OBSTETRIC ULTRASOUND GROWTH ASSESSMENT PROTOCOLS

Radiology protocol in conjunction with

Women & Child Health

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1.0 Background and Introduction

Fetal growth restriction is associated with stillbirth, neonatal death and perinatal morbidity. Confidential enquiries have demonstrated that most stillbirths due to fetal growth restriction are potentially avoidable. A recent analysis based on the West Midlands database has underlined the impact that fetal growth restriction has on stillbirth rates, and the significant reduction which can be achieved through antenatal detection of pregnancies at risk.

Customised assessment of birth weight and fetal growth has been recommended by the RCOG since 2002 and is re-emphasised in the 2013 and 2024 revision of the Green Top Guidelines. The growth trend on serial measurements is of most value in predicting poor fetal outcome.

Requests will be accepted from Obstetricians, Clinic Midwives and ADAU Midwives on the Non-Medical Referrers Register. The midwife Sonographers have a separate referral pathway from the community (see separate SOP for this).

Swansea Bay UHB follow the guidance issued by The Perinatal Institute (GAP/GROW). GAP is based on the following key elements: -

- Evidence based guidance and risk assessment algorithms
- Training and accreditation of all staff involved in clinical care
- Implementation of customised GROW chart and audit tool
- Rolling audit and benchmarking of performance

2.0 Scope

This guideline is relevant to all healthcare professionals involved in the care of pregnant women including Midwives, General Practitioners, Obstetricians and Sonographers.
This Guideline should be read in conjunction with the Perinatal Institute Growth Assessment Protocol (https://perinatal.org.uk/GAPguidance.pdf)

This guideline addresses:

- Use and production of a customised growth chart
- Booking risk assessment
- When and how to measure fundal height using a standardised technique
- When to refer for a growth scan
- Timing and documentation of serial growth scans for women at higher chance of fetal growth restriction

Objectives

- To ensure that there is fetal growth screening through standardised fundal height measurements for women without identifiable risk factors and surveillance through serial growth scans for women at higher chance of fetal growth restriction

- To ensure that standardised fundal height measurements are plotted correctly on customised growth charts
- Where growth problems are suspected from fundal height measurements, referral for a growth scan and appropriate further investigations to assess fetal wellbeing should be undertaken as soon as possible and within 3 working days
- Where a problem has been identified via USS, to ensure referral is made as soon as possible to an obstetrician for discussion and agreement of an appropriate management plan

3.0 Abbreviations and Definitions

BMI	*Body Mass Index (kg/m2)*
Centile Lines	*The lines of growth on the customised growth chart are 3rd 10th, 50th, 90th and 97th centiles of Estimated Fetal Weight*
EDD	*Estimated Date of Delivery*
EFW	*Estimated Fetal Weight.*
AFI	*Amniotic Fluid Index*
FH	*Fundal Height*
FGR	*Fetal Growth Restriction* *Defined by any of the following:* *Estimated weight for gestation below the 10th centile* *Slow growth on serial scans* *Abnormal Doppler* *Histopathology (post-mortem and/or placental examination)*
OGTT	*ORAL Glucose Tolerance Test*
Sonographer	*PROFESSIONAL qualified to perform growth scans*
PET **AID** **SLE** **APLS**	*Pre-eclampsia* *Auto-immune disease* *Systemic lupus erythematosus* *Antiphospholipid antibodies*

4.0 Roles and Responsibilities

Action	**By**
To risk assess at booking, during pregnancy and arrange serial growth scanning if identifiable risk factors for fetal growth problems or if fundal height measurements not accurate (e.g. BMI >35)	*All antenatal care providers (Midwives & Obstetricians)*
To generate Customised growth charts	*ANC Midwife*

To undertake fundal height measurements and plot on customised charts	*All GAP trained antenatal care providers (Midwives & Obstetricians)*
To calculate EFW and plot on customised charts	*Sonographers, Midwives and Obstetricians*

5.0 Clinical Content

5.1 Customised Growth Charts

The charts are used to plot both FH (x) measurements obtained during clinical examination and EFW (0) following an ultrasound examination. They are customised to each individual considering the height, weight, ethnicity and parity of the woman. Birth weights of previous children are used to identify previous problems with growth, but do not affect the centiles produced.

5.2 Chart production

Each woman will have a customised fetal growth chart generated following her dating scan which will be accessible online via the 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, 90th and 97th centile lines.

Height, weight, ethnicity and parity are displayed. 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 highlighted. Mother's name, reference number, chart ID and date of birth will appear above the chart. The chart ID should be documented in the handheld records. The charts can be produced and can be generated at any time during pregnancy. These are available online at grow@perinatal.org.uk.

5.3 Standardised fundal height Measurement (FHM)

Women who are recognised as low risk and suitable for midwifery led care should have serial fundal height measurements undertaken as a primary screen for fetal growth. These should commence from 26 - 28 weeks' gestation. FHM is not aiming to predict EFW rather provide a baseline and appropriate observation of growth trajectory.

Not all pregnancies are suitable for screening by fundal height measurement and require ultrasound biometry instead. In most instances, these pregnancies fall into the following categories:

Fundal height measurement unsuitable / inaccurate due to:

- Single fibroid ≥5cm/multiple fibroids
- High maternal BMI (≥35)
- Multiple pregnancy.
- Pregnancy considered high risk requiring serial ultrasound e.g. pre-existing diabetes.

5.4 Referral to Ultrasound

Antenatal ultrasound scans for third trimester growth in Swansea Bay UHB are performed by both Radiology based sonographers and midwife sonographer via various referral pathways (please see Midwife Sonographer SOPs).

Swansea Bay UHB aims to follow Perinatal Institute GAP Grow Programme, with serial growth scans performed every 3 weeks from 26-28 weeks depending on clinical risk factors.

The only criteria not appropriate for scanning by midwife sonographers is twin pregnancies, those without a completed anomaly scan and those women under care of fetal medicine. Community referrals for fetal growth scans are sent directly to midwife sonographers.

Procedure

The examination is performed trans-abdominally. The Sonographer should confirm the following:

- Fetal viability
- Presentation
- Placental site
- Liquor volume – Deepest pool should be measured following a subjective overall assessment (2-8cm normal limit) if abnormal, AFI is performed (5-25cm normal limit).
- Fetal biometry and EFW calculated. (HC, AC and FL)
- Umbilical artery Doppler
- Comment on any fetal abnormality if detected
- If possible, comment on any associated pelvic pathology

6.0 Serial growth scans

Some women will be at increased risk of developing fetal growth restriction because of risk factors in the current pregnancy, past medical history or past obstetric history.

All women should be assessed at booking for risk factors to identify those who need increased surveillance. Some women will require obstetric led pathways and others will be suitable for specialist midwifery scanning pathways, defined by criteria.

The obstetrician will arrange for serial scans every 3 weeks from 26-28 weeks until delivery, with additional frequency depending on clinical presentation. Risk factors will be clearly outlined on the request form as per IRMER procedure, please see the ‘Guidance for Growth USS Requests’ for additional information.

These women will not require plotting of fundal height measurements while a serial scanning protocol is being followed.

Growth scan requests related to obstetric history are:

- Previous SGA/FGR
- Previous stillbirth.
- PET

Growth scan requests related to current medical conditions include:

- Diabetes
- Chronic maternal disease – e.g. AID (SLE, APLS), kidney disease, cyanotic CHD
- Uterine fibroids – multiple fibroids or a single fibroid ≥5cm
- BMI ≥35 or BMI ≤18
- Hypertension

Growth scan requests related to current pregnancy:

- Late booker (≥20 weeks' gestation at first scan)
- Maternal smoking
- Substance misuse
- Multiple pregnancy
- Fetal echogenic bowel (Confirmed by fetal medicine)
- Pre-eclampsia
- Maternal age ≥40 at booking
- Significant bleeding resulting in hospital admission.
- Low PAPP-A
- Gestational diabetes mellitus (GDM)

Referral following a growth scan in high-risk pregnancy:

If the EFW plots between the 10th and 97th centile and is following the centile curve, and the liquor volume and umbilical artery doppler assessment is normal, the woman will be asked to attend her next antenatal appointment as planned with an ultrasound every 3 weeks.

If the fetal biometry or EFW does not plot within the 10th and 97th centile or is not normal by GROW 2.0 calculation, or there are concerns regarding the liquor volume or umbilical artery Doppler, then the following referrals should be made:

- Any biometry measurement HC, AC or FL or EFW **≤ 3rd** centile refer to fetal medicine clinic for review (either local of regional depending on next availability) with repeat scan in 2 weeks to determine growth velocity.
- Any biometry measurement HC, AC or FL or EFW **>3rd - ≤ 5th** centiles for same day obstetric review and repeat scan in 2 weeks to determine growth velocity.
- EFW **<10th** centile or reduced growth velocity, normal liquor volume, normal umbilical artery Doppler: Refer for obstetric review and repeat scan in 2 weeks to determine growth velocity.
- EFW **<10th** centile or reduced growth velocity with reduced liquor and/or abnormal umbilical artery Doppler: For same day obstetric review for plan of care and rescan in 1 week for liquor volume and umbilical artery Doppler.
- For all above scenarios, if >37 weeks, then IOL may be considered by the obstetrician.

6.1 Umbilical artery Doppler

Umbilical artery (UA) Doppler examination will be performed on all patients who present for USS after 24 weeks gestation. A loop of cord freely floating within the amniotic fluid should be sought for assessment of the UA. Three live traces should be captured with at least 3 complete waveforms, free from movement artefacts, to gain an accurate assessment. If a normal measurement is obtained this should be the reported value.

The pulsatility index (PI) should be measured and quoted if abnormal (above the 95th centile, current chart used H.Schaffer, 1998). If the measurement is normal, then document this on the report however it is not necessary to quote the measurement.

Reporting on RADIS

- If EDF is present with normal PI value use reporting code !PIN in the comment section.
- If EDF is present with a raised PI value use reporting code! PIA in the comment section.

If absent or reversed, then the dropdown box can be used.

Frequency of UA Doppler assessment:
Abnormal findings:

- Raised P.I – 2 x per week
- Absent EDF – Daily
- Reversed EDF– Daily

Following 2 consecutive normal UA Doppler scans (after an abnormal UA Doppler) return to normal scan frequency.

There is currently no Radiology provision for obstetric ultrasound at the weekend and Bank Holidays.

Umbilical Artery PI. H.Schaffer: "JOURNAL FUR FERTILITAT UND REPRODUKTION"
IPDS 1998 11th Congress of the International Perinatal Doppler Society July 2-4, 1998

Gestation Weeks	Umb A PI		
	Mean	5% tile	95% tile
20	1.43	1.09	1.77
21	1.39	1.05	1.74
22	1.36	1.01	1.70
23	1.32	0.98	1.66
24	1.28	0.94	1.63
25	1.25	0.91	1.59
26	1.22	0.87	1.56
27	1.18	0.84	1.53
28	1.15	0.81	1.49
29	1.12	0.78	1.46
30	1.09	0.75	1.43
31	1.06	0.72	1.40
32	1.03	0.69	1.38
33	1.00	0.66	1.35
34	0.98	0.63	1.32
35	0.95	0.61	1.30
36	0.93	0.58	1.27
37	0.90	0.56	1.25
38	0.88	0.54	1.22
39	0.86	0.51	1.20
40	0.84	0.49	1.18
41	0.81	0.47	1.16
42	0.80	0.45	1.14

6.2 Altered Fetal Movement

If a fetus is seen to be moving normally on USS the woman should be reassured and a clinician should arrange appropriate ongoing fetal monitoring. If a fetus is not seen to move normally on USS, a referral to either local or regional fetal medicine clinic should be arranged. Please refer to the All-Wales fetal movement guideline for more information.

6.3 Multiple Pregnancy

Chorionicity should be confirmed at the dating scan and documented to enable correct ongoing management.

Monochorionic twin pregnancies will be scanned fortnightly from 16 weeks including UA Doppler assessment. The septum, or lack thereof in MCMA twins, should be clearly identified on scan. The deepest pool of liquor should be measured.

Dichorionic twin pregnancies should be scanned with UA Doppler from 24 weeks every 3 weeks unless ultrasound findings suggest more regularly.

EFW for each fetus should be plotted for all twin pregnancies on a single growth chart. GAP GROW 2.0 will highlight if there is a growth discordance, if >20% this should be documented within the report for MCDA/MCMA twins.

6.4 Oligohydramnios

(Defined as DVP <2cm or AFI <5cm.)

Management of isolated oligohydramnios at term (> 37 Weeks)

If induction of labour is not accepted by the woman following counselling by clinician, weekly liquor volume and UAD to be performed plus CTG 2 x per week

Management of preterm oligohydramnios

- Consultant advice to be sought, causes such as PPROM to be considered (see guideline for PPROM)
- Weekly liquor volume and UAD, growth assessment every 2 weeks
- CTG 2 x per week advised and if the patient reports altered fetal movements

6.5 Polyhydramnios

(Defined as DVP >8cm or AFI >25cm)

If polyhydramnios is suspected during a scan, the amniotic fluid index (AFI) should be documented. The fetal stomach and bladder should be clearly imaged. Women should have fortnightly scans to include biometry, AFI and Doppler (see Guideline for Polyhydramnios). If polyhydramnios presents with any of the following indications, then referral to fetal medicine is indicated:

- Suspected fetal anomaly
- Small for gestational age (<10th centile)
- Concerns with fetal movement and rapid onset of polyhydramnios (could indicate muscular dystrophy)
- Severe polyhydramnios (Single deepest pool >16cms or AFI >35cms)

6.6 Ultrasound to confirm Intrauterine Fetal Death

Requests for confirmation of intrauterine fetal death from labour ward or antenatal ward will routinely be performed by midwife sonographers (Rm 5/6) and by radiology sonographers from DAU for quiet room access. Presence of cardiac activity, a biometry measurement, placental position and fetal position should be commented upon for appropriate management.

6.7 Presentation

A referral to the M/W sonographers should be made for presentation only scans.

6.8 Late Bookers

Women who first present for ultrasound examination at ≥ 20 weeks are considered to be late bookers. They will require serial growth scans which will be arranged by their obstetrician.

6.9 Estimated fetal weight >97th centile via USS

- Previous history of birth weight >97th centile is not an indication for growth scan – Standardised Fundal heights should be performed as first line investigation.
- If a woman presents and there is clinical suspicion of polyhydramnios a growth scan should be arranged
- Where EFW is over 97th centile via USS prediction, screening for Gestational Diabetes should be offered and women should be referred for obstetric counselling, this should be arranged by the referrer.
- EFW above 97th centile and under 34 weeks' gestation refer for oral glucose tolerance testing.
- EFW above 97th centile and over 34 weeks' gestation refer for HbA1c and fasting blood glucose.

6.10 Accelerative growth identified via GROW 2.0

Defined where the growth trajectory is above the trajectory of the 97th centile on sequential FHM or EFW plots, even where the plot remains within the 10th and the 97th centiles).

If accelerative growth on FHM is identified via GROW 2.0 a growth scan should be arranged. If EFW on USS is above the 90th centile then gestational diabetes screening should be offered and obstetric led care arranged.

6.11 Women Presenting with Bleeding in pregnancy.

- After 20 weeks
    - All women will be seen in Antenatal Assessment Unit.
    - Ultrasound scanning assessment may be considered, depending on the clinical picture
    - Recurrent episodes (more than 2 episodes after 20 weeks) will require serial growth scans.

7.0 Placenta check

- If the placenta is low-lying (less than 2 cm from the internal os) at anomaly scan, a re-scan should be performed at 32 weeks.
- A low anterior placenta plus a maternal history of previous caesarean section warrants referral to fetal medicine service to assess for placenta accreta spectrum.
- If placenta is still low-lying at 32 weeks, a rescan at 36 weeks is indicated.
- For serial growth scans, if a low-lying placenta was previously noted, it should be assessed at each growth scan and commented upon.
- If the placenta is clearly covering the internal os at 36 weeks, a transvaginal scan is not indicated. If there is uncertainty, a transvaginal scan is indicated. If a TVS assessment is

indicated at NPT it should be performed on a day with a consultant present in clinic. If the placenta is clearly covering the internal os on TA USS there is no requirement for TV

8.0 Cervical Length Imaging

Women requiring cervical length imaging will be offered care via the pre-term birth Surveillance clinic with midwife sonographers. Please see pre-term birth guideline for more information.

8.1 Twins

Twin pregnancies have been identified as an intermediate risk by the All-Wales Pre-term Birth Guidelines. NICE (2024) recommend that we offer a single cervical length scan between 16 and 20 weeks to women with a twin or triplet pregnancy.

Twin and triplet pregnancy cervical length measurements will be performed by Radiology.

The following is recommended:

- DCDA twins offered a cervical length scan at 20 weeks at the time of anomaly scan (1 hour scan slot to be allocated).
- MCDA twins offered a cervical length assessment at 18 weeks.

Any queries/issues – refer patient to the fetal medicine clinic.

9.0 Pain in pregnancy after 14 weeks

A scan will not be performed routinely for women presenting with pain. Unless there is a valid clinical question, a discussion with the Sonographers is advised.

10.0 Women who decline post-dates induction

Women should be identified by 38 weeks and offered referral to the obstetric team. When opting for conservative management, ≥42 week USS for liquor volume and UAD and 2 x per week CTG will be offered. Women should be informed that there is no evidence that this additional monitoring programme reduces rates of perinatal adverse outcome, but it may provide further information to guide care planning. Please see induction of labour guidelines for more information.

11.0 Zika virus

Women should avoid becoming pregnant while travelling to a country or area with risk for Zika virus transmission. On returning to the UK, they should avoid becoming pregnant for a further 2 months if only the woman travelled, and for 3 months if both partners travelled. If the pregnancy was conceived within this time frame, then a one-off scan will be offered at 28 weeks with the midwife sonographers. If normal, the woman will return to midwifery lead care. If abnormal, a referral should be made to the fetal medicine consultant. Zika virus will be covered by the M/W sonographers.

13.0 References

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GAPguidance.pdf

Maternity Services

Checklist for Clinical Guidelines being Submitted for Approval by Maternity Quality & Safety Group

Title of Guideline:	Obstetric ultrasound growth assessment protocols
Name(s) of Author:	Laura Jenkins and Tania Peverley
Chair of Group or Committee approving submission:	Antenatal Forum
Brief outline giving reasons for document being submitted for ratification	Version 4.1 amended to remove inaccurate statement on timing of scans for biometry <3-5th centiles.
Details of persons included in consultation process:	Antenatal forum
Name of Pharmacist (mandatory if drugs involved):	
Issue / Version No:	4.1
Please list any policies/guidelines this document will supercede:	Obstetric ultrasound scheme of work and protocols 2019
Date approved by Group:	September 2025
Next Review / Guideline Expiry:	April 2028
Please indicate key words you wish to be linked to document	Ultrasound, scanning, scan, anomaly, radiology
File Name: Used to locate where file is stores on hard drive	