Oxford University Hospitals NHS
NHS Foundation Trust

GS33 - Anomaly Scan Guideline

Category:	Guideline
Guideline Number:	GS33
Summary:	This document provides guidance for all maternity staff and sonographers involved in performing anomaly scans as part antenatal care provision and monitoring of fetal wellbeing
Equality impact assessed:	02/11/2022
Valid from:	19/12/2022
Date of review:	27/09/2025
Ratification date & body:	19/12/2022 – Ratified by Chair's action
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Associated OUH documents:	• Referralwhen a fetal abnormality is detected SOP • Referral When a Fetal Abnormality is Suspected Guideline • Growth Scan Guideline • AntenatalScreening Guideline
Document replaces:	Anomaly Scan v1.4, 24/05/2018 Anomaly Scan v.1.3, 23/03/2018 Anomaly Scan v.1.2, 09/11/2017 Anomaly Scan v1.1, 10/07/2017 Anomaly Scan v1.1, 03/05/2016

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It is the responsibility of all users to this document to ensure that the correct and most current version is being used.
This document contains many hyperlinks to other related documents.
All users must check these documents are in date and have been ratified appropriately prior to use.

Document History

Version valid from	Version number	Reason for review/update
19/12/2022	2.0	3 yearly review - Key Updates listed on page 5
June 2019	1.5	
2013	1.0	New document

Consultation Schedule

Who? Individuals or Committees	Rationale and/or Method of Involvement
Quality Assurance and Improvement Midwife	Review
Document Review Group (DRG)	Review and approval

Contents

Who should read this document?

1. This document should be read by all maternity staff involved in providing antenatal care for women accessing the OUHFT.

Gender inclusive language in OUH Maternity and Perinatal Services:

- This guideline uses the terms woman, women and mother throughout. These terms should be taken to include people who do not identify as women but who are pregnant. Similarly, where the term parent(s) is used, this should be taken to include anyone who has main responsibility for caring for a baby.
- The term partner refers to the woman's chosen supporter. This could be the baby's father, the woman's partner, a family member or friend, or anyone who the woman feels supported by and wishes to involve in their care.

Background/Scope

2. The fetal anomaly scan should be offered to all pregnant women and is usually performed between 18+0 and 20+6 weeks gestation.

3. The aims of this scan are to:

- Identify serious fetal abnormalities, that are either incompatible with life or associated with morbidity, to allow women to make informed reproductive choices.
- Identify certain abnormalities which may benefit from antenatal treatment.
- Identify certain abnormalities which require early intervention following birth.
- Identify women at high risk of early onset impaired fetal growth.

4. The fetal anomaly scan is a screening test for major structural anomalies and as such, not all anomalies will be detected by this scan.

5. Uterine artery Doppler is performed to aid risk assessment in all singleton pregnancies.

6. Written consent should be obtained prior to the scan examination.

7. The NHS Fetal Anomaly Screening Programme (FASP) has issued standards for this scan assessment which include a number of fetal views that should be assessed on each anomaly scan. In addition, NHS FASP has specified images that should be stored for each anomaly scan (basic anatomy and cardiac anatomy).

8. If a scan cannot be completed at first attempt, the reasons for this should be documented on the report generated by Viewpoint, explained to the patient and a further scan no later than 23 weeks offered.

9. In the event of suboptimal imaging of the heart at anomaly scan, this should be recorded on the newborn infant record (purple booklet) in the maternity handheld notes with the request to check neonatal oxygen saturations before discharge.

10. Normal variations of fetal anatomy do not require review in the Fetal Medicine Unit.

11. Abnormalities should be referred to the Fetal Medicine Unit using the EPR 'communicate' function.

12. Where there is uncertainty, a request for Fetal medicine *scan* review may be made using the EPR 'communicate' function.

13. There is a separate guideline and SOP for sonographers to follow when referring women when a suspected fetal anomaly has been identified.

14. This document is intended to provide practical guidance for all health care practitioners involved in the fetal anomaly screening pathway within OUH NHS Foundation Trust (OUHFT).

Key Updates

15. **(Newin v2.0) Further Assessment of Fetal Size Following Anomaly Scan information added on page 15:** In addition to repeat scans determined according to the SGA/ growth scan pathway, the measurements of the baby at the anomaly scan may require earlier follow up. Further scans should not be booked in the USS department, but the following action should be taken:

    - HC, AC, FL all <5th centile and EFW <5th centile: refer for FMU *review*
    - HC, AC and FL >5th centile but EFW <5th centile: no referral required
    - Any of HC, AC or FL <5th centile: refer for FMU scan *review*

16. **(New in v2.0)** The Growth scan Pathway form consent information (appendix 9 on page 41) has been updated.

17. **(New in v2.0)** The 20-week screening scan screens for 11 physical conditions (Table 1 on page 7). The most recent Fetal Anomaly Screening Programme guidance (2022) details performance thresholds for major cardiac anomalies and congenital diaphraghmatic hernia (Table 2 on page 7/8). Fetal anomaly screening standards valid for data collected from 1 April 2022 - GOV.UK (www.gov.uk) .

18. **(New in v2.0)** Placental localisation information amended on page 10. Low lying placenta (LLP) defined as: <2cm from internal os. Further information on management of a LLP (ora placenta located under UV fold) forwomen who have had a previous caesarean section or other uterine surgery also updated.

19. **(Newin v2.0) If the Pulsatility index (PI) is >3 the woman must be offered a 36-week ANC appointment for medical review and birth planning discussion** (added to Scan Pathways Table on page 14).

20. **(New in v2.0) To begin February 2023:** In line with SBLCBv2, for twin pregnancies a growth scan should be offered at 24 weeks gestation in addition to the 28, 32 and 36 week growth scans (please see page 15).

Aim(s)

21. The aims of this guideline are to:

    - Outline the screening scan protocol
    - Describe the pathway of care if an anomaly is suspected
    - Describe the SGA pathway
    - Outline the internal quality assurance arrangements.

Full guideline

Pre-scan information

22. It is important that both women and health professionals appreciate that the scan is a screening tool and because of this it has limitations. Inevitably, someconditions may be missed or misidentified. Women should receive comprehensive information before the scan in a language appropriate to them (OUH interpreter details – Tetum interpreters will have to be booked in advance due to availability issues). The verbal offerof an anomaly scan is usually made by the woman's midwife. If awoman chooses to decline to have a fetal anomaly scan, this must be respected, and her decision should be documented in her maternity notes and on EPR.

23. A full bladder is not required but do not ask her to empty her bladder unless it is impairing views because an empty bladder can make placental site assessment less accurate.

Consent

24. Currently, written consent is gained when the woman attends for her anomaly scan. This is on the 'before your anomaly scan' section of the Growth Scan Pathway Form (See Appendix 9 on page 39). This should be filed in the handheld record.

Measurements

25. The following measurements are requirements:

- Biparietal diameter (BPD)
- Head circumference (HC)
- Posterior ventricle (VP)
- Transcerebellar diameter (TCD)
- Cisterna Magna (CM)
- Nuchal Fold (NF)
- Abdominal circumference (AC)
- Femur length (FL)
- Deepest vertical pool (DVP)
- Uterine artery Doppler on both sides

- All measurements should be transferred automatically by DICOM, not by entering them manually.

Basic anatomical views to be assessed

26. The main structures that should be identified and assessed at the anomaly scan are outlined in Appendix 1. This assessment enables screening for a number of major conditions.

27. The 11 physical conditions screened for at the mid-pregnancy anomaly scan are listed in Table 1:

Conditions
Anencephaly
Open spina bifida
Cleft lip
Diaphragmatic hernia
Gastroschisis
Exomphalos
Serious cardiac abnormalities
Bilateral renal agenesis
Lethal skeletal dysplasia
Trisomy 13
Trisomy 18

28. Performance thresholds (detection rates) are available for conditions listed in Table 2:

Condition	Acceptable threshold	Achievable threshold
Transposition of the great arteries (TGA)	≥ 70.0%	≥ 99.0%
Atrioventricular septal defect (AVSD)	≥ 50.0%	≥ 80.0%
Tetralogy of Fallot (TOF)	≥ 55.0%	≥ 85.0%
Hypoplastic left heart syndrome (HLHS)	≥ 80.0%	≥ 99.0%

Coarctation of aorta	(not set)	(not set)
Congenital diaphragmatic hernia (CDH) – left and right sided	≥ 60.0%	≥ 70.0%

Fetalanomaly screening standards valid fordatacollected from 1 April 2022 - GOV.UK (www.gov.uk).

29. Of these anatomical views assessed, the following 6 images should be stored at the time of the anomaly scan **as a minimum**:

- Head circumference (HC) - demonstrating head circumference and measurement of the atrium of lateral ventricle.
- Suboccipito-bregmatic view of head demonstrating measurement of the transcerebellar diameter.
- Coronal view of lips with nasal tip and both nostrils.
- Abdominal circumference - demonstrating AC measurement.
- Sagittal view of dorsum of spine including sacrum and skin covering.
- Femur length demonstrating femur length measurement
- Fetal cardiac views.

30. These are illustrated in Appendices 3 and 4 together with schematic drawings of each view to illustrate key anatomical landmarks.

Fetal Cardiac Views

31. Congenital heart disease is defined for the purpose of anomaly scanning as acondition that will require immediate cardiac assessment at birth and/or treatment within the first year of a child's life.

32. As part of basic fetal echocardiography, situs/laterality, heart size, heart rate and rhythm must be examined. Fetal cardiac anomaly scanning should also assess:

- Four chamber view of heart (4CH)
- Aorta/Left ventricular outflow tract (LVOT)
- Pulmonary/Right ventricularoutflow tract ORThreevessel(pulmonary artery, aorta, superior vena cava) view (RVOT)

- Three Vessel Trachea View (3VT)

33. Images of these fourviews must be stored - if storing still images, these should ideally be labelled as '4CH', 'LVOT' or 'RVOT' or '3VT'. It is also acceptable to store a short cineloop of the cardiac examination as atransverse "sweep" (see Carvalho et al, 2013, for further information/useful tips on scanning technique).

34. Examining outflow tract increases detection rates for major cardiac malformations above those achievable by four chamber view alone. The inclusion of outflow tracts is more likely to identify conotruncal anomalies such as tetralogy of Fallot, transposition of the great arteries, double outlet right ventricle and truncus arteriosus.

35. A summary of the structures that require assessment and an overview of key features that should be assessed in each view are outlined in Appendix 4.

36. The use of colour flow Doppler is not a requirement at present but is encouraged as it may help provide additionalinformation and improve detection of Congenital Heart Disease (CHD).

37. An assessment of vessel number, size, alignment and arrangement can increase detection of certain anomalies that may have a normal four-chamber view including transposition of the great arteries, tetralogy of Fallot and pulmonary atresia with a ventricularseptal defect. The 3VT view, in assessing the relationship to the trachea is more likely to enable detection of lesions such as coarctation of the aorta, right aortic arch and double aortic arch (see also Cavalho JS et al, 2013).

Uterine Artery Doppler

38. These are assessed in every singleton pregnancy at the time of the anomaly scan. Occasionally only one will be obtainable and this is usually because of an abnormal uterine shape. Please refer to Doppler Guideline in Appendix 5 for the technique.

What to do if Anomaly Scan Cannot be Completed

39. If a scan cannot be completed at first attempt, the reasons for this should be documented in the report generated on Viewpoint, explained to the woman and a further scan no later than 23 weeks be offered.

40. In the event that staffing/circumstances cannot accommodate afollow up completion scan, no further appointment should be offered, and screening should be recorded as:

- Anomaly scan: unable to complete despite two attempts on the day: no further appointment made due to staffing issues.

41. If the fetal cardiac scan cannot be adequately imaged even with the second scan, this should be explained to the woman and astickershould also be added to the maternal and neonatal notes to alert maternity staff that neonatal oxygen saturations should be checked prior to discharge (this sticker reads):

'Unable to complete fetal cardiac anomaly scan - please check neonatal oxygen saturations before discharge - if there are any concerns, the Neonatal Unit Registrar should be informed'.

Image Acquisition and Storage

42. The views outlined in preceding sections capture some of key anatomical areas that are screened for major anomalies. Images stored reflect the overall quality of the examination.

43. If there are factors during the examination that have made it more difficult to complete the scan and/or obtain good quality images to store, this should be clearly documented in the "Comments" section of the report generated on Viewpoint. Such factors might include obesity/raised BMI, body habitus, multiple uterine fibroids. This should also be explained tactfully to the woman.

44. Poor image documentation precludes the possibility for reinterpretation and could support allegations that an incomplete or inadequate study has been performed.

Detection of normal variants and markers that should be referred for further assessment

45. The term "soft marker" should no longer be used.

46. Table 2 lists normal variants that do **NOT** require referral to FMU.

Table 2: Normal variants that should NOT be reported or referred

Choroid plexus cyst(s)*
Echogenic foci in the heart without a structural abnormality
Two vessel cord

*if there is ventricular enlargement >10mm in association with CPCs, refer to FMU.

47. Listed in Table 3 are examples of findings that should be reported, and the woman referred to the Fetal Medicine Unit for further assessment and treated/investigated as for any other suspected fetal anomaly.

Table 3: Findings that should be referred for further assessment

Nuchal fold ≥6mm
Ventriculomegaly >10mm
Cisterna Magna >10mm
Echogenic bowel (with density equivalent to bone)
Unilateral or bilateral renal pelvic dilation (AP measurement >7mm)
Small measurements (See page 14 - 'Further assessment of fetal size following the anomaly scan')

Placental Localisation

48. The placental site should be assessed as part of the anomaly scan and findings recorded using the appropriate dropdown box on the anomaly screen on Viewpoint.

49. If the placenta is low (i.e. <2cm from internal os) or under the uterovesical fold (UVF) (see Appendix 6) ask the woman if she has had a previous caesarean section or any other uterine surgery.

If there has been previous uterine surgery:

- For an anterior placenta that is not low but under the UVF **AND** previous CS:
    - re-scan in the US dept at 28 weeks. If the placenta is still under the UVF refer to placenta clinic ASAP
    - For an anterior low placenta (<2cms from the internal cervical os) or placenta praevia at 20 weeks **AND** previous CS – refer to FMU placenta clinic where the women will be scanned at 28 weeks.

If there has not been previous uterine surgery:

- Whether it is under the UVF is not important.
- Record the placenta in Viewpoint as low if it is <2cm from internal os, but not if it is merely under the uterovesical fold.
- Do not book an extra scan: the routine 36 week scan will suffice.
- Explain these findings to the woman and that she should attend hospital if she has any vaginal bleeding. Do not describe the placental site as "praevia" at this stage- you may tell the woman that most of such placentas are not low-lying by the time she gives birth.

Placenta Praevia

50. Any placenta praevia diagnosed at the anomaly scan should be referred to the Antenatal Clinic using the EPR communicate function.

Amniotic Fluid

51. The deepest vertical pool (cord and limb-free) should be measured at the time of anomaly scan. This should always be recorded on Viewpoint. If this is normal, use the "normal with AFI" function and enter the measurement under Pool Depth (PD).

Polyhydramnios: (NEW)

52. If deepest vertical pool is greater than 8cm, measure the amniotic fluid index (AFI). An AFI greater than 25cm is considered to be polyhydramnios.

53. If the AFI is greater than 25cm but less than 30cm, patient should be referred to antenatal clinic.

54. If AFI is 30cm or greater, patient should be referred to the fetal medicine unit to be seen within 3 working days.

55. If polyhydramnios is observed in a woman who is known to be diabetic, she does not need referral to Fetal Medicine. Any referral to Fetal medicine will be decided in the Diabetic Clinic.

Oligohydramnios:

56. If deepest vertical pool is less than 2cm, this is oligohydramnios. The patient should be referred to Maternity Assessment Unit same day for review to exclude ruptured membranes.

Outcomes of fetal anomaly scan- data entry, diagnosis fields and referrals

57. Data should be populated in Viewpoint using the DICOM connection.

58. Use the anomaly scan chart set: of BPD, HC, AC and FL: 2 to a line and DO NOT create charts of uterine artery Doppler.

    When entering diagnoses, use only the codes in the diagnoses dropdown menu on Viewpoint. This should only be one of the 5 pre-existing anomaly scan options. This is important for auditing activity and referrals. Any additional comments should only be in the comments section. In each case, a copy of the report must be filed in the woman's health record.

59. Use the appropriate diagnosis outcome (see below). A single further scan should be offered by 23 weeks gestation unless staffing restrictions apply.

Outcomes of the anomaly scan include:

60. **No anomaly identified:** Inform thewoman. In the Viewpoint report, use the diagnosis function: "anomaly scan - no evidence of fetal abnormality".

61. **Anomaly scan:** unable to complete despite 2 attempts on the day – no further appointment made due to staffing restrictions. This option may be used because limited or no anomaly completion slots are available.

62. **Anomaly scan:** unable to complete – further appointment made:

- To complete anomaly scan
- To complete uterine artery dopplers
- To complete anomaly scan and uterine artery dopplers

63. **Anomaly scan:** unable to complete examination at second attempt – screening incomplete.

64. **Anomaly scan cannot be completed** due to for example (but not confined to):

- Increased maternal body mass index (BMI)
- Maternal body habitus
- Uterine fibroids
- Abdominal scarring
- Sub-optimal fetal position

65. **Anomaly identified or suspected**: Discuss the findings with the woman and inform her that she willbe referred to the FMU. Record the finding on report in the comments and use diagnosis field "Anomaly scan- referred to FMU". A referral to FMU is made by completing a FMU referral which should be made via EPR using the 'communicate' function. On receipt of areferral, the specialist midwives will allocate an appointment within 3 working days and contact the woman directly. Please ensure all details on the referral are completed correctly as incorrect entries may delay review.

Outcome of risk assessment for small for gestational age/growth pathway

66. After the anomaly scan complete the Growth Scan Pathway form to book follow up scans.

67. There are 4 questions regarding risk. 3 should have been completed by the woman before the scan; Q4 (PAPP-A level) will need to be completed by the sonographer (a low PAPP-A result willbe flagged up as a message box in Viewpoint at the start of the scan). These are the possible pathways for a singleton pregnancy:

	Risk Factors	Uterine artery Doppler		ACTION
Pathway A →	**No *risk factors** (no boxes ticked yes)	**Normal** Uterine arteries **(total PI <2.5)**	**Low risk for SGA/PET**	**36/40 growth scan**
Pathway C →	***Risk factors** (one or more boxes ticked yes)	**Normal** Uterine arteries **(total PI <2.5)**	**Med risk for SGA/PET**	**32/40 and 36/40 growth scans**
Pathway D →	***Risk factors** (whether ticked or not)	**Abnormal** 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 and 31/40 for BP check or if booked under Silver Star (SS), 24/40 SS appointment.
Pathway D →	***Risk factors** (whether ticked or not)	**Abnormal** Uterine arteries **(total PI >3)** **If PI >3 the woman must be offered a 36-week ANC appointment for medical review and birth planning discussion.**	**High risk for SGA/PET**	

***Risk factors:**

- Previous baby <2500g (5lbs 8oz) at any gestation
- Aged 40 or above and nulliparous
- Smoking ≥ 10 day
- PAPP-A ≤ 0.30MoMs

- The Growth Scan Pathway form should beusedto indicate which scans should be booked. A copy of this should be filed in the handheld notes with the scan report.

Note- for twin pregnancies:

Dichorionic twin pregnancy (MC twins and high order multiples to FMU)	**24/40 (NEW in v 2.0), 28/40, 32/40 and 36/40 growth scans** Please arrange usual clinic and scan follow up in the current manner if not already booked

Further assessment of fetal size following the anomaly scan (NEW in v2.0)

68. In addition to repeat scans determined according to the SGA/ growth scan pathway the measurements of the baby at the anomaly scan may require earlier follow up. Further scans should not be booked in the USS department, but the following action should be taken:

- HC, AC, FL all <5th centile and EFW <5th centile: refer for FMU *review*
- HC, AC and FL >5th centile but EFW <5th centile: no referral required
- Any of HC, AC or FL <5th centile: refer for FMU scan *review*

69. Note the *scan review* will usually NOT require the woman to attend FMU in person (see Referral to Fetal Medicine Unit).

Referral to Fetal Medicine Unit

70. If an abnormality is suspected a referral should be made to FMU using the 'communicate' function on EPR. The woman will be rung by the unit to arrange an appointment. Inform the woman of the finding, record finding on report in the comments and use diagnosis field "Anomaly scan - referred to FMU".

71. On receipt of a referral, the specialist midwives will allocate an appointment within 3 working days and contact the woman directly. Please ensure all details on the referral are completed correctly as incorrect entries may delay review. In some circumstances the scan images/measurements only willbe reviewed, and the woman will be rung by an FMU midwife to explain that she does not need to attend in person.

72. In addition, the sonographermay request that FMU reviewseitherimages or the scan measurements: under these circumstances the woman may not needto attend for an FMU appointment. The diagnosis field "Anomaly scan - referred to FMU" should be used, in the recommendations/treatmentdrop down select 'refer to': FMU requested to review scan findings. A referralshould be made via EPR to FMU requesting an image review.

73. Also indicate whether the woman should be contacted by the unit following this review: this contact should only occur if you have informed the woman you are requesting this review.

74. Following this review, the FMU Team will update the woman's EPR accordingly.

EPR Considerations

75. EPR should be used for all referrals and communication between the MDT using the 'communicate' function on EPR and the diagnosis field "Anomaly scan - referred to FMU" for referral to FMU (for example) as detailed throughout this guideline.

References

NHS Fetal Anomaly Screening Programme (FASP: programme overview – www.gov.uk 18+0 to 20+6 weeks fetal anomaly scan national standards and guidance for England. http://fetalanomaly.screening.nhs.uk/standardsandpolicies

Carvalho JS et al., ISUOG Practice Guidelines(updated): sonographicscreening examination of the fetal heart. Ultrasound Obstet Gynecol (2013); **41**: 348–359 http://www.isuog.org/NR/rdonlyres/14895030-9283-4DB6-9CF7-BF9304DAB0B5/0/ISUOG_cardiac_screening_guidelines_aspublished_2013.pdf

Further resources/training

Fetal Medicine Foundation Online Education: Fetal echocardiography
https://fetalmedicine.org/fetal-echocardiography-1

Tiny Tickers
http://www.tinytickers.org/content/resources

Practice Guidelines for performance of the routine mid-trimester fetal ultrasound scan. Ultrasound Obstet Gynecol (2011); **37**: 116-126 http://www.isuog.org/NR/rdonlyres/EA865840-6CA3-45AC-9E99-FBAF775119A9/0/ISUOGGuidelinesmidtriscan20101210.pdf

Papageorghiou AT et al (2013) International Fetal and Newborn Growth Consortium for the 21st Century. Ultrasound methodology used to construct the fetal growth standards in the INTERGROWTH-21st Project. BJOG; **120** Suppl 2:27-32.

Implementation Plan

No.	Recommendation for Implementation	Action to be taken	Evidence of Action	Responsible Person	Date Action to be completed by	R.A.G. Action completion status[2]
1	Raise awareness of updated guideline	Updates to be shared by Matron for Ultrasound during staff meetings	Minutes of meeting held?	Guideline Author/Matron for ultrasound	Within 1 month of guideline being uploaded	
2	Raise awareness of updated guideline	Mention in Monthly Guidelines updates Table	Email Circulating Monthly Guidelines updates Table	Quality Team for inclusion in Monthly Guidelines updates Table	Within 2 weeks of guideline live date	

Appendix 1: Overview of anatomical views to be assessed at the anomaly scan

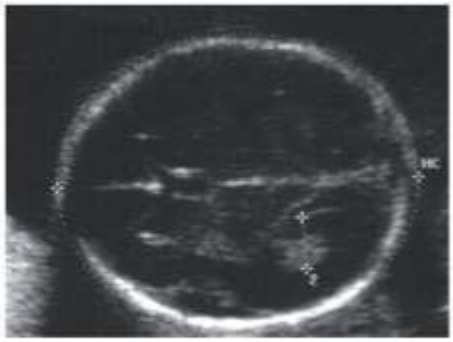
Area		Structures assessed	View	Image stored
1	Head & neck	Skull Neck: Skin fold (NF) Brain: • Cavum septum pellucidum (CSP) • Ventricular atrium (Va & Vp) • Cisterna magna (CM) • Cerebellum (TCD)	Shape Transventricular view to identify CSP, measure BPD, HC & Vp) Transcerebellar view to measure TCD, CM, NF	Transventricular view Suboccipitobregmatic view for posterior fossa and neck
2	Face	Lips, nostrils Profile	Coronal view to visualise intact lip: view to include nostrils and lips; sagittal view to assess profile	Coronal view of lips and nasal tip
3	Chest	Heart Situs/laterality - 4-chamber view - outflow tracts Lungs	See cardiac protocol- Appendix 3 Determine left and right side of fetus from position of fetus in uterus Transverse section of thorax including complete rib and crux of heart Aorta and left ventricular outflow tract & Pulmonary/right ventricular outflow tract/3VV/3VT Look for any echogenic or cystic areas.	Transverse thoracic - 4-chamber view - outflow tracts
4	Abdomen	Stomach and short intrahepatic section of umbilical vein Abdominal wall Renal Pelvis Bladder	Transverse; if stomach bubble not visible, ensure it is present by waiting to see it fill. Check early for stomach in exam, if not visible, again at then end. If still not visible, rescan in 30minutes. If still not visible, refer to PND. Transverse (demonstrate intact) Transverse- measure if AP looks increased Transverse	Abdominal circumference showing AC measurement
5	Spine	Vertebrae Skin covering	Sagittal, transverse& coronal Sagittal	Sagittal view of spine including sacrum and skin covering
6	Limbs	Femora Tibia & fibia Humerus Radius/ulna Hands- metacarpals Feet- metatarsals Orientation of feet to lower legs	Both visible; femur length (one leg only) Visible (both legs) Visible (both arms) Visible (both arms) Visible (both hands, not counted) Visible (both feet, not counted) Coronal view to examine for talipes	Femur length (one leg only) demonstrating FL measurement
7	Uterine cavity	Amniotic fluid Placenta		Subjective volume Visible and position noted

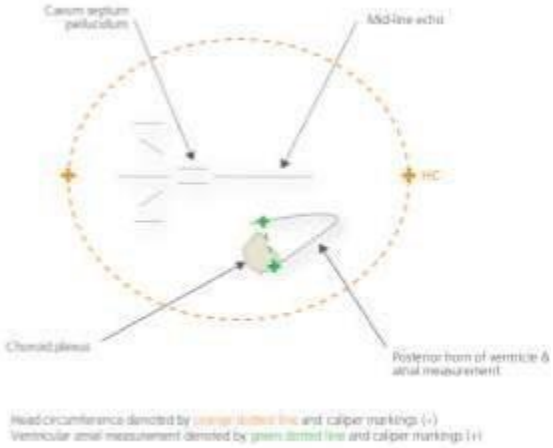
Appendix 2: Definitions

Term	Definition
AC	Abdominal circumference
AFI	Amniotic fluid index
AP	Antero-posterior
CHD	Congenital heart disease
EPR	Electronic Patient Records
FASP	Fetal Anomaly Screening Programme
FMU/PND	Fetal Medicine Unit/Prenatal Diagnosis
PD	Pool depth
PI	Pulsatility index
TV	Transvaginal
Ut Art	Uterine artery
Viewpoint	Software used to store scan examination data and to generate scan reports

Appendix 3: Base menu of anatomical images to be stored

Head circumference and ventricular atrium

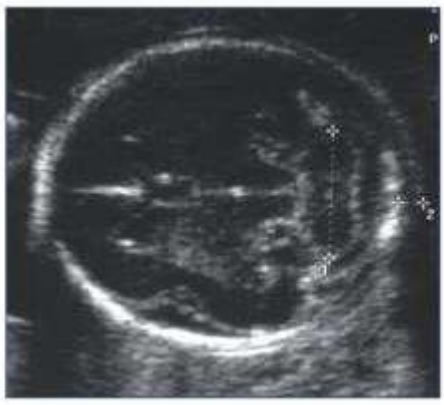


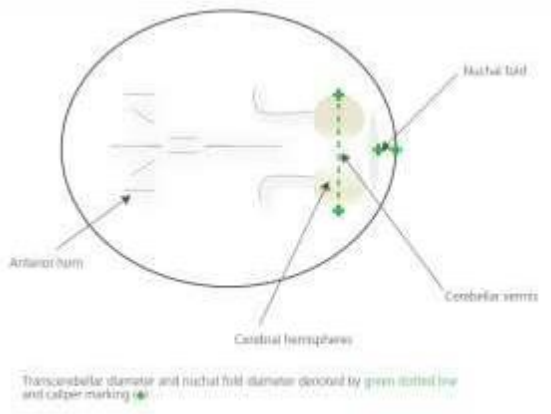


Essential criteria for imaging acquisition (in bold measurements required by FASP):

1. Image should be stored
2. Symmetry: The two hemispheres should be symmetrical
3. Anterior and posterior ventricles should be visible
4. Cavum of the septum pellucidum should be visible
5. No cerebellum should be visualised
6. Ellipse placement should adequate to the size of the head
7. **HC callipers** placement should be along the outer border of the skull
8. Callipers of the BPD should be placed "outer to outer"
9. **Vp callipers** placement should be "inner to inner" perpendicular to the ventricular cavity
10. Region of interest size should be more than 30% of the total picture size

Transcerebellar diameter (TCD) and nuchal fold (NF).



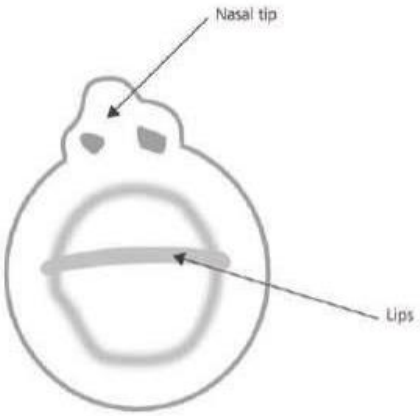


Transcerebellar diameter and nuchal fold diameter denoted by green dotted line and caliper marking

Essential criteria for imaging acquisition (in bold measurements requiredby FASP):

1. Image should be stored
2. Symmetry: The two hemispheres should be symmetrical
3. Cerebellum should be visualised at itsmaximum diameter
4. Cavum of the septum pellucidum should be visible
5. **TCD** callipers placement should be outer to outer the cerebellar hemispheres
6. CM callipers should be placed between the cerebellar vermis and the internal side of the occipital bone
7. NF calliper placement should be from the outer border of the skull to the outer border of the skin
8. Region of interest size should be more than 30% of the total picture size

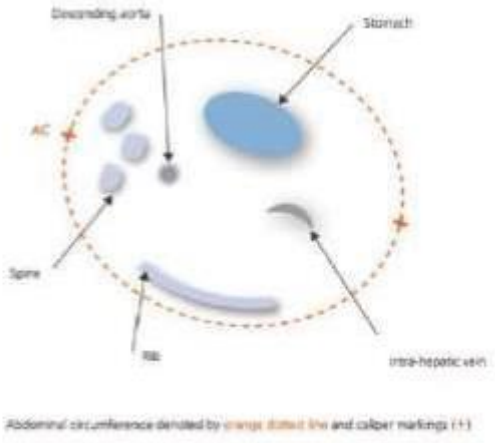
Nasal tip and lips



Essential criteria for imaging acquisition:

1. Image should be stored
2. Upper lip visible
3. Two nostrils visible
4. Two lip angles visible
5. Region of interest size should be more than 30% of the total picture size

Abdominal circumference



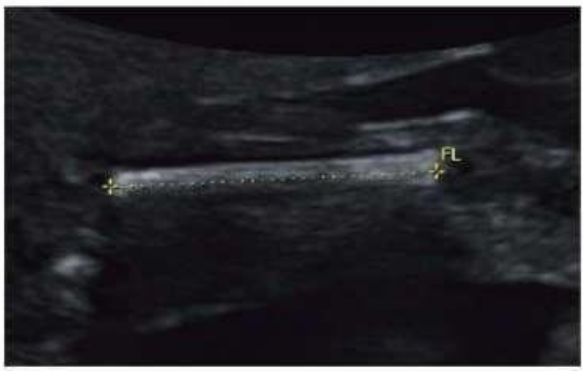
Abdominal circumference denoted by orange dotted line and caliper markings (+)

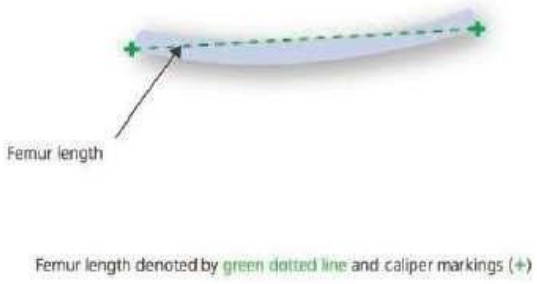
Essential criteria for imaging acquisition (in bold measurements requiredby FASP):

1. Image should be stored
2. AC should be as circular as possible
3. Stomach bubble visible
4. Umbilical vein anterior 1/3rd and level of portal sinus
5. No kidney present
6. Single straight rib
7. **AC** calliper placement on the outer border of the skin
8. Region of interest size should be more than 30% of the total picture size

Note: If the stomach is not visible, please ensure that it is present by waiting to seeit fill. Check for it early in your examination and if not visible, again at the end. If still not visible rescan in approximately 30 minutes. If still not visible, refer to FMU.

Femur Length

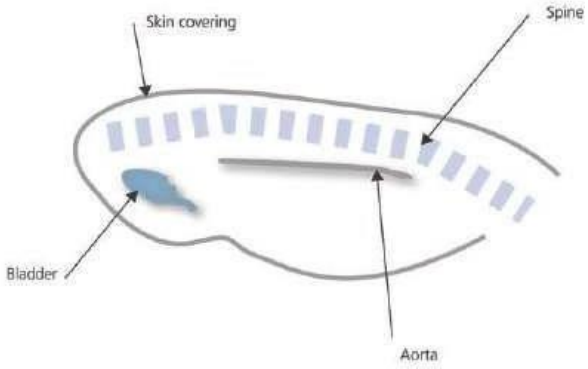




Essential criteria for imaging acquisition (in bold measurements requiredby FASP):

1. Image should be stored
2. Ends of the femur clearly visible
3. Angle of the femur less than 45 degrees to the ultrasound beam
4. **FL** callipers placed outer to outer in the middle of the femur extremities
5. Region of interest size should be more than 30% of the total picture size

Longitudinal view of spine



Essential criteria for imaging acquisition (in bold measurements requiredby FASP):

1. Image should be stored
2. Dorsal spine visible
3. Sacrum visible
4. Alignment of vertebrae visible from the dorsal level to the sacrum
5. Continuity of skin line
6. Amniotic fluid visible beyond skin dorsally
7. Region of interest size should be more than 30% of the total picture size

Appendix4: Fetal cardiac anomaly scan

1. Cardiac images are ideally stored as cine clips.

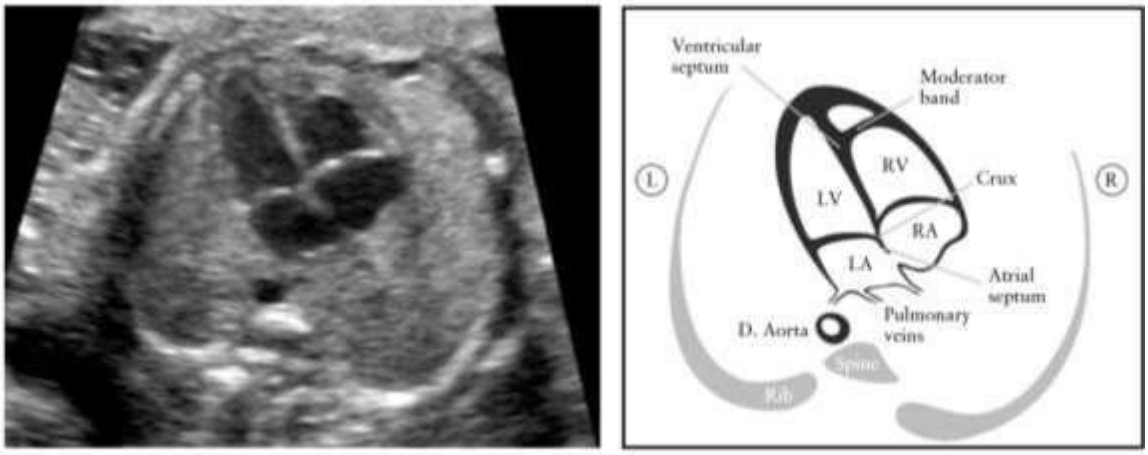
2. As part of basic fetal echocardiography, situs/laterality, heart size, heart rate and rhythm must be examined. Fetal cardiac anomaly scanning should also assess:

3. Four chamber view of heart

4. Aorta/Left ventricular outflow tract

5. Pulmonary/Right ventricular outflow tract OR Three vessel (pulmonary artery, aorta, superior vena cava) view

Four chamber view



(*from Carvalho et al, 2013*)

Assessment of fetal situs/laterality and the four chamber view
Situs and general aspects • Fetal laterality (identify right and left sides of fetus) • Stomach and heart on left • Heart occupies a third of thoracic area • Majority of heart in left chest • Cardiac axis (apex) points to left by 45°±20° • Four chambers present • Regular cardiac rhythm • Pericardial effusion not larger than 2mm **Atrial chambers** • Two atria, approximately equal in size • Foramen ovale flap in left atrium • Atrial septum primum present (near to crux) • Pulmonary veins (at least 2) entering left atrium

Ventricular chambers

- Two ventricles, approximately equal in size
- No ventricular wall hypertrophy
- Moderator band at right ventricular apex
- Ventricular septum intact (apex to crux)

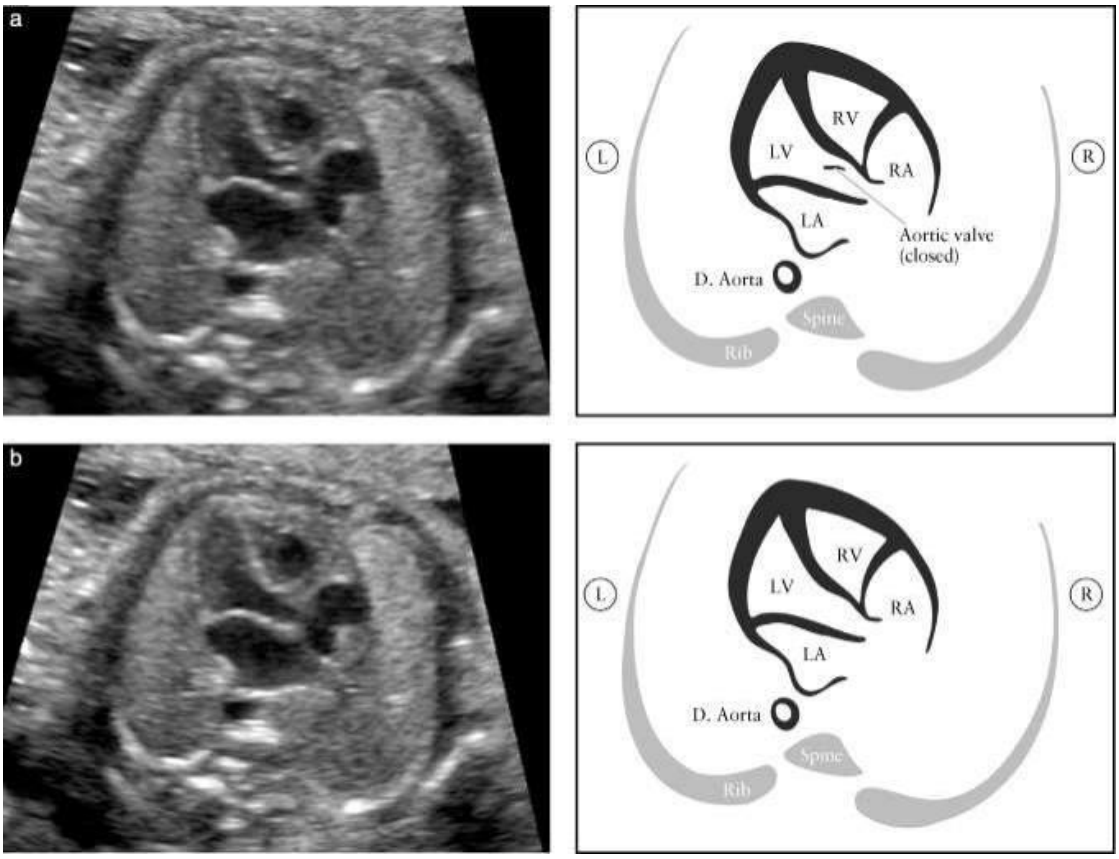
Atrioventricular junction and valves

- Intact cardiac crux
- Two atrioventricular valves open and move freely
- Differential offsetting: tricuspid valve leaflet inserts on ventricular septum closer to cardiac apex than does mitral valve and allows identification of the right ventricle

Outflow tract views

6. In assessment of the LVOT and RVOT, it is important to ascertain normality of the two great vessels, including their connection to the appropriate ventricles, their relative size and position and adequate opening of their arterialvalves. If any of these features appear abnormal, referral to fetal cardiology should be made using standard PND/FMU referral form. A normal examination requires that the great vessels are approximately equal in size (PA very slightly larger) and cross each other at right angles from their origins as they exit from the respective ventricles (normal "cross-over").

Left ventricular outflow tract

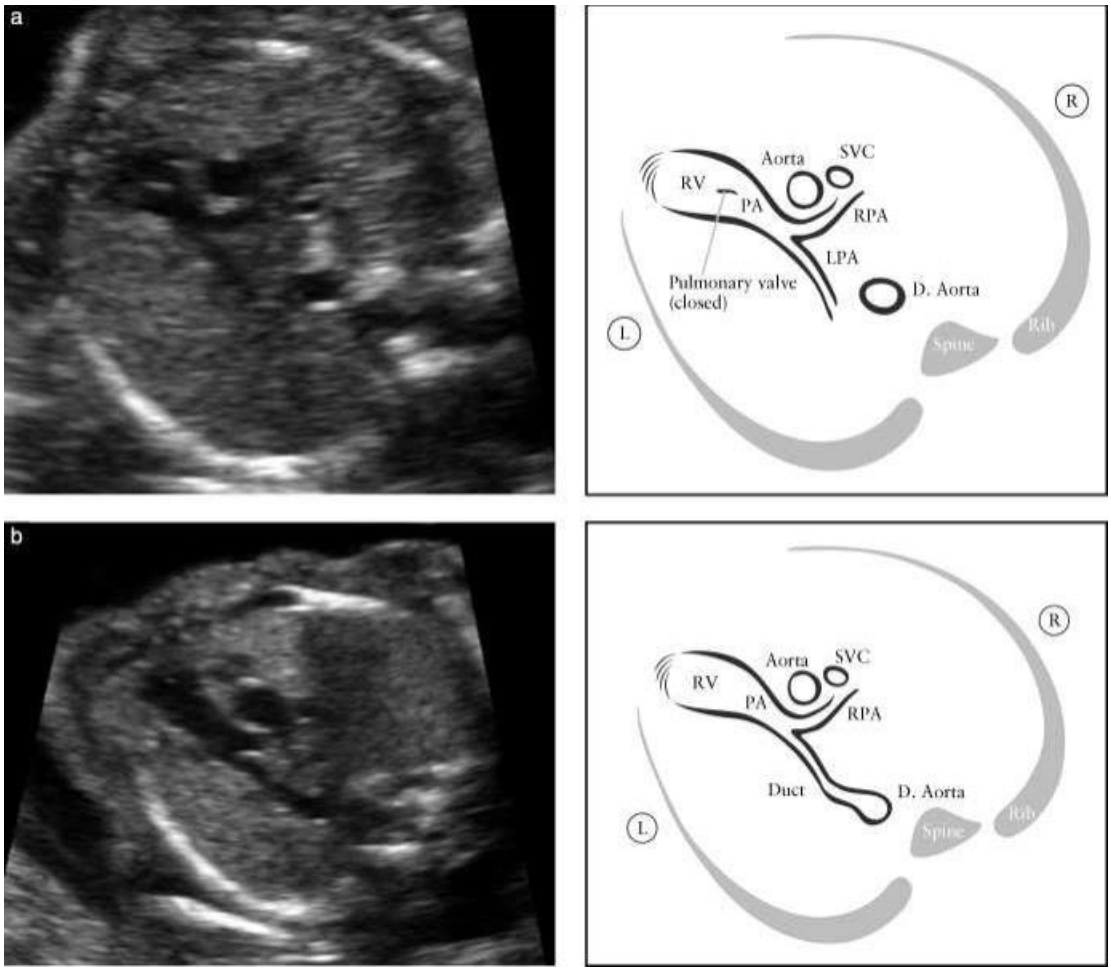


(from Carvalho et al., 2013)

7. The LVOT view demonstrates avesselconnected to the left ventricle. A normal LVOT will demonstrate continuity between the interventricular septum and the anterior wall of this vessel, which in the normal heart corresponds to the aorta (identified by head and neck vessels arising from it). The aortic valve should not be thickened and should open freely.

8. A LVOT view must be stored as part of the fetal cardiac anomaly scan. The valve is closed in (a) and open in (b) – a cine loop will show both, either view would be acceptable as a frozen image.

Right ventricular outflow tract

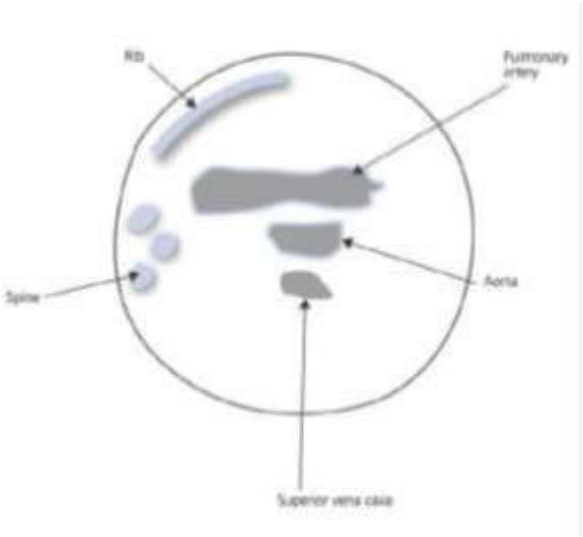


(*from Carvalho et al, 2013*)

9. This view shows a vessel connected to the morphological right ventricle (RV). This vessel divides early thereby identifying it as the pulmonary artery. The pulmonary artery is slightly larger than the aorta which it crosses at almost right angles. The pulmonary artery divides into right and left branches and then continues posteriorly as the ductus arteriosus to join the artery just after its third head/neck branch. The pulmonary valve should not be thickened and should open freely. In (a) the bifurcation of the PA into both pulmonary arteries can be seen.

10. A RVOT view must be stored as part of the fetal cardiac anomaly scan. The valve is closed in (a) and open in (b) – a cine clip is preferred but either view would be acceptable as a stored image.

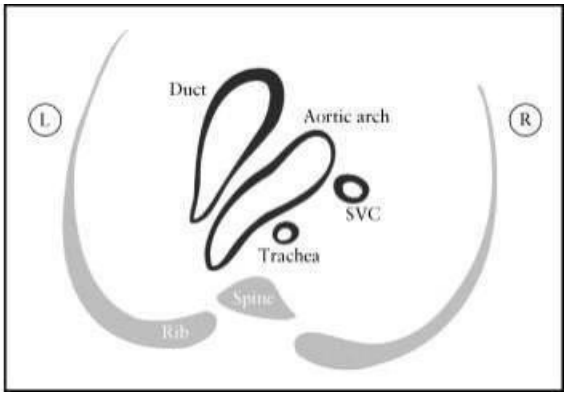
Three vessel view (3VV)



The 3VV view best demonstrates the relationship between the pulmonary artery, aorta and superior vena cava (SVC) in the upper mediastinum. It is important to note the correct position and alignment of the 3 vessels as well as their relative size. The pulmonary artery, to the left, is the largest of the three and the most anterior, whereas the SVC is the smallest and most posterior.

Three vessel view and trachea view (3VT)

A 3VT view must be stored as part of the fetal cardiac anomaly scan. A cine clip is preferred but a stored image would be acceptable.



11. The trachea is usually identified as a hyperechogenic ring surrounding a small fluid-filled space. This view best demonstrates the transverse aortic arch and its relationship with the trachea. In the normal heart, both the aorticarch and the ductal arch are located to the left of the trachea, in a "V"-shaped formation.

Appendix 5: Uterine artery Doppler

1. The purpose of this guidance is to standardise and optimise the technique of Doppler signal acquisition. Poor acquisition reduces the effectiveness of the screening test and creates work for others.

Obtaining optimum measurements

2. The UtA Doppler signal should be obtained at the apparent crossover with the external iliac artery using Color Doppler. If the correct anatomic site cannot be identified the UtA tract closest to the iliac artery should be insonated.

3. In case of an early bifurcation of the UtA the larger vesselshould be insonated. The uterine artery will always have a velocity of >45cm/sec. If the velocity is less you may be insonating an arcuate vessel.

4. In rare cases there is only one vesselbecause of a uterine abnormality. If only one vessel can be insonated a PI of >/=1.25 should be considered high risk and the patient managed as the total PI was >/=2.5.

Normal uterine artery

5. Once 4-6 cycles are obtained and frozen, press the 'uterine artery' (left or right) option, then Autotrace. Limit the section autotraced to the best 3 consecutive similar waveforms. In case excessive background noise and signal is poor, a manual trace can be used. Store the best image of both sides. Use the 'send report' function to ensure they are stored in Viewpoint; in the event of a lost connection, manually enter both PI and RI for each side.

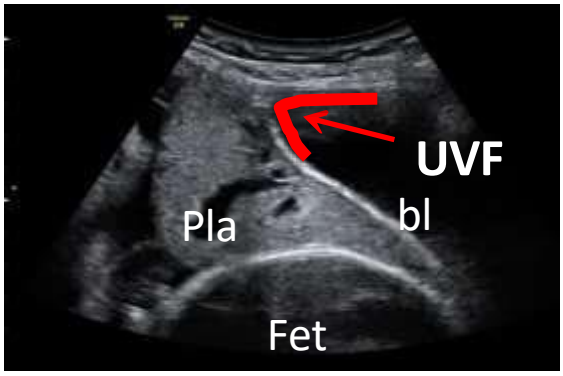
6. The following 6 criteria must be satisfied for any of the Doppler measurements obtained.

Magnification	50% of the screen (zoom box) and sample gate in centre of vessel
Angle	less than 30%

Sweep speed	4 - 6 waves insonated with constant signal
Clearance of the IMAGE	Velocity and colour gain correction (no veins signal)
Anatomic Site	UtA: before the bifurcation above the iliac vessels
Velocity Scale	75% of the peak systolic velocity

Appendix 6: Placental site assessment

1. In this image the placenta is not clearly low, but is under the uterovesical fold (UVF), which is marked by the red arrow. This is only significant if the woman has had previous uterine surgery.



Appendix 7: Monitoring and compliance

Compliance Standard	Monitoring method	Frequency of monitoring	Review Group/Committee
Storage of 6 base menu anatomical views of adequate quality	Audit using validated tool to assess 3 randomly scan examinations undertaken by each sonographer	6 monthly	MCGC
Storage of 3 cardiac views of adequate quality	Audit using validated tool to assess 3 randomly scan examinations undertaken by each sonographer	6 monthly	MCGC
Storage of 3 adequate uterine artery images	Audit using validated tool to assess 3 randomly scan examinations undertaken by each sonographer	6 monthly	AHSN team
Uterine arteries measured	Viewpoint analysis	6 monthly	AHSN team

Appendix 8: Equality Impact Assessment

1. Information about the guideline, service or function

What is being assessed?			
New Guideline/Procedure	[ ]	New Service/Function	[ ]
Existing Guideline/Procedure	[x]	Existing Service/Function	[ ]
Staff membercompleting assessment:			
Name of guideline/service/function: **Anomaly Scan Guideline**			
Details about the guideline/service/function: This document provides guidance for all clinical maternity staff. It is particularly relevant for those staff performing antenatal anomaly ultrasound scans for women who choose to have this aspect of care within the Oxford University Hospitals (OUH) NHS Foundation Trust.			
Review Date:		**Date assessment completed: 02/11/2022**	
Signature of staff member completing assessment: Marie Barnard		**Signature of staff member approving assessment:**	

2. Screening Stage

Who benefits from this guideline, service or function? Who is the target audience? (*tick all that apply*)					
Patients	[x]	Family/Carers	[ ]	Not applicable	[ ]
Staff	[x]	Other (*specify*):			
Does the guideline, service or function involve directengagement with the target audience?					
Yes	[x]	Continue with full equality impact assessment			
No	[ ]	Full equality impact assessment not required			

3. Research Stage

Notes:

If there is no impact for a particular group or characteristic, mention this in the Reasoning column and refer to evidence where applicable.

[1]Race categories follow those used in the National Census by the Office for National Statistics. Consideration should be given to the specific communities within broad categories such as Bangladeshi people.

[2]Please select age groups which may be impacted by the guideline, service or function and complete as appropriate.

[3]Religion or Belief covers a wide range of groupings, the most common of which are Muslims, Buddhists, Jews, Christians, Sikhs and Hindus; it also covers people who do not have a faith. Consider these individually and collectively when determining impacts.

Characteristic		Positive Impact	Negative Impact	Neutral Impact	Not Enough Information	Reasoning
Sex and Gender Reassignment	Men (incl. trans men)			x		All genders of pregnant people will have equal access to the care provided within the Anomaly Scan guideline.
	Women (incl. trans women)			x		
	Non-binary people			x		
Race[1]	Asian or Asian British			x		All pregnant people will benefit from this guideline. Consideration should be taken if not able to read written English – including for white British people. Pictoral explanations may need to be used. Where English is not spoken or not first language, then language line should be used for consultations, especially when giving information of medication uses and doses.
	Black or Black British			x		
	Mixed Race			x		
	White British			x		
	White Other			x		
	Other:			x		

Disability	Disabled people			x		If the woman has any learning difficulties an advocate should be in attendance. If they have a hearing loss– a British Sign Language Interpreter should be offered which can be done via language line.
	Carers			x		
Age[2]				x		This guideline is only applicable to adult pregnant people. Please consult the Children's BNF or gain advise from a paediatrician before if the pregnant person is less than 18 years old.
				x		
				x		
Sexual Orientation				x		This guideline does not discriminate with regards to sexual orientation, as all people will have equal access to the advice and treatments described above.
Religion or Belief[3]				x		This guideline does not discriminate with regards to belief or religion, as all people will have equal access to the advice and treatments described above.
Pregnancy and Maternity		x				The advice in this guideline is for pregnant people therefore will have a positive impact on this group.
Marriage or Civil Partnership				x		This guideline does not discriminate with regards to marriage or civil

						partnership, as all people will have equal access to the guidance and care described above.
Other Groups /Characteristics	For example: homeless people, sex workers, rural isolation.			**x**		This guideline does not discriminate with regards to social situations, as all people will have equal access to the guidance and care described above.

List the sources of information used in the table below
OUH trust Equality impact assessment procedure guideline – available via trust intranet Annual Equality and Diversity Report, Workforce Race Equality Standard Data, or the Equality Delivery System 2 report

Using the table below, list any protected groups you will target during the consultation process, and give a summary of those consultations.	
Group	**Summary of consultation**

List any other individuals/groups that have been or will be consulted on this guideline, service or function.

4. Summary Stage

Outcome Measures List the key benefits that are intended to be achieved through implementation of this guideline, service or function and state whether or not you are assured that these will be equitably and fairly achieved for all protected groups. If not, state actions that will be taken to ensure this.
The benefits of this guideline will be to improve the care of women and pregnant people who choose to have an anomaly scan. This guideline will help to ensure that women are risk assessed appropriately in relation to the conditions screened for as part of the anomaly scan. The findings/choices should be clearly explained, and the health care professional should ensure all options discussed are understood by the woman and her birthing partner. All plans for care should be made in partnership with the woman. Access to health care provision should be with the most appropriate member(s) of the MDT in accordance with national guidance. Consideration should be taken in those pregnant women who may not be able to understand or read written English – including for white British women. Pictoral explanations may need to be used. Where English is not spoken or understood, then language line should be used for consultations, especially when giving information of medication uses and doses. If the pregnant woman has any learning difficulties an advocate should be in attendance. If they are D/Deaf or d/Deaf or have a hearing impairment– a British Sign Language Interpreter should be offered and can be accessed via language line.
Positive Impact List any positive impacts that this guideline, service orfunction may have on protected groups as well as any actions to be taken that would increase positive impact.
This guideline has been written specifically to support the care of women who choose to have an anomaly scan as part of antenatal screening offered by the OUHFT therefore this is a positive impact for this group.

Unjustifiable Adverse Effects List any identified unjustifiable adverseeffects on protected groups along with actions that will be taken to rectify or mitigate them.
No adverse effects predicted on any group
Justifiable Adverse Effects List any identified unjustifiable adverseeffects on protected groups along with justifications and any actions that will be taken to mitigate them.
No adverse effects predicted on any group

Equality Impact Assessment Action Plan

Complete this action plan template with actions identified during the Research and Summary Stages

Identified Risk	Recommended Actions	Lead	Resource Implications	Review Date	Completion Date
Pregnant women with learning disabilities having an understanding the information	Consider if the use of an advocate is required				
Difficulty accessing follow up and appointments for pregnant women who are homeless or have limited means of transport for appointments	Consider whether telephone appointments could be arranged. Consider whether hospital transport is appropriate. Consider whether a more local hospital e.g., the Horton may be an appropriate place for care				

Appendix 9: Growth Scan Pathway Form

NHS
Oxford University Hospitals
NHS Foundation Trust

GROWTH SCAN PATHWAY

Before your anomaly scan:
Please answer the questions in the top half of this page. This will help us to make decisions about how best to monitor your baby's growth during your pregnancy.

Patient Details Label

Q		Yes	No
1	Have you had a baby (not a twin) that **weighed less than 2.5kg (5lbs 8oz)?**		
2	Are you **40 or over** and **having your first baby?**		
3	Do you smoke **10 or more cigarettes a day?**		

I understand the purpose of the Anomaly Scan and consent to this scan being performed today.

Signed: Date:

ULTRASOUND STAFF USE ONLY

Q		Yes	No
4	Low PAPP-A (<0.3MoMs) NB: Low result will be flagged on Viewpoint		

NB: If only 1 x UtArt Doppler obtained use PI = 1.25 as threshold.

Total PI < 2.5

Total PI ≥ 2.5
OR
☐ Multiple Pregnancy
(MC twins and triplets go to FMU)

EDD:

Signed:

Pathway	A ☐	C ☐	D ☐
Growth Scans Date and Time			28/40
		32/40	32/40
	36/40	36/40	36/40
ANC Follow up	No additional action required	No additional action required	☐ Check seeing MW or Doctor: 25/40 and 31/40 **OR** ☐ If under SS, check 24/40 appt