Oxford University Hospitals NHS
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Growth Scans

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Contents

Key Recommendations

- Uterine Dopplers will be performed at the anomaly scan and, depending on these results and defined risk factors, the woman may be offered additional growth scans at 28/40, or 28/40 and 32/40.
- Each woman will have a routine growth scan at 36/40, including MCA Dopplers

Background

Small for gestation (SGA) babies, and those whose growth slows from what is expected, are at a significantly increased risk of stillbirth, neonatal death and perinatal morbidity. Currently in the UK we identify only about 30% of babies who are small for their gestational age during pregnancy.

Since 2010 the number of additional scans, such as for growth, presentation and placental site, has been rising significantly. In 2015, the OUHFT performed 2000 more of these scans than in 2010, despite the number of anomaly scans remaining similar. This means that for each anomaly scan done, the same number of additional scans after 20 weeks were performed, adding significant pressures to the healthcare system.

The growth scan pathway is designed to reduce the need for a number of the additional scans, and monitor the wellbeing of pregnancies in a more structured, planned and clinically effective way that should improve the identification of babies who are growing poorly in utero, and therefore at risk of a number of complications, including stillbirth.

Aims

The purpose of this guidance is to aid the identification and investigation of the SGA and particularly growth restricted fetus.

Scope

The document applies to all midwifery and medical staff who provide care, support and/or information to women and their families within the OUH NHS Foundation Trust.
A copy of the guideline is available to view on the intranet.

Definitions

Term	Definition
AC	Abdominal Circumference
AEDF	Absent End Diastolic Flow
CPR	Cerebroplacental Ratio (MCA PI/ UmbA PI)
EFW	Estimated Fetal Weight
EDF	End Diastolic Flow
FGR	Fetal Growth Restriction
FL	Femur Length
FMU	Fetal Medicine Unit
HC	Head circumference
IUGR	Intra Uterine Growth Restriction
MCA	Middle Cerebral Artery
PD	Pool Depth
PI	Pulsatility Index
PET	Pre Eclampsia
PAPP-A	Pregnancy associated plasma protein A
REDF	Reversed End Diastolic Flow
RI	Resistance Index
SGA	Small for Gestational Age
UmbA	Umbilical Artery

Possible reduction in growth velocity: The AC has dropped >/=40 centile points from the anomaly scan
Small for gestational age: The EFW or the AC are <10th centile
SGA risk: Either there is a reduction in AC growth velocity (see above) OR the fetus is small for gestational age
Abnormal umbA PI: The umbA PI is >95th centile
Abnormal CPR: The CPR is <5th centile

Executive Summary

The use of ultrasound for assessment of fetal growth has been structured.

The growth scan pathway is designed to reduce the need for a number of the additional scans, and monitor the wellbeing of pregnancies in a more structured, planned and clinically effective way that should improve the identification of babies who are growing poorly in utero, and therefore at risk of a number of complications, including stillbirth.

Each woman will be offered a growth scan at 36/40 which will include the measurement of the umbilical artery (umbA) Doppler and Mid Cerebral Artery (MCA) Doppler to allow calculation of the cerebro-placental ratio (CPR).

In addition to the 36/40 growth scan, some women will be offered growth scans at 28/40, or 28/40 and 32/40 according to whether they have any of the defined risk factors and the results of a uterine artery Doppler which is performed routinely at the anomaly scan.

Additional scans outside of the Growth Scan Pathway must meet the criteria for referral as detailed in the full guideline.

Growth scan pathways

From the 9/5/16 every woman will be offered a growth scan at 36/40 which will include the measurement of the umbilical artery (umbA) Doppler and Mid Cerebral Artery (MCA) Doppler to allow calculation of the cerebro-placental ratio (CPR).

In addition to the 36/40 growth scan, some women will be offered growth scans at 28/40, or 28/40 and 32/40 according to whether they have any of the risk factors* (see below) and the results of a Uterine artery Doppler which is performed routinely at the anomaly scan.

The pathway for each woman will be indicated on the Growth Scan Pathway Form by the sonographer. This will be filed in the hand-held notes at the time of the Anomaly Scan. The Ultrasound Department will book all the scans advised at the time of the anomaly scan. The scans can be booked +/- 5 days of the advised gestation.

The Pathway is as follows-

	Risk Factors *	+ Uterine artery Doppler	=	ACTION
Pathway A →	**No risk factors**	**Normal** Uterine arteries **(total PI <2.5)**	**Low risk for SGA/PET**	**36/40 growth scan**
Pathway B →	**No risk factors**	**Abnormal (Raised)** Uterine arteries **(total PI ≥ 2.5)**	**Med risk for SGA/PET**	**28/40 and 36/40 growth scans** Needs MW/ consultant appointment @25/40 for BP check or if booked under Silver Star, 24/40 SS appointment
Pathway C →	**Risk factors**	**Normal** Uterine arteries **(total PI <2.5)**	**Med risk for SGA/PET**	**28/40 and 36/40 growth scans**
Pathway D →	**Risk factors**	**Abnormal (Raised)** Uterine arteries **(total PI ≥ 2.5)**	**High risk for SGA/PET**	**28/40, 32/40 and 36/40 growth scans** Needs to be under Consultant care. Needs MW/cons. appointment @25/40 for BP check or if booked under Silver Star, 24/40 SS appointment
Pathway D →	**Multiple pregnancy**	**Not done**		**28/40, 32/40 and 36/40 growth scans** Follow usual clinic and scan pattern

***Risk factors:**

- **Previous baby born <2500g (5lbs 8oz) at any gestation**
- **Smoking ≥10 day**
- **Aged 40 or above and nulliparous**
- **PAPP-A <0.3MoMs** (this will 'flag' in Viewpoint when patient's entry 'opened')

The following Patient Information Leaflets are available in print and on the OUHFT Intranet to support this pathway

Mid-pregnancy Scan
Raised Uterine Dopplers
Growth scan

Additional scans outside of the Growth Scan Pathway

Permitted additional scans:

Additional scans can be booked in the following circumstances:

By the ultrasound department

See USS protocols

New pregnancy complications

These are

- PV bleeding
- symphysis fundal height >2cms under gestation if more than 26 weeks
- new hypertension
- reduced fetal movements (if criteria met according to reduced fetal movements guideline)
- gestational diabetes requiring insulin
- other (this must be stated)

Pre-existing problems

Women at very high risk on basis of pre-existing medical disease or previous obstetric history will have scans as requested by their clinicians, as currently occurs. These are

- previous baby <2500g (5lbs 8oz)
- previous pregnancy loss after 16 weeks
- pre-existing medical disease (antiphospholipid syndrome, chronic hypertension requiring treatment etc)

Additional scans: not permitted

The following indications may not be used for referral for ultrasound:

- Placental site (no PV bleeding) unless not recorded at 20 weeks
- Presentation. If ≥36 weeks these should be referred to the breech clinic
- Large for dates

Growth scans requests for scans (unless Doppler only for known SGA risk baby) within 2 weeks of a previous scan are also not permitted.

Requesting growth scans

Please ensure all referrals for scans meet the above conditions.
When requesting, it is essential that the indication for referral is clearly documented, and if 'other' is used detail should be provided. The referral also needs to include the agreed EDD and clear patient contact details and referrer details.

Failure to complete the referral to these standards *may result in a delay or refusal of the scan.*
In these circumstances the referrer will be contacted and will be responsible for liaison with the woman.

Explanation of growth scan diagnosis codes

Fetal growth is assessed according to the following criteria, and used as diagnosis codes on ultrasound reports. The following is a simplified interpretation of diagnosis codes.

1. **Normal fetal growth.**

The baby has grown consistently and both the estimated fetal weight (EFW) and the abdominal circumference (AC) are ≥ 10th centile for gestational age. This baby is currently at low risk of adverse outcomes.

2. **Normal growth but abnormal Dopplers**

This situation can be due to normal variation, over-estimation of size or, occasionally, acute placental events. These women should be reviewed in FMU to determine the best course of action. The ultrasound department will normally arrange this.

3. **Possible reduction in growth velocity.**

The abdominal circumference (AC) has dropped centiles – a 40+% centile drop from the anomaly scan. The baby may be at risk of adverse outcome. Reduction in velocity only of other measurements such as EFW are not considered relevant.

4. **Small for gestational age with normal Dopplers**

The EFW or AC are <10th centile for gestational age but fetal condition currently appears good. Repeat scans are normally indicated if the gestation is <36 weeks. The ultrasound department will normally arrange these.

5. **Small for gestational age with abnormal Dopplers**

The EFW or AC are <10th centile for gestational age and the Dopplers are abnormal. This baby is at risk of adverse outcome. Close monitoring is required and if at >36-37 weeks, delivery is advised.

Together 3-5 are defined as **'SGA risk'**

Management of singleton pregnancy according to scan findings

At any antenatal review the USS report should be examined by the clinician.

Abnormal findings

If UmbA AEDF/ REDF:
Admit for CTG
<32 weeks: urgent FMU review
≥32 weeks: urgent consultant or FMU review, probably LSCS

If SGA risk with abnormal umbA Doppler:
<32 weeks: refer FMU
32-36 weeks: twice weekly umbA Doppler, book this in USS department. Ensure a consultant antenatal clinic appointment has been made. A CTG is not required unless another indication is present.
>36 weeks: arrange delivery. Consider CTG

If SGA risk (with normal umbA Doppler) see Fig 2 and below:
<36 weeks
repeat scan in 2-3 weeks

>36 weeks
1. EFW <5th centile: deliver around 37 weeks
2. Abnormal PAPP-A (<0.30MoMs) or abnormal (total PI>2.5) uterine Dopplers in earlier pregnancy: deliver around 37 weeks
3. Abnormal CPR: deliver around 37 weeks. Consider CTG.
4. EFW 5-10th centile with normal CPR: repeat scan in 2 weeks (around 38 weeks)

38 weeks
If EFW < 5th centile deliver ASAP
If abnormal CPR deliver ASAP. Consider CTG.

If EFW >/=5th centile with normal CPR: repeat scan in 2 weeks

40 weeks
If EFW < 5th centile: deliver ASAP
If abnormal CPR deliver ASAP. Consider CTG.

If EFW ≥5th centile with normal CPR: deliver by 41 weeks

If abnormal umbA Doppler or CPR but *not* SGA risk:
All women should be referred to FMU where an assessment and management plan will be made. This will normally have happened from the ultrasound department. They should not be sent to the DAU or MAU and a CTG should not be routinely arranged. Pregnancy management should not be routinely altered.

Normal findings

If not SGA risk, normal umbA +/- CPR Dopplers:

<36 weeks

No routine scan follow up is required. However, the routine 36 week scan will go ahead unless a scan has been performed <7 days prior to the time for which it has been booked.

>36 weeks

No routine scan follow up is required.

Incomplete findings

If the MCA cannot be obtained, and there is no 'SGA risk' (see definitions) further scan appointments are not required. If there is SGA risk, the patient should be seen in the next available antenatal clinic. A repeat scan or delivery (usually only if EFW <10th centile) at 37 weeks may be indicated.

Late booking/ uncertain dates

If a woman books late and a growth scan after 20 weeks is being used to assign dates (HC), no routine second scan follow up is required, providing the umbilical artery Doppler is normal. If it is not, referral to FMU is indicated.

Abnormal placental site

If, at the 36 week scan, the placenta is found to be either covering the cervix, or the lowermost edge of the placenta is less than 2 cm distant from the internal os, an antenatal clinic appointment is required unless the patient has already been seen in the FMU Placenta Clinic and is already being followed up. A TV scan should be performed if position is unclear (particularly with posterior placenta) and no current bleeding.

If the placenta is found to be low at scans before 36 weeks and there has been no vaginal bleeding, no additional action is required. However women with a prior caesarean section should be referred to FMU placenta clinic.

Fig 1 Management of the SGA fetus 32-36 weeks

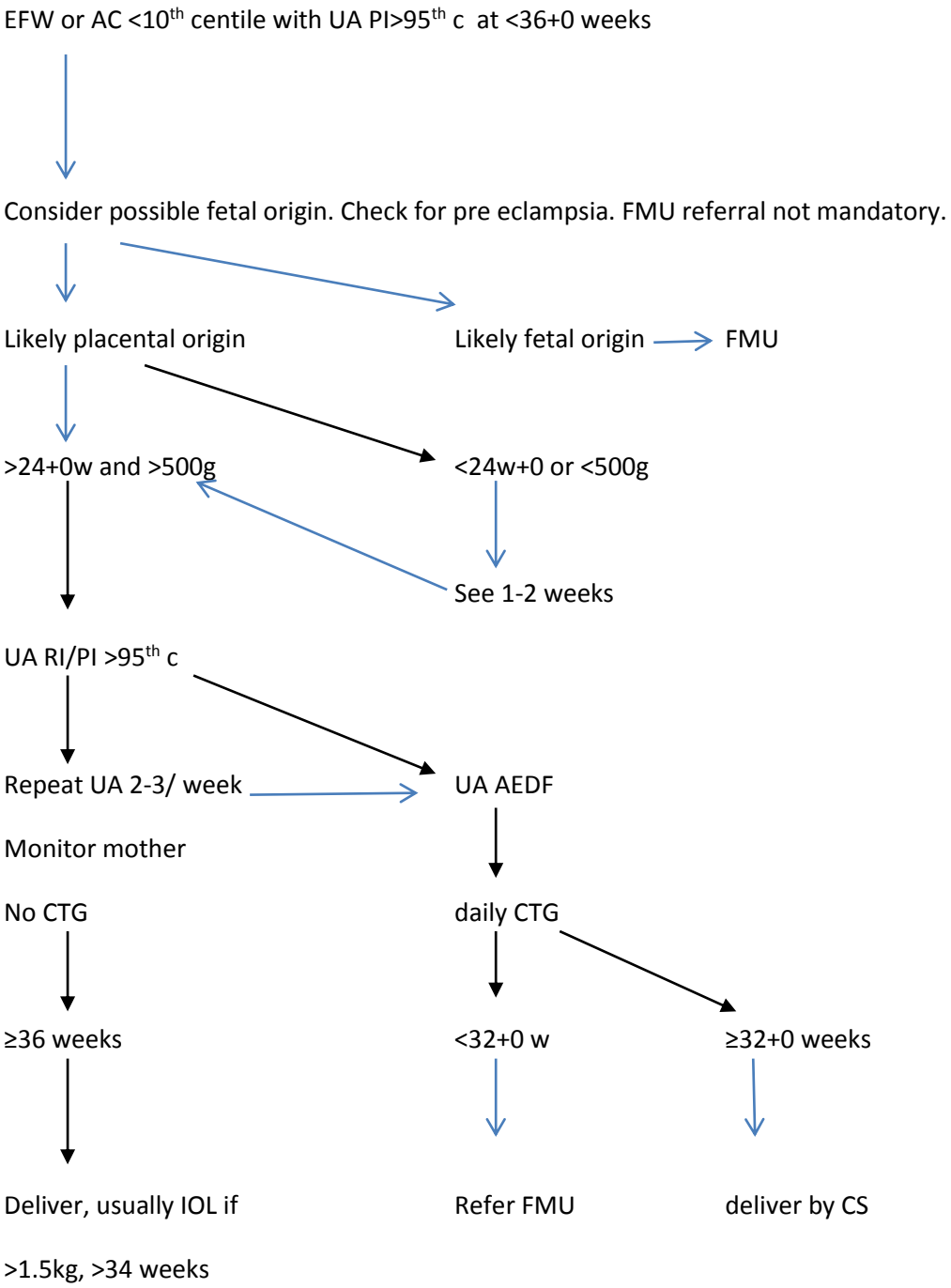
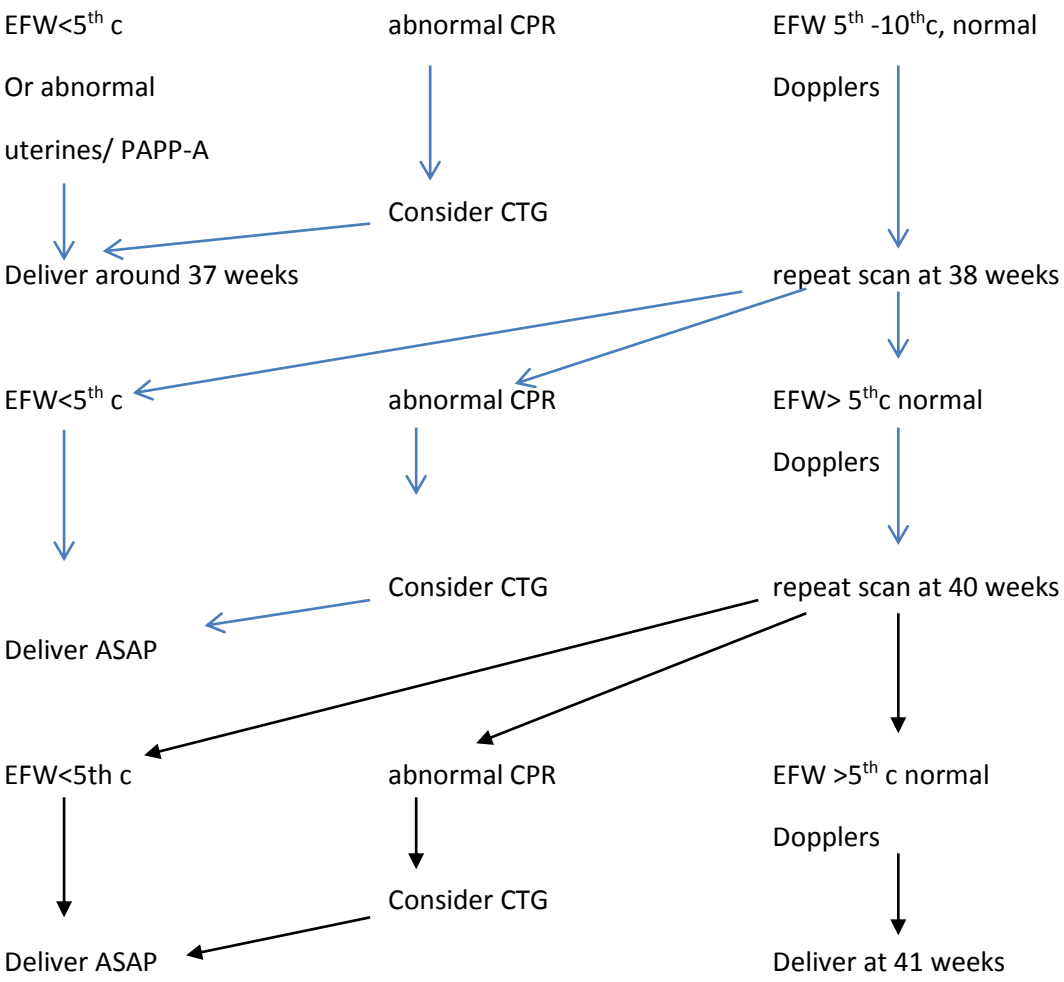


Fig 2 Management of 'SGA risk' fetus ≥36 weeks

NB SGA risk is defined as:
EFW or AC <10th centile OR reduction in growth velocity of AC of ≥40%



Large for dates

If the fetus is large for dates, NICE does not recommend an alteration in obstetric management. The woman should be informed that ultrasound estimation of weight, especially with larger babies, is relatively inaccurate.

However, gestational diabetes is more common in this situation. If the EFW is >95th centile or there is polyhydramnios (AFI >25), glucose assessment is worthwhile.

The woman should reviewed as soon as possible by their MW or Consultant clinic: If they should have had a 24-28 week GTT by current criteria, yet did not, they should have a glucose series arranged via Level 6. Follow up will be via the Friday diabetic clinic.

If they have no risk factors for diabetes or had a normal GTT between 24 and 28 weeks, perform a fasting blood glucose. If the level is >/= 6.5mmol/l refer to the Monday diabetic clinic. If the level is <6.5mmol/l normal antenatal care should continue.

Refer to Diabetes Guideline.

If diabetes is not present, women should not be routinely offered caesarean section or induction of labour for this indication alone. If a homebirth or MLU birth is planned, referral to a consultant clinic for a discussion should be offered.

Repeat scans to assess the growth of a large baby should not be routinely arranged.

FAQs

If the pregnancy had abnormal/raised Uterine artery Dopplers at the Anomaly scan, but the scans afterwards show normal growth and the pregnancy has continued normally, can the woman be considered for delivery at the SPIRES, a MLU, or a homebirth?
Yes.

What should be done if a woman has not has an anomaly scan at the OUHFT – for example if she has moved from out of area, or has booked late?
She should be managed according to her pregnancy risk and growth scans only requested according to the above criteria. A routine 36 week scan will still be offered.

If a woman declines the additional growth scan/s, should any other care be put in place?
This should be documented and referral to a consultant antenatal clinic offered.

If a woman has an otherwise low risk pregnancy what does abnormal uterine artery Dopplers mean?
The pregnancy is at higher risk of growth restriction and pre eclampsia than was suggested by her history and repeat scanning is indicated. Nevertheless most women will still have a normal pregnancy outcome.

If a woman has a normally grown baby but the Dopplers are abnormal what does this mean?
In most cases the Doppler measurement has been taken inaccurately but occasionally this means that although the growth appears normal the baby is at more risk than suggested by its size. Because this is complicated and unusual these babies will usually be assessed in FMU.

Appendix 1 – Supporting information about Doppler Ultrasound

Umbilical artery (umbA) Doppler
This is a useful test before 35 weeks to help distinguish the normal small baby from the small compromised baby and helps determine monitoring frequency and iatrogenic preterm delivery. Chronic placental dysfunction may lead to increased resistance (RI) and pulsatility (PI) in the arteries. The waveform is considered abnormal if the pulsatility index is >95th centile or if there is absent or reversed end-diastolic flow. These latter two describe increasing degrees of placental dysfunction. Umbilical artery Doppler it is not useful after 35 weeks except as part of the 'CPR'.

Middle cerebral artery (MCA) Doppler
This has 2 principal uses.
Firstly it can be used to exclude fetal anaemia in at risk fetuses e.g. Rhesus disease. The peak systolic velocity is assessed.
Secondly the waveform (PI normally used) may demonstrate head sparing: more blood is sent to the brain in fetal diastole as a 'survival' mechanism. The pulsatility (PI) reduces in adverse circumstances. Its principal usage is therefore as part of the cerebroplacental ratio (see below).

Cerebroplacental ratio (CPR)
This is thought to be useful at after 35 weeks to help distinguish between the normal small baby from the small compromised baby and is considered abnormal if reduced (<5th centile). It may also help identify chronic fetal compromise babies that are not obviously small for gestational age. It is calculated by dividing the MCA PI by the umbA PI.

Uterine artery (utA) Doppler
This is a screening test, which is most effective for growth restriction and pre eclampsia that occurs before 34 weeks. It can be measured at any gestation but is routinely used at 20 weeks at the anomaly scan. A high pulsatility or resistance waveform (PI or RI) suggests less effective placental implantation. A normal result implies a low risk of early growth restriction or indeed pre eclampsia and this is a more effective screening test than just using maternal history: this allows fewer scans and intervention in apparently higher risk women. It is used in this protocol to reduce the number of women having 'serial scans' to allow more room for later pregnancy scans: late onset (>34 weeks) growth restriction is less reliably predicted by abnormal uterine artery waveforms.

Pregnancy associated plasma protein A (PAPP-A)
This serum analyte forms part of the combined test screening for aneuploidy at 12 weeks. A low level (<0.3MoMs) also suggests a higher later pregnancy risk of growth restriction, pre eclampsia and stillbirth.

Appendix 2 – Monitoring and Compliance

Compliance Standard	Monitoring method	Frequency of monitoring	Review Group/Committee
% Women having 36 week growth scan and within +/- 5 days	Viewpoint	Annual	WCGC/ AHSN
% Women having 36 week growth scan who are getting CPR calculation	Viewpoint	Annual	WCGC/ AHSN
No of women having growth scans outside standard pathway	Viewpoint	Annual	WCGC/ AHSN

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