Maternal height (cm): 170
Booking weight (kg): 60
Body Mass Index: 20.8
Previous baby details:
1. A Tester; F; 40w 0d; 3500g = centile 60
2. B Tester; M; 40w 0d; 2500g = centile 0 (** SGA)
X = Fundal height
= Estimated weight by scan
centile lines
97th
90th
50th
10th
3rd
Gestation (wks)
Wednesday...
EDD

Appendix 3: FGR Management based on cCTG and doppler findings

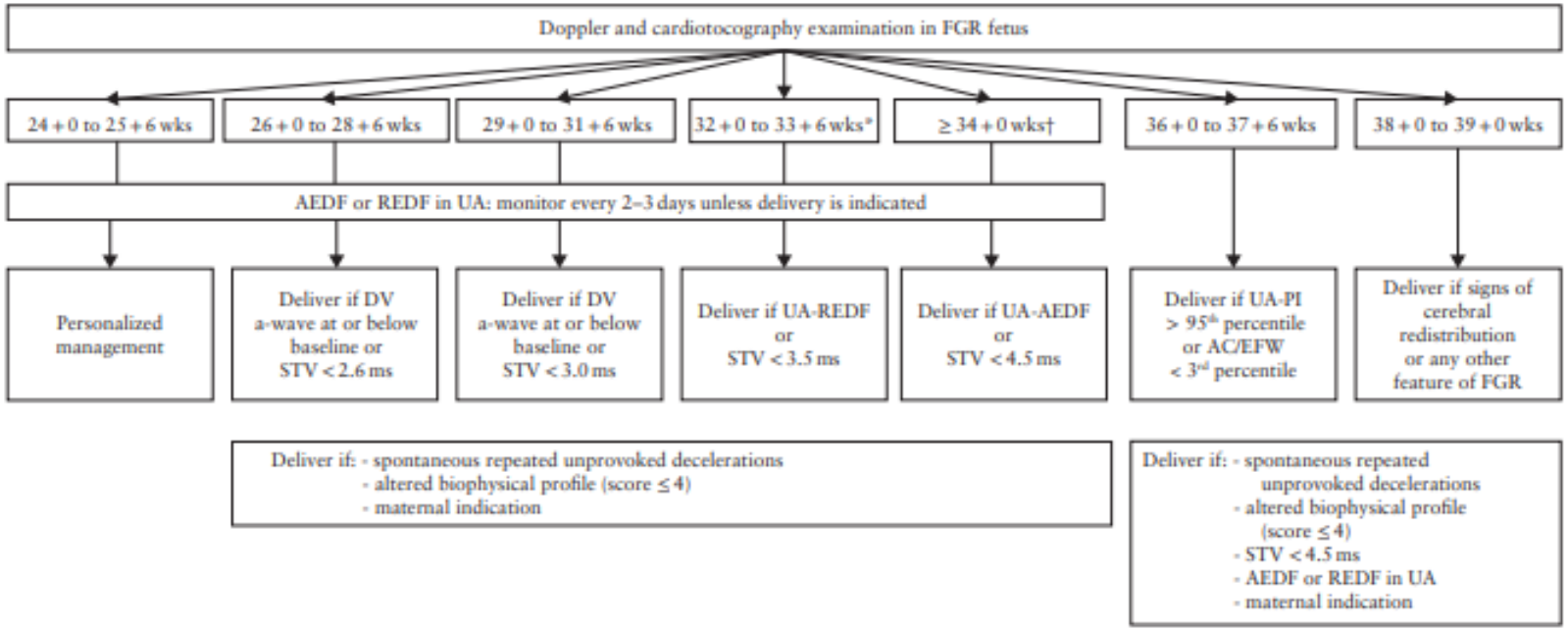


Figure 2 Recommended management of pregnancies with fetal growth restriction (FGR), based on computerized cardiotocography and Doppler findings. *Permitted after 30 + 0 weeks. †Permitted after 32 + 0 weeks. AC, fetal abdominal circumference; AEDF, absent end-diastolic flow; DV, ductus venosus; EFW, estimated fetal weight; PI, pulsatility index; REDF, reversed end-diastolic flow; STV, short-term variation; UA, umbilical artery; wks, gestational weeks.

Appendix 4: SOP for uterine artery doppler measurement

STANDARD OPERATING PROCEDURE (SOP) FOR UTERINE ARTERY DOPPLER MEASUREMENT BETWEEN 20 AND 23 WEEKS GESTATION FOR A SINGLETON PREGNANCY

References to other standards and procedures:

UHL Trust -
Standard Operating Procedure for Managing Patients with either a Suspected or Confirmed Case of Coronavirus Disease 2019 (COVID-19)

APPROVERS	POSITION
SOP Author: Ian Scudamore	Clinical Director Consultant Obstetrician
Senior Management Lead: Ian Scudamore	Clinical Director Consultant Obstetrician

NB: Paper copies of this document may not be most recent version. The definitive version is held on INsite Document. Once the SOP is obsolete ensure it is removed/archived.

Introduction and Background:
Uterine artery Doppler's should be performed for women identified as being at high risk for impaired fetal growth . (SBLCBv3) If possible both Uterine Artery Doppler waveforms should be evaluated and used to establish the appropriate fetal surveillance pathway
Procedure:
• Patient identified on antenatal record as High Risk for fetal growth restriction (see SVBLV2 algorithm). • Perform uterine artery Doppler assessment during anomaly scan. • Identify longitudinal image of iliac vessels • Using colour imaging identify uterine artery as it crosses iliac vessels on medial aspect • Place gate for pulse wave Doppler over uterine artery trying to keep vessel vertical and incident beam directly down longitudinal axis of vessel. • Confirm pulsatile flow with wave form consistent with uterine artery. • Apply auto calculate to 'frozen' waveform. Manual tracing can also be used if necessary. • Store image and save Doppler data • If after 60 seconds a suitable vessel and image cannot be identified, then cease attempt on

that side. • Repeat for the contra-lateral uterine artery • Send data to viewpoint at completion of the scan If there is at least one uterine vessel with a PI<1.5 then start serial growth scan schedule from 32 weeks gestation. If both uterine vessels have a PI ≥1.5 then start serial growth scan schedule from 28 weeks gestation. If only able to measure one uterine artery PI use the cut off PI of 1.5 as noted; PI<1.5 scan from 32 weeks, PI ≥1.5 scan from 28 weeks. If neither vessel is able to be evaluated then treat as High Risk and start serial growth scan schedule at 28 weeks gestation. Do not book a repeat scan to complete the uterine artery Doppler assessment , however if you have been unable to evaluate the uterine artery Doppler this may be attempted again if a further anomaly scan is required to complete the anomaly scan.
Follow-up:
Dependent on findings as noted above.
Governance and Audit:
All incidents will be reported via Datix
Training:
Staff trained prior to commencement of carrying out Doppler assessment of the uterine artery waveform.
Documentation:
Store image and save Doppler data