Freedom of Information (Scotland) Act 2002

Environmental Information (Scotland) Regulations 2004

Date received	27/09/2022	**Subject**	Maternity Guidelines – obesity		
Date passed	27/09/2022		**Respond by**	18/010/2022	
Passed to	Maternity			**FOI number**	2022-403
Category of information requested	H&SC Delivery - Assessment / Diagnosis / Treatment				

Question/s to be answered

I am writing to request the following information under the Freedom of Information (Scotland) Act 2002:

1. Copies of any maternity/midwifery/obstetric care guidelines or policies specifically relating to the care of obese women/women with a raised BMI (>30kg/m²)

2. Copies of any other maternity/midwifery/obstetric care guidelines or policies which contain information relating to the care of obese women/women with a raised BMI (>30kg/m²) even if this is not the sole focus of the guideline/policy

   Please see the requested documents attached.

   Please note that, as NHS Grampian is the tertiary referral centre and all our women with a BMI over 40 give birth there, NHS Shetland generally uses their guidelines rather than develop its own.

Referrals to Consultant Obstetrician for Women with Additional Care Needs in Pregnancy Guideline

Approval date:	**09/03/2022**
Version number:	**1**
Author:	**Joanna Inkster, Midwife**
Review date:	**09/03/2024**
Security classification:	**OFFICIAL – Green – unclassified information**

If you would like this document in an alternative language or format, please contact Corporate Services on 01595 743069.

Document reference number: NAGUI020

NHS Shetland Document Development Coversheet*

Name of document	Referrals to Consultant Obstetrician for Women with Additional Care Needs in Pregnancy Guideline		
Document reference number	NAGUI020	**New or Review?**	New
Author	Joanna Inkster, Midwife		
Executive lead	Kathleen Carolan, Director of Nursing and Acute services		
Review date			
Security classification	OFFICIAL – Green – unclassified information		

Proposed groups to present document to:		
Midwives	ANMAC	Guideline group
Consultants		

Date	Version	Group	Reason	Outcome
17/01/2022	0.1	Midwives	PI	
17/01/2022	0.1	Consultants	PI	
20/01/2022	0.1	Guideline group	PI	Minor changes
		ANMAC		

Examples of reasons for presenting to the group	**Examples of outcomes following meeting**
• Professional input required re: content (PI)	• Significant changes to content required – refer to Executive Lead for guidance (SC)
• Professional opinion on content (PO)	• To amend content & re-submit to group (AC&R)
• General comments/suggestions (C/S)	• For minor revisions (e.g. format/layout) – no need to re-submit to group (MR)
• For information only (FIO)	• Recommend proceeding to next stage (PRO)
• For proofing/formatting (PF)	• For upload to Intranet (INT)
• Final Approval (FA)	• Approved (A) or Not Approved, revisions required (NARR)

***To be attached to the document under development/review and presented to the relevant group**

Please record details of any changes made to the document in the table below

Date	Record of changes made to document
Sept 2019	Initial review and draft document produced
Jan 2022	For review by groups as above
17/01/2022	Minor changes
09/03/2022	ANMAC - approved

Contents

1. Purpose of this document

This guideline covers the care that should be offered to women with additional care needs during pregnancy in addition to the routine care that is offered to all women during pregnancy. It aims to reduce the risk of complications and improve outcomes for women and their babies.

For simplicity of language the guideline uses the term women throughout, but this should be taken to also include people who do not identify as women but who are pregnant, in labour and in the postnatal period. When discussing with a person who does not identify as a woman please ask them their preferred pronouns and then ensure this is clearly documented in their notes to inform all health care professionals

Please note that the list below is not exhaustive and clinical judgement should also be used to decide if consultant review is required.

2. First point of contact

The following risk factors require immediate referral

- Long term conditions on medication
- Require initiation or change of medication (e.g. clotting disorders)
- Significant medical history (e.g. heart disease, cancer, diabetes)
- Known haemoglobinopathies
- Significant mental ill health/mental ill health if on medication
- Unwell
- Previous molar pregnancy
- VTE score above 4 or clotting disorders
- Thyroid disease
- Pre-existing diabetes
- Pre-existing hypertension

3. After dating scan

3.1. Medical history

- Age over 40
- BMI ≤18 – ≥35
- Neurological disease including epilepsy
- Autoimmune disease (e.g. lupus)
- Connective tissue disorder
- Diabetes type 1, 2 or gestational
- Past or current use of non-inhaled steroids or deteriorating asthma / cystic fibrosis
- Essential / secondary hypertension

- Anaphylaxis
- Heart conditions
- Haematological disease
- Malignancy
- Active blood borne virus
- History of herpes
- Organ transplant
- Anti-coagulant therapy
- Substance misuse
- Current history of smoking
- Hepatitis / liver disease
- VTE score above 2
- Previous major abdominal surgery
- Inflammatory bowel disease
- Other significant medical history (e.g. .abnormal renal function or disease, myasthenia gravis)

3.2. Obstetric / gynae history

- IVF
- Multiple pregnancy (may need referral after early scan)
- Pelvic floor or cervical surgery
- Uterine fibroids
- Women who book after 14 weeks
- Previous pre-term birth
- Previous cholestasis
- Previous still birth
- Previous 3rd / 4th degree tear
- Previous shoulder dystocia
- Previous PPH
- Previous retained placenta with PPH
- Previous labour complications
- Previous uterine surgery / rupture
- Previous pre-eclampsia
- Previous iso immunisation (e.g. rhesus / kell)

- FGM
- Previous LLETZ (by 13 weeks)
- Previous traumatic birth

3.3. Anaesthetic history

- Spinal injury or disease
- Severe needle phobia
- Anaesthetic complications
- History of difficult / failed intubation
- Previous anaesthetic drug reaction
- Family history of suxamethonium apnoea
- Family history of malignant hyperpyrexia
- Previous technical difficulties with epidural or spinal block

3.4. Fetal / neonatal

- Previous baby below 10th centile or above 95th centile
- Previous neonatal death
- Previous hypoxic ischaemic encephalitis
- Previous baby congenital abnormalities

4. During pregnancy

4.1. Maternal

- Hypertension
- Pre-eclampsia
- Raised PCR
- Abnormal LFTs
- Low platelets
- Hb below 85g/dl and not responding to iron
- Any other abnormal blood chemistry
- PV bleeding - recurrent minor PV bleeding / one episode of significant PV bleed
- Antibodies
- Gestational diabetes
- Active genital herpes
- Significant mental ill health

- Significant pain
- Recurrent UTI
- Altered fetal movements 2 or more episodes
- Unwell

4.2. Fetal

- Fetal anomaly
- Fetal growth above 90th centile
- Fetal growth below 10th centile
- Slow growth on GROW chart by scans
- Polyhydramnios
- Oligohydramnios
- Placenta praevia at 34 weeks
- Malpresentation at 36 weeks
- Altered fetal movements 2 or more episodes

Altered Fetal Movements Guideline

Approval date:	**18th August 2021**
Version number:	**1.0**
Author:	**Jacqueline Whitaker, Chief Midwife**
Review date:	**23rd July 2023**
Security classification:	**Official – Green: unclassified information**

If you would like this document in an alternative language or format, please contact Corporate Services on 01595 743069.

Document reference number: NAGUI015

NHS Shetland Document Development Coversheet*

Name of document	Altered Fetal Movements Guideline		
Document reference number	NAGUI015	**New or Review?**	New
Author	Jacqueline Whitaker, Chief Midwife		
Executive lead	Kathleen Carolan, Director of Nursing & Acute Services		
Review date	23rd July 2023		
Security classification	Official – Green: unclassified information		

Proposed groups to present document to:		
Midwives Group	Consultant Obstetricians	ANMAC

Date	**Version**	**Group**	**Reason**	**Outcome**
25.03.2021	0.1	Midwives	PI. PO	
25.03.2021	0.1	Consultant Obstetricians	PI, PO	To add for consultant review if 3rd episode of RFM
18.08.2021	0.1	ANMAC	FA	A

Examples of reasons for presenting to the group	**Examples of outcomes following meeting**
• Professional input required re: content (PI)	• Significant changes to content required – refer to Executive Lead for guidance (SC)
• Professional opinion on content (PO)	• To amend content & re-submit to group (AC&R)
• General comments/suggestions (C/S)	• For minor revisions (e.g. format/layout) – no need to re-submit to group (MR)
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• Final Approval (FA)	• Approved (A) or Not Approved, revisions required (NARR)

***To be attached to the document under development/review and presented to the relevant group**

Please record details of any changes made to the document in the table below

Date	Record of changes made to document
25/11/2020	1st draft based on NHS Grampian guideline
25/03/2021	Consultant review if 3rd episode of RFM added
01/07/2021	Title changed to Altered fetal movements in line with NHS Grampian guideline

Contents

1. Introduction

Maternal perception of fetal movements is one of the first signs fetal life and is regarded as a manifestation of fetal wellbeing. Movements are first perceived by the mother between 18 and 20 weeks gestation and rapidly acquire a regular pattern. A significant reduction or sudden alteration in fetal movement may be an early warning sign of impending fetal compromise. Studies have found a direct association between a perceived reduction in fetal movements (RFM) and stillbirth as RFM is thought to be a fetal response to chronic hypoxia. The RFM conserves energy and is an adaptive mechanism to reduce oxygen consumption (Maulik 1997) Stillbirth continues to be a major cause of perinatal mortality with the UK having high stillbirth rates compared to other high income countries. 55% of women experiencing a stillbirth perceived a reduction in movements prior to diagnosis (RCOG 2011). It is estimated that between 40 – 55% of women with a stillbirth experience RFM prior to diagnosis of fetal death (Efkarpidis, Alexopoulos et al 2004)

There is currently no universally agreed definition of altered fetal movements. However, most women will have felt movements by 20 weeks gestation with the number of fetal movements increasing with a regular pattern until they plateau at approximately 32 weeks gestation. There should be NO reduction in the frequency of fetal movements in the late third trimester.

Fetal movements have been defined as any discrete kick, flutter, swish or roll. A significant reduction or sudden change in fetal movements is an important clinical sign and may warn of pending fetal death. 55% of women experiencing a stillbirth have perceived a reduction in fetal movements prior to this diagnosis.

Women must be informed about the importance of recognising their baby's movements including the normal frequency and pattern. Women need to be made aware that reduced movements can be associated with a risk of stillbirth and that this is a risk in any pregnancy. The community midwife will discuss this with every pregnant woman at 24 weeks gestation and provide the woman with the NHS Scotland approved Tommy's 'Movements Matter' leaflet. She will document this discussion in the woman's electronic record.

2. Aim of guideline

To contribute to a reduction in the rate of stillbirth by:

- Increasing pregnant women's awareness of the need to report early when they perceive a reduction in fetal movements.
- Provide a management plan for identification and delivery of the "at risk" baby in women with reduced fetal movements.

3. Definitions

3.1. Normal fetal movement during pregnancy

Perceived fetal movements are defined as the maternal sensations of any discrete kick, flutter, swish or roll. Such activity provides an indication of the integrity of the central nervous system and musculoskeletal systems

Most women are aware of fetal movements by 20 weeks gestation plateauing at 32 weeks. There is no reduction in the frequency of movements in the late third trimester.

The woman's perception of a reduction in actual movements should be taken very seriously.

4. Advice for women with altered fetal movements

Any woman reporting altered fetal movements should be advised to:

- Find space and time to lie down for one hour on her left side.
- Have a hot or a cool drink with something to eat
- Not watch TV or read or become otherwise distracted.

If normal fetal movements are not felt within 1-2 hours they should contact the unit the maternity ward for review.

N.B. Women with diabetes should be asked to attend for review as soon as possible rather than waiting the 1-2 hours.

They should also call straight away if their baby has gradually reduced movements over several days.

Any women making contact and reporting no fetal movements must attend the unit as soon as possible.

5. Telephone advice

If the woman has already followed the advice in section 4 above then she should be advised to attend for assessment as soon as possible.

If the woman has not followed the advice in section 4 above advise her to do so. If movements do not return to normal she should attend for assessment as soon as possible.

Your assessment and advice should be recorded in BadgerNet.

6. Clinical examination and history

Upon presenting with altered fetal movements, a relevant history should be taken to assess a woman's risk for stillbirth and small for gestational age (SGA). A basic assessment should also be taken including maternal temperature, pulse, blood pressure and urinalysis with all being recorded in Badgernet. Assessment should be made using the Assessment Unit notes to document the visit along with the Reduced Fetal Movement checklist.

6.1. Factors influencing fetal movements

Women may perceive decreased fetal activity in the following circumstances:

- When sitting or standing
- Anterior placenta prior to 28 weeks gestation
- Fetal position direct occipito-anterior
- Maternal characteristics such as obesity
- Sedating drugs such as alcohol, benzodiazepines, Methadone and other opioids

6.2. Conditions associated with reduced fetal movements

- Placental insufficiency leading to fetal growth restriction and SGA
- Medical conditions such as diabetes and hypertension
- Congenital malformation, especially abnormalities of the central nervous system
- Musculo-skeletal dysfunction
- Congenital infection

6.3. Risk factors for stillbirth

Risk factors for stillbirth

- Multiple consultations for RFM
- Known SGA
- Placental insufficiency
- Diabetes
- Hypertension/pre-eclampsia
- Extremes of maternal age
- Primiparity
- Smoking
- Congenital malformation
- BMI > 35
- Poor past obstetric history (e.g. stillbirth and SGA)

Methods employed to detect a SGA fetus include:

- Measurement of symphyiofundal height plotted on to the woman's individual growth chart
- Serial scans and ultrasound biometry

Consideration should be given to use USS to obtain accurate measures in those women in whom a clinical assessment is likely to be less accurate e.g. high BMI and plot measurements on grow chart.

7. Management of Altered fetal movements

The initial goal of antenatal fetal surveillance in cases of altered fetal movements is to exclude fetal demise. Subsequent to this, the aim is to exclude fetal compromise and to identify pregnancies at risk of adverse fetal outcome (RCOG 2011)

7.1. Management before 24 weeks gestation

If a woman reports altered fetal movements prior to 24 weeks she should be seen by a community midwife on the same day and the fetal heart auscultated. If the fetal heart is heard, the woman is offered reassurance. Referral to hospital should only be necessary if the woman cannot be seen in a timely manner.

If a woman reports that she has not felt any fetal movements by 24 weeks gestation referral for Consultant review following an ultrasound for assessment of fetal wellbeing.

7.2. Management of altered fetal movements between 24 and 27+6 weeks gestation

Women should be encouraged to report altered fetal movements on the day of occurrence.

There is no evidence to support the use of cardiotocograph (CTG) monitoring to assess fetal wellbeing prior to 28 weeks gestation (RCOG 2011). Any decision to perform this level of monitoring at an earlier gestation should be made by a Consultant Obstetrician and the justification documented. If a decision is made to monitor fetal wellbeing with CTG monitoring before 28 weeks, staff need to be aware of the different parameters needed to review the CTG. As the parasympathetic nervous system is not fully developed until the third trimester the fetus may have a higher baseline fetal heart rate with apparent reduction of baseline variability due to unopposed action of the sympathetic nervous system (Afors and Chandrahan 2011).

If a woman reports significantly reduced movements the fetal heart beat should be auscultated for 1 – 2 minutes to confirm fetal viability.

A comprehensive risk assessment for stillbirth should take place, including a review of other risk factors associated with stillbirth.

Clinicians should be aware that placental insufficiency may be present at this gestation, although it is rare. If there are risk factors present an ultrasound scan and medical review should be arranged within 72 hours and the on-going care plan documented on Badgernet. Assessment should be made using the Assessment Unit notes to document the visit along with the Reduced Fetal Movement checklist

7.3. Management of altered fetal movements from 28 weeks gestation

Women should be encouraged to report altered fetal movements on the day of occurrence.

On admission a full assessment is made including:

- Abdominal palpation
- Auscultation of fetal heart with hand-held doppler followed by computerised CTG monitoring if present. If fetal heart is not heard via doppler, call consultant or sonographer to arrange an urgent scan. If fetal heart not seen on scan a second opinion should be sought even out of hours (consultant/sonographer)
- Document appropriate medical and obstetric history
- Recording maternal blood pressure, temperature and pulse

The presence of a normal fetal heart rate pattern showing accelerations of fetal heart rate coinciding with fetal movements is indicative of a healthy fetus with a properly functioning autonomic nervous system.

7.4. Computerised CTG using Dawes Redman criteria

Computerised CTGs are recommended over and above visualised CTG due to the potential to reduce the risks of human error.

Computerised CTG is an objective analysis of CTG. It uses computerised analysis of the CTG which is derived from the world's largest CTG database linked to outcomes. It works in a 2 stage process where is derives a dataset similar to the traditional interpretation process and then applies the Dawes/Redman criteria to this dataset. The final clinical judgement should be based on the entire clinical assessment with computerised CTG forming part of this holistic approach to pregnancy management (Saving babies lives version 2 2019)

7.4.1. Performing a computerised CTG assessment

- Start the CTG, turn 'analysis' on
- Enter the gestation age in weeks and days
- Turn on the printing
- After 10 mins if the D/R criteria is met, this will be displayed on the bottom of the screen with a tick
- If the D/R criteria are not met then continue to record the CTG

There are 2 possible outcomes

1. Criteria met
2. Criteria not met

Criteria met

This can be in as little as 10 minutes. It indicates a normal trace. The CTG can be stopped subject to visual assessments and clinical judgement. Do not rely on the analysis in isolation. It may not always identify unusual or pathological patterns that may be more obvious from visual interpretation, holistic assessment of and knowledge of, the whole clinical scenario.

Criteria not met

1. **Criteria not met before 60 mins**

   This indicates that the criteria have not yet been met and normality has not been demonstrated. There are many reasons why a trace may not meet the criteria for a while including uncertain base line and fetal behavioural state (sleep state). Reasons for failure to meet the criteria are shown as codes. Unless there are clear pathological features, or any cause for concern continue the trace CTG

2. **Criteria not met at 60 mins**

   Continue the trace as described above and call the consultant to review.

The Dawes/Redman criteria are based upon the normal distribution at 32 weeks. Gestations below 32 weeks may take longer to achieve the criteria due to the immature nervous system.

8. Ultrasound scanning and altered fetal movements

If a computerised CTG has been performed and is normal and there are no other indications for an ultrasound scan then a scan is not required for a first presentation of altered or reduced movements but should be offered for women reporting recurrent altered or reduced movements. If an appropriate scan has been performed within the previous two weeks and was normal a repeat scan is not required. (Saving babies lives version 2 2019)

Ultrasound scan assessment should be undertaken in women presenting after 28 weeks if the perception of altered fetal movements persists despite a normal CTG or if there are other risk factors for fetal growth restriction/stillbirth. (RCOG 2011). If a scan is deemed necessary this should be performed within 24 hours if possible. An ultrasound scan should also be performed for women with a high risk of fetal growth restriction and stillbirth or if they are already on the SGA pathway.

If the woman presents with a second episode of altered fetal movements, even if the CTG is normal a scan should be arranged. If the woman presents with altered fetal movements for a third occasion then, even if the CTG is normal, arrange for a scan and consultant review.

If the woman has had a growth scan in the preceding 2 weeks, the liquor volume and umbilical artery doppler should be performed and a growth scan repeated no less than 2 weeks from the date of the last scan.

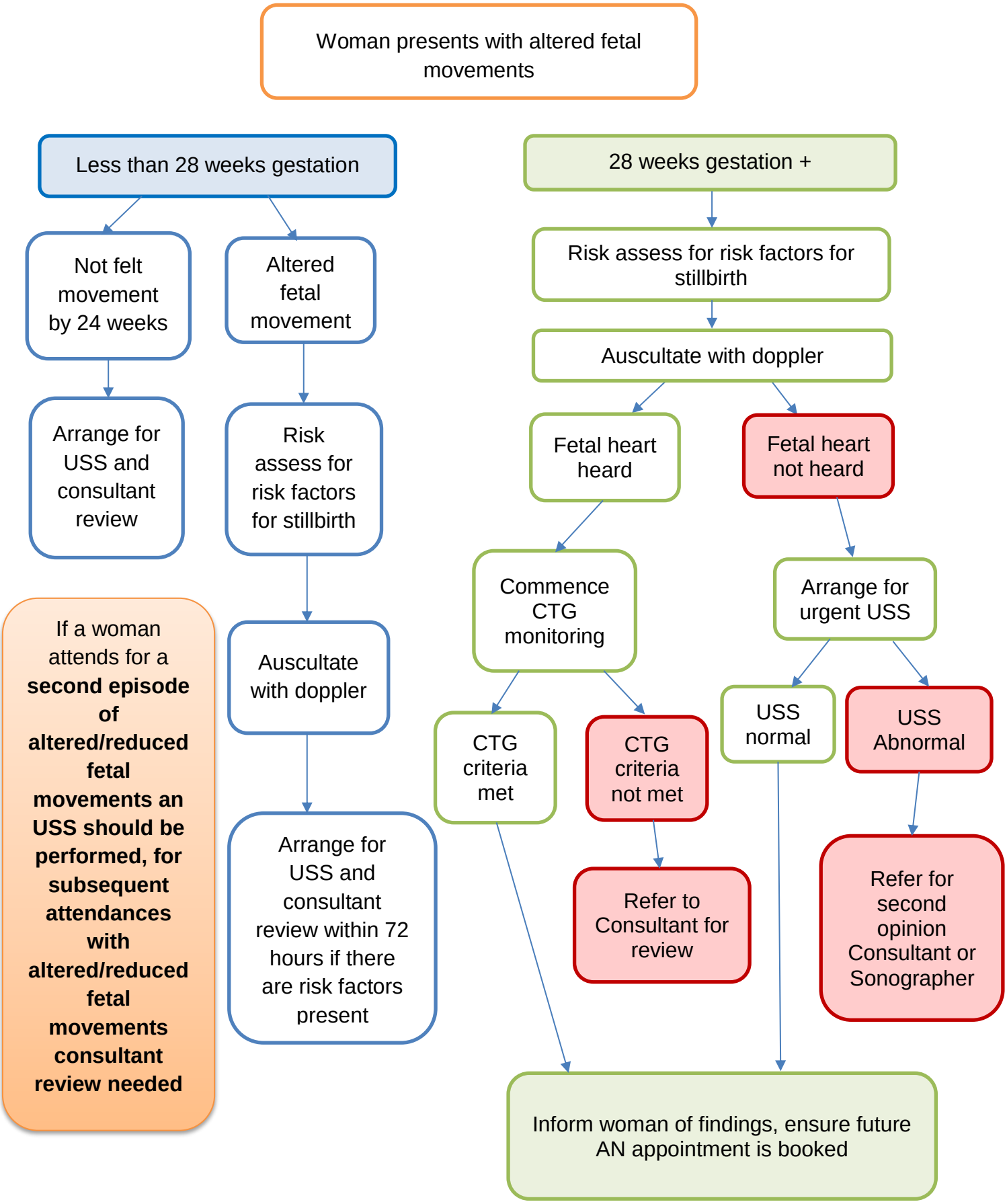
If RFM is reported on a weekend or a bank holiday extra surveillance with CTG monitoring may be indicated.

If abnormalities are identified on the CTG or ultrasound an individual management plan should be developed following discussion with the Consultant. If pre-term, consideration to the administration of steroids should be considered. Assessment should be made using the Assessment Unit notes to document the visit along with the Reduced Fetal Movement checklist

9. Indication for induction

Prior to 39 weeks, induction of labour or caesarean section is associated with small increase in fetal morbidity. Thus the decision for delivery needs to be based upon evidence of fetal compromise e.g. abnormal CTG, estimated fetal weight (EFW) < 10th centile or oligohydramnios. In this instance consider transfer to AMH if safe to do so. Other concerns would be maternal co-morbidities such as hypertension or diabetes in addition to RFM. Transfer to AMH should be arranged for these women. After 39 weeks induction of labour is not usually associated with an increase in Caesarean section, assisted delivery or fetal morbidity. Therefore IOL could be offered if appropriate. It is important that women presenting with recurrent RFM are additionally informed of the association with an increased risk of stillbirth and given the option of delivery for RFM alone after 38+6 weeks. (Saving babies lives version 2 2019)

Appendix 1


Woman presents with altered fetal movements
Less than 28 weeks gestation
Not felt movement by 24 weeks
Altered fetal movement
Arrange for USS and consultant review
Risk assess for risk factors for stillbirth
Auscultate with doppler
Arrange for USS and consultant review within 72 hours if there are risk factors present
If a woman attends for a **second episode of altered/reduced fetal movements an USS should be performed, for subsequent attendances with altered/reduced fetal movements consultant review needed**
28 weeks gestation +
Risk assess for risk factors for stillbirth
Auscultate with doppler
Fetal heart heard
Fetal heart not heard
Commence CTG monitoring
Arrange for urgent USS
CTG criteria met
CTG criteria not met
USS normal
USS Abnormal
Refer to Consultant for review
Refer for second opinion Consultant or Sonographer
Inform woman of findings, ensure future AN appointment is booked

References

Efkarpidis, S., E. Alexopoulos, L. Kean, D. Liu and T. Fay (2004). "Case-control study of factors associated with intrauterine deaths." Med Ged Med 6(2): 53-58.

Karolina Afors, Edwin Chandraharan, "Use of Continuous Electronic Fetal Monitoring in a Preterm Fetus: Clinical Dilemmas and Recommendations for Practice", Journal of Pregnancy, vol. 2011, Article ID 848794, 7 pages, 2011. https://doi.org/10.1155/2011/848794

NHS England, Saving Babies' lives version 2. A care bundle for reducing perinatal mortality. March 2019

Maulik, D. (1997). Doppler velocimetry for fetal surveillance: Adverse perinatal outcome and fetal hypoxia. Doppler ultrasound in Obstetrics and Gynecology D. Maulik. New York, Springer-Verlag.

Royal College of Obstetricians and Gynaecologists (2011). Management of Reduced Fetal Movements. London, RCOG.

Management of Shoulder Dystocia Guideline

Approval date:	**18 August 2021**
Version number:	**1.0**
Author:	**Jacqueline Whitaker, Chief Midwife**
Review date:	**7 July 2023**
Security classification:	**Official – Green: unclassified information**

If you would like this document in an alternative language or format, please contact Corporate Services on 01595 743069.

Document reference number: NAGUI010

NHS Shetland Document Development Coversheet*

Name of document	Management of Shoulder Dystocia Guideline		
Document reference number	NAGUI010	**New or Review?**	New
Author	Jacqueline Whitaker, Chief Midwife		
Information Asset Owner	Jacqueline Whitaker, Chief Midwife		
Executive lead	Kathleen Carolan, Director of Nursing & Acute Services		
Review date	7 July 2023		
Security classification	Official – Green: unclassified information		

Proposed groups to present document to:		
Guideline review group	Consultants	Midwives
ANMAC		

Date	Version	Group	Reason	Outcome
07/07/2021	0.1	Consultants	PI	
07/07/2021	0.1	Midwives	PI	
22/07/2021	0.1	Guideline review group		

Examples of reasons for presenting to the group	**Examples of outcomes following meeting**
• Professional input required re: content (PI)	• Significant changes to content required – refer to Executive Lead for guidance (SC)
• Professional opinion on content (PO)	• To amend content & re-submit to group (AC&R)
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***To be attached to the document under development/review and presented to the relevant group**

Please record details of any changes made to the document in the table below

Date	Record of changes made to document

Contents

1. Introduction

Shoulder Dystocia is a birth complication where additional manoeuvres are required to release the shoulders from a bony obstruction. It occurs in less than 1% of vaginal deliveries and even if the dystocia has been managed well, accounts for significant morbidity and mortality to the infant. Complications include:

- Brachial Plexus injury (Erbs palsy) (2.3 – 16%)
- Fractured Clavicle or humerus
- Cerebral hypoxia leading to cerebral palsy

Maternal complications include:

- Post partum haemorrhage (11%)
- Severe perineal tears (3rd and 4th degree) (3.8%)

2. Definition

Shoulder dystocia is the bony impaction of the fetal shoulder on the maternal pelvis. Timely management requires both prompt recognition and a measured response that recognises the need to release the bony impaction.

3. Factors associated with shoulder dystocia

Pre labour	**Intrapartum**
Previous shoulder dystocia	Prolonged first stage of labour
Macrosomia 48% of shoulder occurs in infants > 4.5 kg	Secondary arrest
Diabetes Mellitus	Prolonged second stage of labour
Maternal body mass index (BMI) > 30kg/m2	Oxytocin augmentation
Induction of labour	Assisted vaginal delivery

4. Diagnosis of shoulder dystocia

Anticipating the shoulder dystocia will include recognition of the associated risk factors as well as preparing the woman and her birth partner(s) for a potential emergency.

Recognition:

- Difficulty delivering the face or chin
- The fetal head remaining tightly applier to the vulva or retracting (turtle necking)
- Failure of the head to restitute
- Failure of the shoulders to descend

5. Management of shoulder dystocia

Immediately after recognition of shoulder dystocia, additional help should be called.

- The problem should be clearly stated as ‘this is shoulder dystocia’ to the arriving team
- Fundal pressure should not be used
- McRoberts’ manoeuvre is a simple, rapid and effective intervention and should be performed first. It has a reported success rate of around 90%.
    1. The buttocks should be brought to the edge of the bed
    2. Each manoeuvre should be attempted for 30-60 seconds and an attempt to deliver by routine axial traction should be tried.
    3. Maternal pushing should be discouraged
    4. The cord should not be cut if it is around the fetal neck
    5. Be prepared for neonatal resuscitation and post-partum haemorrhage
- Suprapubic pressure should be used to improve the effectiveness of the McRoberts’ manoeuvre.
- An episiotomy is not always necessary
- Take cord blood for blood gas analysis

6. Prompt sequence to resolve shoulder dystocia (mnemonic: H.E.L.P.E.R.)

H: Call for help	Emergency call bell Fast bleep – Obstetrician/Anaesthetists Discontinue traction and maternal pushing
E: Evaluate for episiotomy	Not a soft tissue obstruction but may help with additional manoeuvres
L: Legs (McRoberts)	McRoberts manoeuvre is flexion and abduction of the maternal hips. It is the single most effective manoeuvre if the legs are in lithotomy, take them out to achieve McRoberts
P: Pressure (suprapubic)	Place hand over hand behind the fetal anterior shoulder above the maternal symphysis in CPR position and maintain a rocking movement. The aim is to push the shoulder towards the fetal chest and anteriorly into the oblique diameter thus dislodging it from the symphysis. Continue for 30 – 60 seconds.
A decision may be made at this point to try the 'all fours' position before attempting the internal rotation or delivery of the posterior arm	
E: Enter (the vagina)	Maintain the McRoberts position. Insert hand into posterior vagina moving up to the posterior aspect of the anterior shoulder and push into the oblique position If this fails, locate the posterior shoulder from the front and attempt to rotate through 180° (woodscrew manoeuvre) Both shoulders are pusher towards the fetal chest. If any movement is achieved attempt gentle axial traction with maternal pushing
R: Remove the posterior arm	Follow posterior arm to the elbow (2 fingers to splint the humerus). Flex arm at the elbow Grasp forearm and sweep across chest to deliver arm. Anterior shoulder then usually follows.

It is important that a scribe is allocated to ensure the timings of all manoeuvres are documented. See Appendix 1.

7. Persistent failure of first and second line manoeuvres

It is difficult to recommend a time limit for the management of shoulder dystocia; this should be a consultant decision only. Evidence suggests that there appears to be a low rate of hypoxic ischaemic injury if delivery is within 5 minutes. If there is further delay Neonatologists should be

informed and discussions started about the need for Neonatal support/retrieval. It is very rare that routine manoeuvres are unsuccessful however last resort methods can include:

- Cleidotomy (fracturing of the clavicle with either a finger or with scissors)
- Symhysiotomy (partial dividing of the symphyseal ligament) is not performed in the UK as there is a high incidence of serious maternal morbidity and poor neonatal outcome with this approach.
- Zavanelli manoeuvre (cephalic replacement of the head by external manual flexion and rotation). A muscle relaxant of Terbutaline 0.25 mgs may be required. Care should be taken not to perform cephalic replacement during a contraction. Maternal safety of this procedure is unknown and this should form part of the decision making as by this stage a high proportion of babies will have irreversible hypoxia-acidosis and the family should be informed of a likelihood of a poor outcome. Staff involved in the emergency response should also prepare for this likelihood.

8. Care after delivery

There is significant maternal morbidity associated with shoulder dystocia, particularly post partum haemorrhage (11%) and 3rd and 4th degree tears (3.8%). Other complications include:

- Vaginal lacerations
- Cervical tears
- Bladder rupture
- Uterine rupture
- Symphyseal separation, sacroiliac joint dislocation and leteral femoral cutaneous neuropathy.

For the neonate, Brachial Plexus Injury is one the most important complications affecting 2.3 to 16% of all such deliveries. Other complications include:

- Fractured humerus and clavicle
- Pneumothorax
- Hypoxic brain damage

9. Auditable standards

NHS Education for Scotland (NES) recommend that all Midwives and Obstetricians undertake a recordable update of obstetric emergency training at least annually. This training, which should be the equivalent to a least two hours of training, should include the use of PROMPT style team working sessions, or NES nationally developed team or individual based learning. In addition to this, all Midwives and Obstetricians will complete an adapted SCOTTIE or PROMPT full day session at least every two years.

It is also recognised that Midwives also require neonatal resuscitation training. This should be 4 yearly attendance at a Scottish Neonatal Resuscitation Course (SNRC) OR Neonatal Life Support Course (NLS) with yearly local updates

Appendix 1 – Shoulder dystocia documentation

Shoulder Dystocia at Birth scribe notes

Mother's name ……
Date of birth ……
CHI number ……

Date: ……
Time: …… Time of delivery of head: ……

Called for help at: ……..		Emergency call via switchboard at: ……..		
Staff present at delivery of head		Additional staff attending for the delivery of shoulders		
Name	**Role**	**Name**	**Role**	**Time arrived**

Position of woman before and during birth……

Procedure used to assist delivery	**By whom**	**Time**	**Details**	**Reason if not performed**
Placed in McRoberts position				
Episiotomy				• Enough access • Tear present • Already performed (circle as appropriate)
Supra pubic pressure applied				
Internal rotational manoeuvre				
Delivery of posterior arm				Right / Left arm (circle as appropriate)
Turn on to all fours				

Time of delivery of baby……...

Neo natal documentation

<table>
<tr><td colspan="2">Mode of delivery of head</td><td colspan="2">Spontaneous</td><td colspan="4">Instrumental</td></tr>
<tr><td colspan="2">Time of delivery</td><td colspan="2">Head</td><td colspan="4">Body</td></tr>
<tr><td colspan="2">Fetal position during dystocia</td><td colspan="2">Head facing maternal left
Left fetal shoulder anterior</td><td colspan="4">Head facing maternal right
Right fetal shoulder anterior</td></tr>
<tr><td>Birth weight</td><td>…….kg</td><td>Apgar</td><td>1 min</td><td colspan="2">5 mins</td><td colspan="2">10 mins</td></tr>
<tr><td colspan="2">Explanation to parents</td><td>Yes</td><td>By:</td><td colspan="2">Datix completed</td><td colspan="2">Datix number</td></tr>
<tr><td colspan="2" rowspan="3">Neonatologist called</td><td rowspan="3">Time</td><td rowspan="3">Arrived</td><td rowspan="2">Outcome</td><td>Signs of #</td><td>Yes</td><td>No</td></tr>
<tr><td>Resuscitation needed</td><td>Yes</td><td>No</td></tr>
<tr><td>Baby retrieved</td><td>Yes</td><td colspan="2">No</td></tr>
</table>

References

Royal College of Obstetricians (London) Shoulder Dystocia Green top guideline No 42 . Originally published 28/03/2012. Updated February 2017

Chief Medical Officer (Scotland) Core element of mandatory training for midwives and obstetricians 21/12/2020

NHS Grampian Guideline. Shoulder Dystocia

NHS Grampian

STANDARD OPERATING PROCEDURES FOR OBSTETRIC ULTRASOUND IN NHSG

Author	Reviewer:	Approver:
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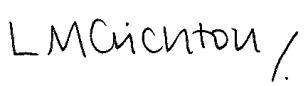
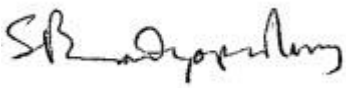
Signature: 	Signature: 	Signature: 

Identifier: (provided by the NHS Grampian Review Group)	Review Date:	Approval Date:
	31st January 2020	4th February 2019

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Version 4

Executive Sign-Off

This document has been endorsed by the Director of

Signature:

This document is also available in large print and other formats and languages, upon request. Please call NHS Grampian Corporate Communications on Aberdeen (01224) 554400.

Title:	Standard Operating Procedures for Obstetric Ultrasound in NHSG
Unique Identifier:	(provided by the NHS Grampian Review Group for Clinical Process Documents)
Replaces:	Ultrasound Department Protocols 2017
Lead Author/Co-ordinator:	Dr Lena M Crichton
Subject (as per document registration categories):	All Obstetric Ultrasound Scans within NHSG
Key word(s):	Obstetric Ultrasound
Process Document: Policy, Protocol, Procedure or Guideline	Operating Procedure
Document application:	NHS Grampian
Purpose/description:	Provide detailed guidance on obstetric scans, how they should be performed and managed
Group/Individual responsible for this document:	Multiprofessional team
Policy statement:	It is the responsibility of all staff to ensure that they are working to the most up to date and relevant policies, protocols procedures.

Responsibilities for ensuring registration of this document on the NHS Grampian Information/ Document Silo:

Lead Author/Co-ordinator:	Dr Lena M Crichton Consultant Obstetrician
Physical location of the original of this document:	Ultrasound Department in Aberdeen Maternity Hospital
Job title of creator of this document:	Dr Lena M Crichton Consultant Obstetrician
Job/group title of those who have control over this document:	All staff who undertake obstetric ultrasound

Responsibilities for disseminating document as per distribution list:

Lead Author/Co-ordinator:	Dr Lena M Crichton Consultant Obstetrician

Responsibilities for implementation:

Organisational:	Operational Management Team and Chief Executive
Sector	General Managers, Medical Leads and Nursing Leads
Departmental:	Clinical Leads
Area:	Line Manager

Review frequency and date of next review:	To be reviewed each year December 2019

Responsibilities for review of this document:

Lead Author/Co-ordinator:	Dr Lena M Crichton and all ultrasound staff

Revision History:

Revision Date	**Previous Revision Date**	**Summary of Changes (Descriptive summary of the changes made)**	**Changes Marked* (Identify page numbers and section heading)**
04/02/19	01/05/17	Addition of Glossary of terms	
4/2/19	1/5/17	Throughout document, hand held notes has been changed to Badgernet Record	All pages
4/2/19	1/5/17	Throughout SOPS “flimsy” scan sheet has been changed to Scan Image Envelop	All pages
4/2/19	1/5/17	**Documentation** : All significant findings should be documented in the comments section on page 1 of the ultrasound record	All SOPS
4/2/19	1/5/17	**Infection control:** Procedures updated to reflect the change to Trisel Fuse	**Infection Control** Page 7

Revision Date	Previous Revision Date	Summary of Changes (Descriptive summary of the changes made)	Changes Marked* (Identify page numbers and section heading)
4/2/19	1/5/17	**BMI > 50,** women with high BMI should be scanned in AMH or Dr Gray's in Elgin due to access to bariatric couch. All scan appointments to be 30 minutes, inclusive of dating/NT, anomaly and growth. Repeat detailed scans can be booked on medical staff list. *(If BMI <50 but scan technically difficult – discuss with medical staff*)	**Working environment** Page 9
4/2/19	1/5/17	**Early Pregnancy scans** : minimal changes, addition of table for indicating summary of diagnosis, terminology used and management options.	**Early pregnancy scans** Page 14
4/2/19	1/5/17	**Dating Scan Multiple Pregnancy diagnosis :** If twin / multiple pregnancy diagnosed at the time of a booking scan commence , the woman should be offered Low dose Aspirin (LDA) 75mg – packs available in scan department	**Dating scan** Page 19
4/2/19	1/5/17	**Amniotic Bands**: change, addition of explanatory image	**Amniotic bands** Page 33
4/2/19	1/5/17	**Anomaly scan:** Delay until 21 weeks where BMI >30	**Anomaly scan** P 34
4/2/19	1/5/17	**Anomaly scan report** : Document significant features for anomaly scan in 1st page of report, including deviations in measurements where appropriate, e.g. FL <5th centile	**Anomaly scan** Page 34
4/2/19	1/5/17	**Images to be stored at time of anomaly scan** Additional images to be stored; annotated 4 chamber, transverse Kidneys	**Anomaly scan** Page 35
4/2/19	1/5/17	**Anomaly scan** Gender only where medically indicated	**Anomaly scan** Page 34
4/2/19	1/5/17	**Incomplete Anomaly scan :** No further appointments should be offered if unable to complete views in 2 visits unless anomaly	**Anomaly scan** page 34

Revision Date	Previous Revision Date	Summary of Changes (Descriptive summary of the changes made)	Changes Marked* (Identify page numbers and section heading)
		suspected	
4/2/19	1/5/17	**Fetal Echo referral criteria** : abnormal 4 chamber or outflow view or unable to obtain 4 chamber view at anomaly scan Previous baby with CHD Patient (or partner) with structural heart defect (ie NOT PDA or murmur)	**Fetal Echo Criteria** Page 36
4/2/19	1/5/17	If NT >3.5 mm at booking *detailed scan and fetal echo with medical staff at 18-20 weeks*	**Fetal echo criteria** Page 36
4/2/19	1/5/17	**Fetal ectopic beats** – DO NOT require fetal cardiac scan (if >37 weeks – CTG on Westburn, <37 weeks CMW review at next appointment)	**Fetal echo criteria** page 36
4/2/19	1/5/17	**Placental Location scans :** review placental location at anomaly scan; refer for medical scan at 26 **-** 28 weeks **ONLY** where anterior low placenta + previous caesarean section, otherwise rescan at 34 weeks (or at growth scans if booked) and refer to ANC if placenta remains low at 34 weeks.	**Management of a low lying placenta** Page 37
4/2/19	1/5/17	**Growth scans** High risk SGA (RED BOX) – additional growth scan at 24 weeks	**Growth Scans** Page 41
4/2/19	1/5/17	**Liquor assessment :** Change from AFI to single deepest pool. Normal is >3cm ≤10cm	**Assessment of Liquor** Page 43
4/2/19	1/5/17	**Assessment of fetal growth >24 weeks:** New charts for Dopplers have been added, Middle cerebral artery (MCA) and umbilical artery (UA) Doppler charts added If HC, AC, FL < 5th centile – for medical review EFW >90th centile or LV >10cm OGTT within 7 days if < 36 weeks gestation	**Assessment of fetal growth** Page 46
4/2/19	1/5/17	**Assessment of Post Dates Pregnancy**: LV + Doppler only	**Post dates pregnancy** Page 54
4/2/19	1/5/17	**Presentation scan:** Assess presentation,	**Presentation**

Revision Date	Previous Revision Date	Summary of Changes (Descriptive summary of the changes made)	Changes Marked* (Identify page numbers and section heading)
		growth measurements regardless of presentation unless post dates	**scan** Page 55
4/2/19	1/5/19	**ECV protocol : added**	**External Cephalic version** Page 56
4/2/19	1/5/17	**Measurement of cervical length**: should only be carried out >18 weeks gestation, refer back to medical staff if requested prior to this.	**Cervical length** Page 60
4/2/19	1/5/17	**Microcephaly:** Chart added with normal range of head size and standard deviations below size	**Microcephaly** Page 32
4/2/19	1/5/17	**Isolated short femur:** isolated short femur at <24 weeks gestation is strongly associated with Trisomy 21, parents should be offered appropriate counselling and options of diagnostic testing if wished.	**Short femur** Page 69
4/2/19	1/5/17	**Spina Bifida**: In-utero surgery now available for specific cases: entry criteria for UCL London included (CVS/Amnio normal, MRI normal) Refer prior to 26 weeks	**Spina bifida** Page 76

* Changes marked should detail the section(s) of the document that have been amended i.e. page number and section heading.

STANDARD OPERATING PROCEDURES (SOP) FOR THE PROVISION OF ULTRASOUND DURING PREGNANCY WITHIN NHSG

GLOSSARY

AC	**Abdominal circumference**
AFP	**Alpha feto protein**
AMH	**Aberdeen Maternity Hospital**
AS	**Asha Shetty**
BMI	**Body Mass Index**
4CV	**4 chamber view of heart**
CHD	**Congenital Heart Disease**
CMW	**Community midwife**
CMV	**Cytomegalovirus**
CRL	**Crown rump length**
DGH	**Dr Gray's Hospital**
DS	**Downs screening**
DV	**Ductus Venosus**
ECV	**External cephalic version**
ED	**Emma Doherty**
EDF	**End Diastolic Flow**
EFD	**Early fetal demise**
EFW	**Estimated Fetal Weight**
EPAU	**Early Pregnancy Assessment Unit**
EPAC	**Early Pregnancy Assessment Centre**
HC	**Head circumference**
HCG	**Human Chorionic Gonadotrophin**
FL	**Femur length**
GA	**Gestational age**
GC	**Grant Cumming**
GF	**Gail Fullerton**
ID	**Identification**
i.u.	**International Units**
LMC	**Lena M Crichton**
LUSCS	**Lower Uterine Segment Caesarean Section**
Mm	**Millimeters**
MCA	**Middle Cerebral Artery**
MRI	**Magnestic resonance imaging**
MSD	**Mean Sac Diameter**
NM	**Neil Maclean**
NT	**Nuchal translucency**
OGTT	**OraL Glucose Tolerance Test**

OPA	**Outpatient assistant**
PAPP-A	**Pregnancy Associated Plasma Protein A**
PJD	**Peter Danielian**
PUL	**Pregnancy of Unknown Location**
PUV	**Pregnancy of Unknown Viability**
RCOG	**Royal College of Obstetricians & Gynaecologists**
Rm	**Room**
RPD	**Renal pelvic dilatation**
RSI	**Repetitive Strain Injury**
RPOC	**Retained products of conception**
SB	**Subhayu Bandypadhya**
TA	**Trans-abdominal**
TAS	**Trans-abdominal Scan**
TF	**Tara Fairley**
TOP	**Termination of Pregnancy**
TV	**Transvaginal**
TVS	**Transvaginal Scan**
Ua	**Umbilical Artery**
US	**Ultrasound**
VA	**Ventricular Atrium**
VP	**Viable pregnancy**

2. INFECTION CONTROL

Hand Hygiene

Hand hygiene washing hands/using gel before and after each scan will minimise cross infection.

Cleaning of Ultrasound Probes

1. Abdominal Scans
   Wipe excess gel off with paper towel and then use Trionic cleaning cloth over the probe and up over the cable. Leave the probe to dry in the holder for 5 minutes. If disinfection required ensure surface remains wet for the 5 minutes.

   Use a probe cover if there is an abdominal wound.

2. Transvaginal Scans
   PPE disposable apron and gloves are worn for all TV scans. Use disposable probe cover for all endocavity probes
   At the end of the scan remove the probe cover using paper towel and dispose of it in an orange waste bag then use **TRISTAL** WIPES
   See **page 7** for guidance on the use of **TRISTAL** wipes

Cleaning of Ultrasound Machines.

The machine should be cleaned with a detergent wipe daily.
Use a wet paper towel, well rung out, to clean over the screen and touch screen to avoid damage to these.
The probe holders should be taken off and soaked if required to remove any gel once per week.
The fans/air filters at the back of the machine should be checked weekly for build up of dust and if observed reported to Medical Physics for cleaning.
The cables should be inspected and any wear on the cable or transducer head reported immediately to Medical Physics Tel 50982/ Bleep 2390 in AMH or Ex 67498 in DGH.

Cleaning of Couches.

1. Abdominal Scans.

Following scan, the paper towel is disposed of in black bag waste. The couch is wiped over with a detergent wipe before pulling clean paper towel over.
The pillow cases are changed daily but as required if soiled.

2. Transvaginal Scans.

Prior to TV scan, the couch must be initially covered with a plastic draw sheet, paper placed on top of it and at least 1 incontinence pad placed on top. Disposable plastic apron and gloves must be worn by operator and OPA.

Any blood stained waste must be disposed of into an orange bag. A blood stained draw sheet should be placed into a water soluble pink bag and fastened with a neck tie. This bag is placed into a red bag.
Any used, but uncontaminated draw sheet should be placed into the linen skip (Linen skip is taken into scan room).
The couch must be wiped over with detergent wipes after each patient.

If there is blood/vaginal loss on the couch/floor, wipe it off initially using paper towels to clear the contamination, then use a detergent wipe and finally follow with Actichlor Plus tablets: 1 tablet in 100ml water [10 tablets in 1 litre of water] in solution to wipe over the whole area.

Ultrasound Gel Bottles

- For AMH - Use a gel bottle for 1 day only and discard gel remaining and wash bottle out in warm water with detergent and dry bottle before refilling from container. DGH do not refill bottles
- Use 1 bottle on the machine only to prevent waste.
- For patients who are at high risk of susceptibility to infection use sterilised single use sachet of gel.
- In low use areas date bottle and discard after 1 month.

Infectious Patients Requiring Scans.

- Discuss with Consultant /Infection Control team.
- Arrange scan at end of list to allow adequate cleaning and when there are no patients in waiting area.
- Consider taking machine to Room where patient is barrier nursed in Westburn/Labour ward.

References:

1. Toshiba medical Systems Operation Manual 2010.
2. Infection Control NHS Grampian
3. Management of Linen Protocol

Using the Tristel Trio™ Wipes System for the decontamination of Transvaginal Ultrasound Probes

Prior to commencing the decontamination process please refer to these notes.

- Disinfect hands and wear appropriate PPE when handling disinfectants and medical devices.
- Disinfect hands and change gloves after each stage of the decontamination procedure.
- Keep the used Wipes sachets next to the Quality Audit Trail Record Book so that the details can be completed at the end of the procedure.
- Discard the Wipes and gloves in accordance with hospital guidelines.
- Remove the sheath/condom from the probe with a paper towel and discard to clinical waste.
- Prepare for the decontamination procedure by taking one of each Wipe and the Activator Foam from the box.

HIGH-LEVEL DISINFECTION

Step 4 - Remove the Sporicidal Wipe from the sachet, unfold and lay out in the palm of your hand.

Step 5 - Apply two doses of Activator Foam onto the Wipe.

When using a 50ml Activator Foam, apply four doses of Foam.

Step 6 - Fold the Wipe in on itself and scrunch it for 15 seconds to generate chlorine dioxide.

Ensure that the Wipe is completely covered in Foam.

Step 7 - Wipe the probe from 'clean' to 'dirty': start with the probe holder, followed by the cable, handle and tip. Ensure that all surfaces of the probe come into contact with the Wipe at least once.

RINSING

TRANSPORT

Step 8 - Place the probe back in the holder and leave it for 30 seconds.

Step 9 - Remove the Rinse Wipe from the sachet, unfold and lay out in the palm of your hand.

Step 10 - Rinse the probe to remove excess disinfectant.

Place the probe back in the holder.

Step 11 - Refer to the used Wipe sachets and Activator Foam bottle to complete the Quality Audit Trail Record Book.

For more information, refer to the Quality Audit Trail Help Guide.

3. PATIENT IDENTIFICATION & RECORDING OF SCAN REPORTS

Identification

All patients MUST have their identification verified PRIOR to the ultrasound scan commencing. The CHI should be entered into the machine so that all images can be attached to the correct patient.

- Ask patient to confirm their name.
- Ask patient to confirm their date of birth.
- Check corresponds to CHI and name on Badgernet electronic record.
- Check corresponds to initials and CHI entered onto ultrasound machine new patient page.

Documentation

All scan reports must be recorded in the ultrasound record sheet in the Badgernet electronic record. This includes all early pregnancy and post natal scans.

Any comments should be typed into the free text box on page 1. See black folder in scan rooms for 'how to use Badgernet for scans'.

Medical staff must not enter scan reports in to specialist review page in Badgernet.

Images

All images should be stapled on to the scan card labelled with patient's ID label and then placed into a polypocket.

EPU images are stored in AMH records in Rubislaw Ward until viability confirmed. Thereafter the scan cards should be sent through to main department.

4. **WORKING ENVIRONMENT DURING ULTRASOUND SCAN SESSIONS**

Reduce risks of repetitive strain injury (RSI)

1. Arrange couch, ultrasound machine and sonographer seat position and height so to minimise stretching and leaning. Be especially careful if being asked to take on an extra scan in another sonographer's break or when teaching as 'hot seating' increases the risks to the sonographer.
2. Ask patient to lie on couch at a comfortable distance to suit sonographer.
3. If patient has a high BMI consider raising couch and standing to scan.
4. If required ask patient politely to hold abdomen to permit scan of lower uterus and baby.
5. During scan release pressure on probe for micro breaks/ put probe down to measure.
6. Do not continue to sustain pressure in order to obtain images when views suboptimal see SOP 16 for action for detailed anomaly scans.

Concentration

An ultrasound examination is a diagnostic test and the sonographer requires full concentration to reduce the risk of inadvertently forgetting to do a specific part of the examination

The appointment letter advises women to take one adult only to the scan appointment. It also informs patients that if anyone at the appointment is noisy or distracting the sonographer will ask them to leave or reschedule the appointment.

Special allowance should be made for young teenagers, adults with learning needs, women requiring translation, parents with handicapped children and other extenuating circumstances.

If you have concerns during a scan consider seeking HCSW support if available to help in room. Discuss with the sonographer in charge for additional support and to plan for future scans.

Women with a BMI over 50

Women with a BMI of 50 or over are to have all ultrasound scans performed in AMH or DGH.

Women with a BMI ≥ 50 should have ultrasound scans booked for Room 2 in AMH (where the bariatric couch is placed) and will be allocated a similar room in DGH once a bariatric level couch is obtained.

Women with a BMI ≥ 50 will be given 30min appointments for booking, detailed and growth scans to allow adequate time for the sonographer.

TRAKcare should be marked for Room 2 or BMI >50 to ensure the correct room allocation is used

When women are asked to re-book for further scans, the reception staff should make all bookings for Rm 2.

5. THE USE OF ULTRASOUND IN THE ASSESSMENT OF EARLY PREGNANCY COMPLICATIONS

Standard procedures

- Assessment of early pregnancy complications <8 weeks Gestational Age (GA) by dates or of unknown viability or uncertain GA should be made by **Transvaginal Scan** (TVS). If a transvaginal ultrasound scan is unacceptable to the woman offer a transabdominal (TA) ultrasound scan and explain the limitations of this method of scanning.

  - Pregnancies>8 weeks should have a TA scan performed as the first line of imaging. A TA scan may be required at any gestation if a wider field of view is required due to pelvic pathology, such as fibroids or large ovarian cysts.

- Obtain verbal consent

- A chaperone **MUST** be present for a TVS examination

- Check that the lady has an empty bladder prior to TVS and a full bladder prior to TAS

  All scan findings must be documented in the ultrasound record of Badgernet .

- Representative images of the scan findings (as per each protocol) should be attached to the “flimsy” scan record sheet.

- If the pregnancy is viable, the flimsy should be returned to the scan department at the earliest opportunity, so that future images can be linked to the same pregnancy. If the pregnancy is non-viable please place the flimsy in the hospital record.

6. ACCEPTED TERMINOLOGY FOR EARLY PREGNANCY SCANNING

The following terminology should be used when describing early pregnancy scan findings

- **Viable Pregnancy (VP)**
  A pregnancy sac within the uterus containing a fetal pole with fetal cardiac activity identified

- **Pregnancy of Uncertain Viability (PUV)**
  An empty gestational sac (mean sac diameter [MSD] of ≤25mm), a gestational sac +/- yolk sac only (MSD<25mm) or a fetal pole measuring ≤7mm without a visible fetal heart pulsation.

- **Early Fetal Demise (EFD)**
  An empty gestational sac (MSD >25mm) or a sac containing a fetal pole >7mm with no fetal heart pulsation.

- **Pregnancy of Unknown Location (PUL)**
  A pregnancy that is not confirmed in the uterus nor is visible anywhere else in the pelvis

7. ULTRASOUND DIAGNOSIS OF EARLY FETAL DEMISE [EFD]

The aim of this operating procedure is to avoid the unintentional evacuation of a potentially viable pregnancy.

Diagnosis may be made by one member of staff if they have a formal qualification which is recognised by Aberdeen Maternity Hospital (AMH) Ultrasound Department.

Ultrasound criteria for the diagnosis of Early Fetal Demise
The diagnosis should be made by TV scan unless the patient is >8 weeks gestation and the images obtained are of good quality. The following criteria should be recorded: If there is any concern regarding suboptimal views (obesity, fibroids, retroverted uterus, etc) then a second opinion should be sought or repeat scan recommended

- The gestational sac should be measured in 3 planes and the mean sac diameter (MSD) calculated.

- The presence or absence of a yolk sac should be documented.

- If the mean sac diameter is < 25mm, a repeat scan should be offered 14 days later
(if on repeat scan 2 weeks later, there is no progression of the pregnancy ie no yolk sac has developed or no fetal pole if a yolk sac was present on the initial scan, then a diagnosis of EFD can be made even if there is a small increase in the MSD)

- If the MSD is ≥ 25mm and there is no evidence of a fetal pole a diagnosis of EFD can be made at the time of initial presentation.

- If the iu sac contains a clear fetal pole there is no need to record the MSD of the iu sac

- The fetal crown rump length (CRL) should be measured if a fetal pole is present.

- If the CRL is >7mm and no fetal heart pulsation seen, a diagnosis of EFD can be made

- If the CRL is ≤ 7 mm rescan in 7 days.

Please be aware that these are only guidelines. There may be occasions e.g. when a patient attends for a booking scan at 12 weeks and is certain of dates and is found to have

an empty sac with MSD of 20-25 mm where the case should be discussed with senior staff and a diagnosis made even on the first visit.

SUMMARY OF EARLY PREGNANCY SCAN DIAGNOSIS

Complication	Diagnosis	Management
EFD	- If the CRL is > 7mm and no fetal heart pulsation seen. - If the MSD ≥ 25mm and there is no evidence of a fetal pole.	Refer to EPAU for treatment options.
PUV	- If the CRL is < 7mm and no fetal heart pulsation seen - If the MSD is < 25mm with no fetal pole seen.	Rescan in 1 week Rescan in 14 days
PUL	- If a pregnancy is neither confirmed in the uterus nor visible anywhere in the pelvis and UPT remains positive.	Refer to EPAU for medical review and BHCG tracking.
Complete miscarriage	- If a pregnancy is neither confirmed in the uterus nor visible anywhere in the pelvis and UPT is negative.	Refer to EPAU for counselling
Incomplete miscarriage	- If RPOC noted with AP diam < 15mm - If RPOC noted with AP diam > 15mm (Please note UPT is not required to be positive for RPOC to be present.)	Treat as complete miscarriage Refer to EPAU for treatment options.

Compulsory images that MUST be recorded and stored on the scan sheet or within the notes

1. A low power image illustrating the location of the pregnancy within the uterus

2. A higher power image (with appropriate magnification) illustrating the key features of the EFD should be printed

3. A copy of image 1 and 2 should be attached to the scan record sheet.

Ultrasound scans done out with Rubislaw Ward or the Ultrasound Department in AMH / DGH

If a woman has been scanned in a peripheral unit, a private facility, the fertility services, the gynaecology department or the pregnancy counselling service and the relevant recordings have been made to confirm EFD (as outlined above) – the scan can be used in the assessment and diagnosis of early pregnancy complications as per SOP 7.

References :

The Management of Early Pregnancy Loss; Green Top Guideline No 25; RCOG 2006
Addendum to GTG No 25 (Oct 2006): The Management of Early Pregnancy Loss: RCOG 2011

8. DATING SCAN

Introduction

All women should be offered a dating scan between 11 and 14 weeks gestation of pregnancy. The reasons for this scan are:

- Localise the pregnancy
- Record the number of fetuses
- If multiple pregnancy, determine chorionicity
- Determine viability
- Offer nuchal measurement
- Check adnexae
- Check for fibroids/uterine anomalies

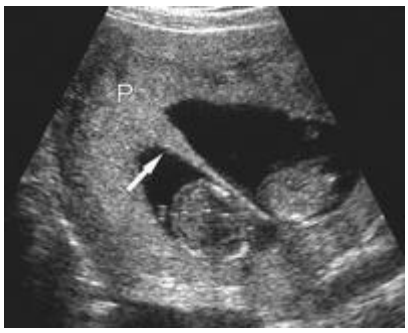
Confirm patient Identity

1. Localise the pregnancy

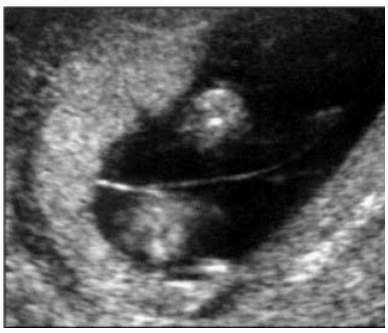
Identify the bladder and uterus and ensure that the gestation sac is visualised within the uterine cavity.
If there are any concerns about the position of the gestation sac (e.g. within the cervical canal, adherent to a previous scar, or particularly close to the cornua of the uterus) a medical opinion should be obtained within 72 hours

2. Determine number of fetuses

- Singleton
- Twin or increased multiple pregnancy – determine chorionicity



Dichorionic (lambda sign)


Monochorionic (T-sign)

If there is no dividing membrane, the twins are classed as monoamniotic

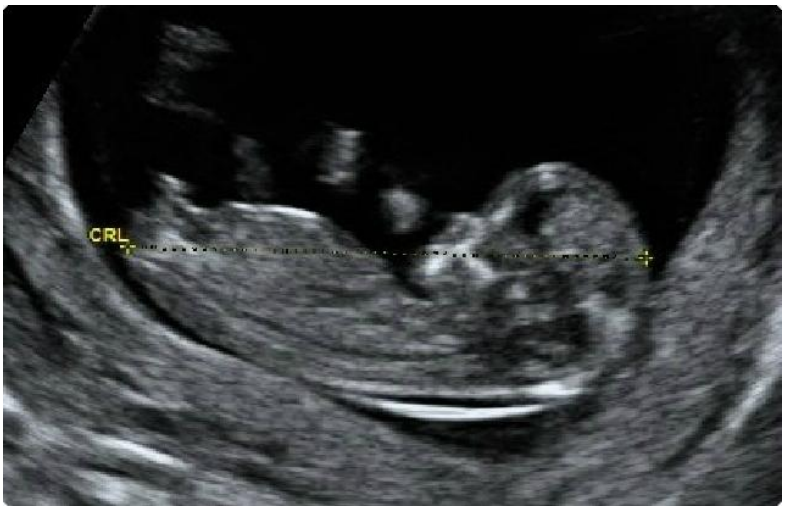
If there is any confusion about the chorionicity, refer to medical staff within 2 weeks for a second opinion

3. Determine viability – is the fetal heart present?

- If fetal heart activity is present, continue and complete the scan as detailed below
- If there is no fetal heart activity, measure the CRL. If the CRL is ≤7mm, refer to Rubislaw (AMH) or EPAC (DGH) for a repeat scan in 7 days time
- If there is no fetal heart activity, and the CRL ≥7mm a diagnosis of Early Fetal Demise (EFD) can be made. It is helpful to complete the scan to gain as much information as possible. The patient should then be referred to Rubislaw Ward (AMH) or EPAC (DGH) for further counselling and management

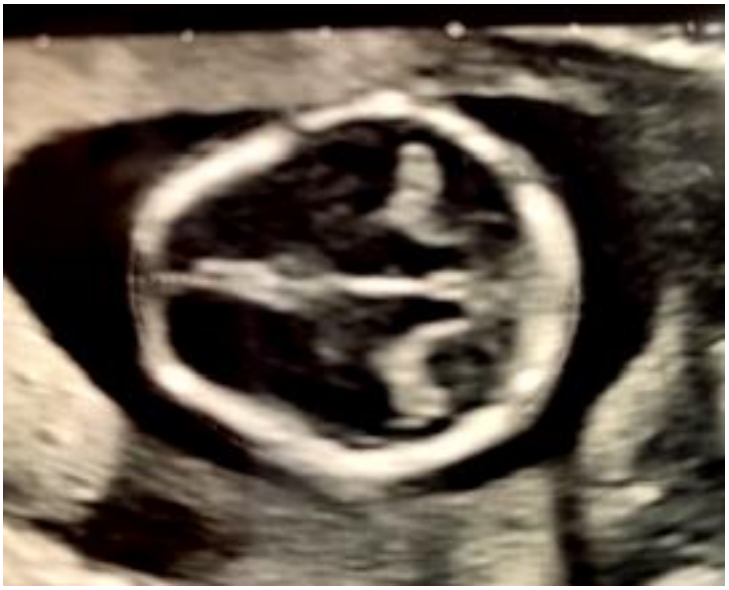
4. Determine gestation

- Crown rump length (CRL) is the most accurate way to determine gestation before 13 completed weeks of pregnancy
- A mid-sagittal horizontal section of the whole fetus should be obtained and the image magnified appropriately to occupy the whole screen. The callipers should be placed at the end points of the crown and rump
- 3 measurements should be taken and the best measurement used



- If the CRL ≥ 42 mm (= 11+0 weeks gestation) the CRL can be used to calculate the EDD. If the patient does not wish NT screening they do not require a further dating scan.
- If the CRL >84mm, a head circumference (HC) measurement should be used to determine gestational age

    - The optimal head circumference measurement should be a cross-sectional view at the level of the ventricles with the following landmarks
    - Rugby football shape
    - Centrally positioned, continuous midline echo broken by cavum septum pellucidum
    - Anterior walls of the lateral ventricles centrally placed around the midline
    - Choroid plexus visible within the posterior horn of the ventricle in the distal hemisphere



    - If the pregnancy is >14 week gestation use the HC as a guide for EDD. The FL should also be checked to ensure that the estimation of gestation is as accurate as possible

5. Review basic anatomy relevant for gestation

- The fetal skull bones should be seen to form a complete ellipse. If the skull bones are not clearly seen or the cross section of the skull does not form an ellipse, or there is

no clear midline seen, a medical opinion should be sought to exclude anencephaly/exencephaly or holoprosencephaly
- Identify 2 arms and 2 legs and the cord insertion
- Comment on liquor volume – normal or abnormal
- The nuchal area should be evaluated and if the patient wishes screening a formal NT measurement should be obtained (see NT SOP 9 p20). If the NT measurement is >3.5 mm the patient should be advised of the finding as this is out with the normal range and referred to the pregnancy screening midwife within 48 hours for further discussion

6. Scan the uterus for fibroids/uterine anomalies

- If fibroids are noted, document the position of the fibroid(s) and the measurements of all fibroids taken in 3 planes.
- Refer to **SOP 14 p32** for further guidance on fibroids
- If the uterus is bicornuate – please document which uterine horn the pregnancy is located in
- If an amniotic band is present please refer to **SOP 15 p33**

7. Scan the adnexae bilaterally

- If ovarian cysts are noted, document the side, size and nature of the cyst.
- Simple cysts ≤5cm require no further action
- Simple cysts >5 cms and <10 cms – should be rescanned in 4 weeks time
- Complex or solid cysts >5cms should be referred to medical staff for further evaluation
- Refer to **SOP 13 p29** - Management of Women with Ovarian cysts in Pregnancy for further guidance

Once the dating scan is finished, the Badgernet scan recording sheet should be completed; the EDD set in Badgernet and the patient should be given an appointment to attend for an anomaly scan at 20-21 weeks gestation

If the pregnancy is a MULTIPLE PREGNANCY, the woman should be given LDA 75mg daily and referred to the twin clinic as per SOP 29

References:

1. Loughna P, Chitty L, Evans T, Chudleigh T. Fetal size and dating: charts recommended for clinical obstetric practice. Ultrasound 2009; 17(3): 161-167.
2. Antenatal Care – routine care for the healthy pregnant woman. NICE Clinical Guideline 2008
3. Spencer CP, Robarts PJ. Management of adnexal masses in pregnancy. The Obstetrician and Gynaecologist 2006; 8:14-19.

9. NUCHAL TRANSLUCENCY (NT) MEASUREMENT

The Nuchal Translucency should be measured at the time of the dating scan. Prior to obtaining an NT please check if the patient wishes first trimester screening for Trisomy 21. If they wish screening:

- Confirm patient identity and date of birth
- Confirm patient has received verbal/written information on Trisomy 21 screening
- Explain the test
- Explain how test results will be delivered as per SOP 10 p22 (women with a high risk result (of >1:150) will be contacted by telephone or letter (as per their instructions) within 5-7 days
- Confirm the patient has given their consent to perform NT screening – ensure that Badgernet is updated to accept/decline DS screening

Should the patient decline, it should be explained that should any abnormality e.g. increased nuchal/cystic hygroma, they will be referred to a member of medical staff for review.

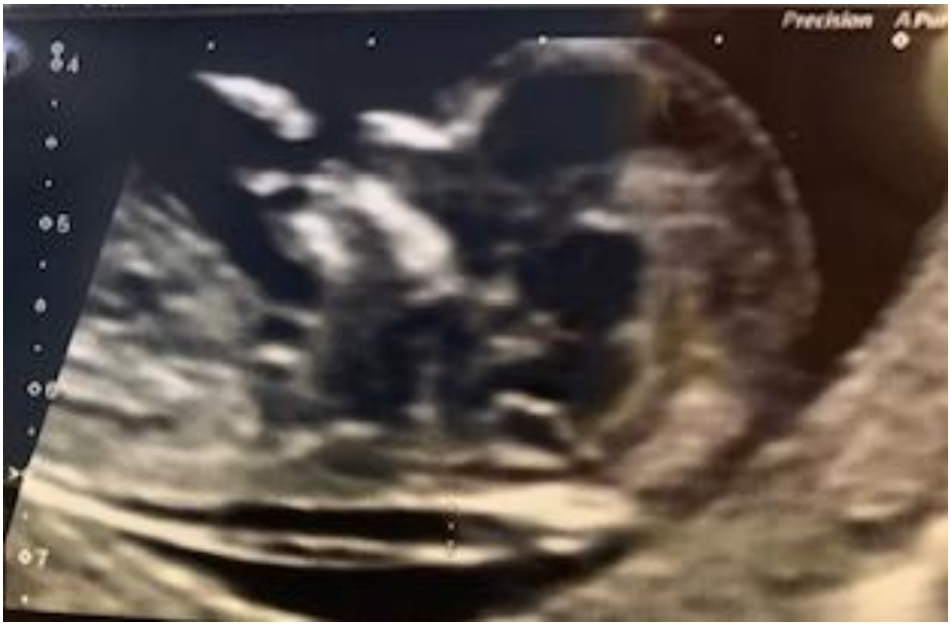
- The fetal crown-rump length (CRL) should be between 45 and 84mm. (CRL will be rounded up ie 84.5mm will be rounded up to 85 mm and therefore will not be valid for NT measurement)
- The fetus should be in a neutral position, ideally horizontal, with the head in line with the spine, either in the supine or prone position, at 90 degrees to the ultrasound beam
- Magnification of the image should be such that the fetal head and thorax occupy the whole screen (ideally 60-90%)
- A mid saggital view of the face should be obtained, demonstrating the tip of the nose, rectangular shape of the palate anteriorly, the diencephalon in the centre, and the nuchal membrane posteriorly.
- A pocket of fluid, at least equal to the width of the palate, should be seen between the chin and the chest
- The nasal tip should be level with or above the anterior abdominal wall

In order to achieve optimum images, consider adjusting the controls on the machine. The CLEAR campaign (2012) gives a handy mnemonic:

Consider reducing Power
Lower Gain

Enlarge image
Adjust Focus
Reduce Dynamic Range

IMAGE of NT measurement



- Care must be taken to distinguish between fetal skin and amnion.
- The widest part of the translucency must be measured. In 5% of cases, there may be cord present around the fetal neck. In such cases, the NT both side should be measured, and the average of the two measurements used.
- Measurements should be taken with the horizontal lines on the callipers placed 'on' the lines that define the maximum NT thickness, and not in the translucency.
- Take up to 3 NT measurements, obtain thermal images, and use the maximum NT measurement that meets all the criteria, and document on the scan form, and on the blood form.
- Blood should then be obtained from the patient by the OPA in dayward (and they will update Badgernet accordingly.
- Should the measurement be above 3.5mm, the patient should be informed, and referred to the pregnancy screening midwife for counselling within 48 hours.

References:

http://www.fetalmedicine.org/fmf
http://www.fetalanomoly.screening.nhs.uk

10. SCREENING FOR TRISOMY 21 IN SINGLETON PREGNANCIES

7.1 First Trimester Screening

All pregnant women in Scotland should be offered first trimester screening, as part of the national screening programme.
Couples should receive a copy of the national information leaflet to support the screening programme and this should be discussed with women by their community midwife part of their booking appointment at least 48 hours prior to the test being taken.

Women should be asked by their community midwife to accept or decline DS screening and this should be recorded clearly in Badgernet.

In **SINGLETON** pregnancies it is a combined test incorporating a maternal blood sample to measure levels of free β-human chorionic gonadotrophin (free βHCG) and pregnancy associated plasma protein (PAPPA-A) levels, and an ultrasound measurement of nuchal translucency (NT). It has an 85-90% detection rate with a 5% false positive rate (Stenhouse et al 2004).

If a woman wishes first trimester screening, the Sonographer will attempt to measure the Nuchal Translucency (NT) as prescribed in **SOP 9, p20**. If this is within normal limits a sample of blood is obtained to measure PAPP-A and free βHCG from the woman on the same day. The green first trimester screening form package should be fully completed as illustrated overleaf and the form, with the enclosed blood sample, are sent away to the central screening laboratory in Edinburgh for analysis. If the sonographer is unable to get an NT measurement the patient should be advised to attend their community midwife (for AMH patients) or DGH (for Elgin patients) between 14+2 and 20 weeks to obtain second trimester blood screening

RESULTS
The results are calculated as a numerical risk factor for each individual pregnancy.
The cut off for becoming High Risk is a result with a risk greater than 1:150
Women with a low risk result will be notified via the patient portal on Badgernet, within 14 days, informing them that their result has come back low risk and no further action is required.
Women with a high risk result (of >1:150) will be contacted by telephone or letter (as per their instructions) within 5-7 days

The screening midwives will offer extra support and advice to all women who have a high risk result. This will involve discussing the result in more detail and discussing the options of diagnostic testing or private non invasive prenatal testing.

Background Information on the serum hormones measured

(i) Pregnancy Associated Plasma Protein-A (PAPP-A).

- originates from the placental syncytiotrophoblast
- concentration increases with gestation
- screening sensitivity decreases with gestation
- optimal sensitivity at 8-9 weeks gestation
- levels are reduced in pregnancies affected by Downs Syndrome

(ii) Free Beta Human Chorionic Gonadotrophin (hCG)

- produced by syncytiotrophoblast cells
- decreases with gestational age
- sensitivity maintained in second trimester
- levels are raised in pregnancies affected by Downs Syndrome

First Trimester Combined Biochemical and Ultrasound Screening
Antenatal Screening Service, Combined Laboratories, Western General Hospital, Crewe Road, Edinburgh EH4 2XU
Tel: 0131 537 1171 Email: Lothian.AntenatalScreening@nhs.net

Lab Use Only

Hospital/Health Centre

Consultant/Midwife Phone Number

CHI/Other eg UHPI

Surname Forename

Date of Birth Postcode

...../...../.....

Screening requested (circle according to patient consent)

Down's Syndrome Yes / No

Edwards' and Patau's Syndrome Yes / No

Number of Fetuses (circle) **Chorionicity if twins** (circle)

1 2 Monochorionic Dichorionic

Maternal Weight

.....kg

Current Smoker (circle) **Maternal Family Origin** (see reverse)

Yes / No

.....

Insulin Dependant Diabetic (circle) **If previous trisomy pregnancy** (circle)

Yes / No

Trisomy 21 / Trisomy 18 / Trisomy 13

Date and time of test

...../...../..... ..... : ..... hrs

Ultrasound Dating Details

	Singleton or twin 1	twin 2
CRL (mm)	.....	.....
NT (mm)	.....	.....

Sonographer ID Code ___ ___ ___ ___

If Assisted Conception

Origin of Egg (circle) Own Egg / Donor Egg

Date of Egg Retrieval ...../...../.....

Date of Embryo Transfer ...../...../.....

If Donor, Donor age at Egg Retrieval .....yrs

Further Clinical Information

BIOCHEMICAL AND ULTRASOUND SCREENING

First Trimester Screening.

The gestation on the date of test should be equivalent to a fetal crown rump length of 45 - 84mm inclusive.

Sample Type. 5ml of whole blood collected into a serum gel tube is the preferred sample type. Samples containing either K-EDTA or fluoride oxalate are unsuitable for analysis and will result in the reporting of erroneous results. Always collect the screening sample first before collection of blood into other tube types.

Sample Transit and Storage. Whole blood samples should be received by the laboratory within 48 hrs of venepuncture (72 hrs for serum samples). If samples need to be stored for a short time prior to dispatch, store in cool conditions (but not frozen).

Date of Test. This is the date on which both the NT measurement and the blood sample are obtained. These should be performed on the same day Requests indicating that the investigations have been performed on different days will only be accepted in exceptional circumstances.

Maternal Family Origin.
Please select one of the following groups;

Ancestry Group	FOQ* Code	Example
Afro-caribbean	A	Caribbean Islands Africa
Asian	B	India, Pakistan, Bangladesh
Oriental	C	China inc Hong Kong, Taiwan Singapore, Malaysia
Other	D	South America, Middle East
Caucasian	E,F,G	All European
Not known	H,J	Not known / Declined to answer

*Family Origin Questionnaire

High Risk of Infection Specimens.
Please label the samples as 'High Risk of Infection' if it is thought that a woman could be infected with a Category 3 Organism (excluding HIV, Hep B and Hep C). See list at **http://www.hse.gov.uk/pubns/misc208.pdf**

Further Information. For additional information please see the Scottish Down's Syndrome and Fetal Anomaly Screening Programmes Protocols at **http://www.nsd.scot.nhs.uk**

BIOCHEMICAL AND ULTRASOUND SCREENING

11. MID TRIMESTER SCREENING

Women who are unable to get first trimester screening and who wish screening for Trisomy 21, should be advised to attend their community midwife (in Aberdeen & shire) or DGH in Elgin from **14+2** - **20** weeks gestation for mid trimester screening. It is less accurate with a detection rate of 75-78%.

The mid-trimester test entails a blood sample (to estimate levels of four serum markers – see below) and this, in combination with the woman's age, is used to calculate a risk of the pregnancy being affected with Downs Syndrome. Once a blood sample is obtained, the white mid-trimester screening blood form should be fully completed as illustrated in the form on page 18 and the completed form (with the blood sample enclosed) sent to the Screening Laboratory in Bolton.

Serum Markers Assessed:

(a) Alpha-fetoprotein (AFP)

- produced by the yolk sac and liver
- increases with gestational age
- levels reduce in pregnancies affected with Downs Syndrome
- levels are increased in pregnancies affected by spina bifida or abdominal wall defects

(b) Human Chorionic Gonadotrophin (hCG)

- produced by the syncytiotrophoblast cells in the placenta
- decreases with gestational age
- levels increase in pregnancies affected by Downs Syndrome

(c) Unconjugated estriol (uE3)

- produced by placenta, fetal liver and fetal adrenals
- increases with gestation
- levels are reduced in pregnancies affected with Downs Syndrome

(d) Inhibin-A

- produced by the placenta
- decreases with gestational age between 14 and 17 weeks whereupon it begins to increase again
- levels increased in pregnancies affected with Downs Syndrome

RESULTS

Like first trimester screening, a specific risk for each individual pregnancy is calculated. A risk of 1:150 or greater is deemed high risk. Women with a risk of less than 1:150 will be notified via the patient portal on Badgernet within 14 days informing them of a LOW RISK result, and advising them that no further action is required.

Women with high risk results (>1:150) will be contacted (by telephone or letter) within 7 days, by the pregnancy screening midwives, informed of their specific risk, and offered information about amniocentesis or non-invasive prenatal testing available privately.

SECOND TRIMESTER DOWN'S SYNDROME SCREENING FOR NHS SCOTLAND

Bolton NHS
NHS Foundation Trust

HOSPITAL - Code or Name | CONSULTANT

CHI Number | HOSP No.

SURNAME:

FIRST NAMES:

ADDRESS: | DOB:

FAMILY ORIGIN OF PREGNANT WOMAN:

☐ UK White ☐ N. European White ☐ Southern/ other European White
☐ Other Non-European ☐ African or African Caribbean ☐ Mixed Race
☐ South Asian ☐ South East Asian

COMMENTS:

Min 5ml PLAIN BLOOD REQUIRED - NO ANTICOAGULANT!

DATE OF ULTRASOUND SCAN

Weeks ____ and days ____ gestation when scanned

CRL ___.__ mm HC ___.__ mm

EDC

MATERNAL WEIGHT AT BLOOD SAMPLING ____ Kg

PREGNANCY DETAILS:

	Y	N		Y	N
Current smoker?	☐	☐	Diabetic on insulin?	☐	☐
On nicotine replacement?	☐	☐	Bleeding in last 2 weeks?	☐	☐
Using electronic cigarettes?	☐	☐	Prev. Down's Pregnancy?	☐	☐
			Prev. T13/18 Pregnancy?	☐	☐

For IVF Pregnancies only
Egg origin: Own ☐ Donor ☐ Age of donor at extraction: ____

Date of extraction:

Date of implantation:

NAME OF REQUESTER TAKING BLOOD:.....
SIGNATURE:..... Sample Date

Department of Laboratory Medicine, Antenatal Screening Laboratory, Bolton NHS Foundation Trust, Minerva Road, BOLTON, BL4 0JR

FAMILY ORIGIN OF PREGNANT WOMAN:

UK WHITE	England, Scotland, Wales, Northern Ireland
N. EUROPEAN WHITE	Austria, Belgium, Ireland, France, Germany, Netherlands, Scandinavia, Switzerland etc. Any other European familiy origins eg. Australia, USA, South Africa
SOUTHERN/ OTHER EUROPEAN	Cyprus, Greece, Turkey, Italy, Portugal, Spain. Any other Mediterranean country Albania, Czech Republic, Poland, Romania, Russia etc
OTHER NON-EUROPEAN	North Africa, South America, Middle East
AFRICAN OR AFRICAN CARIBBEAN	Caribbean Islands, Africa (excluding North Africa)
SOUTH ASIAN	India or African-Indian, Pakistan, Bangladesh
SOUTH EAST ASIAN	China, Thailand, Malaysia, Vietnam, Philipines etc.

SMOKING / NICOTINE REPLACEMENT

Current smoker?
Tick Y if woman is a current smoker

On nicotine replacement?
Tick Y if on nicotine replacement
e.g. patches, gum or tablets

Using electronic cigarettes?
Tick Y if using electronic cigarettes containing nicotine

IVF PREGNANCY

If donor eggs are used, the age of the eggs at the time of extraction should be supplied.

(If the eggs are from a donor it is the eggs' age that will be used to calculate the risk of Down's syndrome)

MISCELLANEOUS

CRL is the preferred measure in the 1st trimester
HC is the preferred measure in the 2nd trimester

Tel: (01204) 390424 Fax: (01204) 390421

R21c
Version 8

12. SCREENING FOR TRISOMY 21 IN MULTIPLE PREGNANCIES

Screening for Trisomy 21 is available for multiple pregnancies, but only in the first trimester. The risk is calculated based on the nuchal translucency measurement **only** as serum hormone levels vary in multiple pregnancies and therefore blood samples cannot be used to calculate risk.

- Perform a booking scan for each fetus to determine gestational age, chorionicity and amnionicity (as described in SOP 8)
- The NT measurement should be obtained for each fetus as outlined in SOP 9.
- Complete ONE green first trimester screening forms (for twins) or TWO for Triplets, ensuring all the information is complete as outlined in SOP 10
- In the section "further information" of the form document the chorionicity and amnionicity of the pregnancy
- **NO blood sample should be obtained**.

The completed form is sent to the National laboratory in Edinburgh

If there is a twin pregnancy with x1 viable fetus and x1 non-viable fetus, the DS risk is again calculated using only the NT measurement

If there is a twin pregnancy with x1 viable fetus and x1 EMPTY sac – the DS risk should be calculated using both NT measurement and bloods as described in SOP 9

Results are calculated for each fetus. Women with a risk of less than 1:150 will be notified via the patient portal on Badgernet within 14 days informing them of a LOW RISK result, and advising them that no further action is required.

If the risk is greater than 1:150, the patient will be contacted directly by the pregnancy screening midwives, the specific risk discussed and the options of diagnostic testing outlined

13. MANAGEMENT OF WOMEN WITH OVARIAN CYSTS IDENTIFIED IN PREGNANCY

Background

The incidence of ovarian cysts/adnexal masses in pregnancy is approximately 2% with ovarian malignancy rates of 0.004-0.04% [1]. They are usually diagnosed as an incidental finding on USS. The majority are benign, therefore conservative management with observation only is required. Complications (torsion and rupture) are not common in stable cysts once into the 2nd trimester. Ultrasound characteristics must be used to help define cysts into benign and those with malignant potential, as demonstrated in the IOTA trials. MRI can be considered for doubtful masses. Intervention by surgical means should be considered in symptomatic women in **any trimester**.

ANTENATAL CARE

Ultrasound assessment

- Note location of cyst (right or left adnexae)
- Measure cyst in 3 planes, document and print picture copy
- Assess cyst for any of the following features and document
- Septae (measure thickness, >3mm more suspicious)
- Growths papillae within cyst
- Solid components (measure size, >7mm more suspicious)
- Shape of cyst
- Vascularity/colour Doppler examination
- Assess for free fluid
- Assess other ovary

Management

1. Simple cyst ≤5cm

- All women with a simple ovarian cyst ≤5cm identified in early pregnancy or booking scan should be reassured and no follow up required.

2. Simple ovarian cyst >5cms and ≤10cms in size

- Repeat USS and ANC clinic appointment in 4 weeks.
- If no change in size and asymptomatic document in antenatal record to ensure an appointment is made as per outlined below.

3. Simple cysts > 10cms in diameter

- Refer to medical staff (within 7days) for consideration of US guided aspiration as an alternative to surgery if symptomatic
- Follow-up scans in pregnancy should be arranged by the medical staff.

4. Solid or complex ovarian cysts

- Refer to medical staff for repeat USS (within 7 days).
- An MRI should be arranged if suspicious features remain.
- These cases should be referred for MDT discussion (email Dr Mary Cairns) and tumour marker checked (Ca 125). Please check with Dr Cairns if additional tumour markers are also required (this will on the nature of the cyst)

5. Symptomatic cysts in pregnancy

- Surgery should be considered at any time in pregnancy if the woman is symptomatic, the masses are increasing in size or if the diagnosis of malignancy is in doubt.
- The opinion of the gynae-oncologist team (Dr Mary Cairns, Dr Maha Gurumurthy) should be sought in the latter of these clinical scenarios.
- For women with persistent cysts in the 3rd trimester, a discussion on management should she undergo CS needs to be documented clearly (see below).

POSTPARTUM FOLLOW-UP

All women with a known cyst/adnexal mass >5cm should have a repeat ultrasound scan 6 weeks postnatal in the main scan department at ARI – this should be booked prior to leaving the postnatal wards and if the cyst persists a gynaecological opinion sought.

References

1.Spencer & Robarts, Management of Adnexal masses in Pregnancy, TOG, 2006; 8:14-19

2.Ameye L, et al. A scoring system to differentiate malignant from benign masses in specific ultrasound-based subgroups of adnexal tumors. Ultrasound Obstet Gynecol 2009; 33:92 – 101

3.http://www.ajronline.org/doi/full/10.2214/AJR.09.3562

4.American College of Obstetricians and Gynaecologists Practice Bulletin 83. Management of Adnexal Masses. Obstet Gynecol 2007; 110: 201-14.

5.P Hogston et al, Ultrasound study of ovarian cysts in pregnancy: prevalence and significance, BJOG; Volume 93(6), pages 625–628, June 1986

6.Zanetta et al, A prospective study of the role of ultrasound in the management of adnexal masses in pregnancy; BJOG; 110 (6): pages 578-83, June 2003

7.Timmerman et al, Simple ultrasound rules to distinguish between benign and malignant adnexal masses before surgery: prospective validation by IOTA group, BMJ 2010; 341: c6839

14. FIBROIDS IN PREGNANCY

Uterine fibroids are a very common finding in women of reproductive age. The majority of fibroids do not change their size during pregnancy, but one-third may grow in the first and early second trimester. Most are asymptomatic; however, severe localized abdominal pain can occur if a fibroid undergoes so-called “red degeneration,” torsion, or impaction. Pain is the most common complication of fibroids in pregnancy, and is seen most often in women with fibroids > 5 cm during the second and third trimesters of pregnancy

Although the data are conflicting and most women with fibroids have uneventful pregnancies, the weight of evidence in the literature suggests that uterine fibroids can be associated with a small but increased rate of spontaneous miscarriage, preterm labour, placenta abruption, malpresentation, labour dystocia, caesarean delivery, and postpartum haemorrhage

Diagnosis

The uterus is checked for uterine fibroids (benign muscle growths of the uterus), particularly at the time of fetal viability, booking and the anomaly scan.

- Document the size and location of the fibroids on the scan sheet and take relevant images (measure in three planes)
- Discuss with patient the ultrasound findings.

Counselling and Management

<u>If fibroids are ≤ 6cms at time of anomaly scan and not within the cervix</u>

- Reassure the patient
- No further scans are indicated

<u>If fibroids > 6cms at time of anomaly scan or the fibroids are within the cervix</u>

- Refer to ANC at 28 weeks with growth scan appointment
- Rescan at 28, 32 and 36 weeks gestation

References

Contemporary Management of Fibroids in Pregnancy Lee et al
Rev Obstet Gynecol. 2010 Winter; 3(1): 20–27
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2876319/

15. AMNIOTIC BANDS

Definition:
Amniotic bands are typically seen as thin free floating stands of amnion within the amniotic sac.

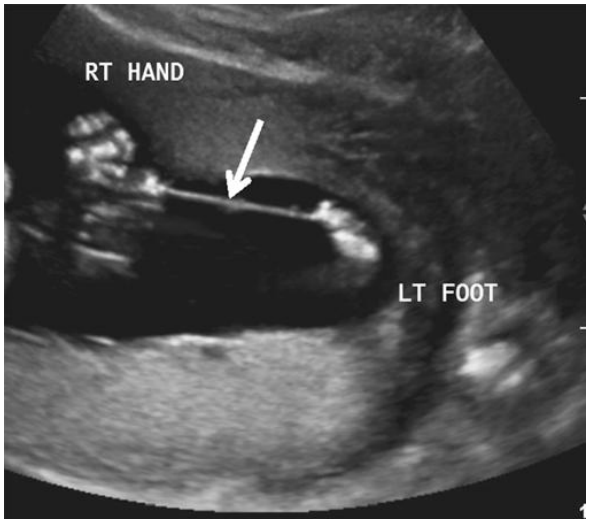
Aetiology:
They are usually due to bleeding (either concealed or revealed) within the Gestation sac during the early stages of pregnancy. They are harmless but can occasionally present as amniotic band syndrome where the developing fetus becomes entangled in them. This can cause limb abnormalities and in severe cases limb or digit amputation.

Management

- If amniotic bands are seen at the time of booking and the fetus appears to be freely moving then no follow up is required.

- If there is possible fetal involvement (i.e. direct involvement of limbs around the band) or doubt over foetal development, rescan at 16 weeks to exclude amniotic band syndrome.

- If involvement appears probable at 16 weeks, add the woman onto the next available medical scan list (within 7 days) for medical follow up and subsequent management.



16. THE ROUTINE ANOMALY SCAN

- All patients should be offered a detailed anomaly scan between 20 and 22 weeks gestation
- If the BMI is > 30 the timing of the initial scan should be delayed until 21 weeks gestation so that all the fetal structures to be seen at one single visit
- If the patient is a late booker (>28 weeks) attempt to visualise the fetal structures but if not visible simply record on the electronic notes that not all structures are visible due to the late gestational age
- Measure AC, HC and FL and plot measurements. If any of the measurements are ≤ 5th centile give the woman an appointment for a consultant list within 7 days.
- Record the placental position. If the placenta is reaching or totally covering the cervix, please refer to **SOP 18** (Management of a Low Lying Placenta)
- The fetal structures (listed in the checklist) should be identified and the appropriate images recorded and stored on the hard card. Document any structural abnormalities in the comments section on the FIRST page of ultrasound documentation on Badgernet.
- Abnormalities should be referred for a medical opinion within 5 working days.
- If the Sonographer is unable to complete the scan examination due to :

    a. Increased body mass index (BMI)

    b. Uterine fibroids

    c. Abdominal scarring

    d. Sub-optimal fetal position

  A repeat scan examination should be offered at 23 weeks gestation

- **If on the second attempt, the image quality remains restricted but there is no obvious abnormality identified, the woman should be advised of the limitations of the scan and no additional appointments made thereafter. A medical scan is not indicated**

- **Fetal Gender is NOT determined unless a medical indication (e.g. X linked condition)**
- **Document all measurements including lateral ventricle and cerebellum on Badgernet. Please print the report and attach all images and the report to the scan card**

ANOMALY SCAN CHECKLIST

SYSTEM	DETAILS TO BE EXAMINED	IMAGES TO BE STORED
Head & neck	Skull : shape Neck : assess nuchal fold (NF) measure if appears >6mm Brain Cavum septum pellucidum (CSP) Ventricular atrium VA (≤10mm) Cerebellum	*Image to include HC, CSP, VA *Image to include TCD *Image NF if more than 6mm
Face	Lips : coronal view	Coronal view of lips with nasal tip
Chest	Heart Correct position in chest 4 chamber view Both outflow tracts,3 vessel view (3VV Lungs : ? any echogenic or cystic lesions	 4 chamber view of heart Annotate left and right on stored image 3 vessel view
Abdomen	Stomach Abdominal wall Cord insertion Bowel Renal pelvis : AP diameter Bladder Diaphragm	Transverse section of abdomen at level of AC measurement Cord insertion Transverse image of the renal pelvis R and L and AP diameter of RP
Spine	Vertebrae Skin covering complete in 3 views	Sagittal view of spine Including sacrum and skin covering
Limbs	Femur : measure 1 leg only unless abnormality identified Both Hands – radius, ulna humerus Metacarpals seen (not counted) Both legs-tibia fibula femur	Femur length measurement

	Metatarsals seen (not counted)	
Uterine cavity	Amniotic fluid : subjective assessment Placental position	

17. FETAL ECHOCARDIOGRAPHY

The following women ONLY should be referred for a detailed fetal cardiac echo examination at 20-22 weeks gestation by TF, GF, AS, SB or LMC or the detailed scan and fetal echo can be done at the same time around 21 weeks gestation

a. When a 4 chamber view of the heart cannot be obtained during the routine anomaly scan despite adequate views of the chest

b. When an abnormal 4 chamber view of the heart is found at routine anomaly scan

c. Women with a previous child affected by Congenital heart disease (CHD)

d. Women with an increased first trimester NT (>3.5mm)

e. If the **pregnant woman herself or her partner** has a structural heart defect herself (a PDA {patent ductus arteriosus} is NOT a structural abnormality)

f. Pregnancies with a sustained fetal tachycardia or fetal bradycardia : a fetus with “missed” beats (ectopic beats heard during auscultation) does not require a fetal echo – if >37 weeks they should be referred for a CTG to Westburn ward (AMH patients) or DGH (Elgin Patients).

18. MANAGEMENT OF A LOW-LYING PLACENTA

Diagnosis of Low Lying Placenta at the time of routine anomaly scan

- Routine ultrasound scanning at 20 weeks of gestation should include placental localisation.
- If there is any evidence of a succinturate lobe please document this on the front "notes" section of the scan report

- **If the woman has had a previous caesarean section AND she has an ANTERIOR placenta praevia – she should be scanned on a medical staff in either DGH or AMH between 26-28 weeks gestation to allow for assessment of placenta accrete. A lady with a previous CS and a posterior placenta praevia does NOT need a medical review as scar adherence is NOT an issue.**

  OTHERWISE

- If the placenta is low-lying at 20 weeks (within 2.5cms from the cervical os)– the placental scan should be repeated either during a serial growth scan or at 34 weeks gestation if the patient has NO further scans booked

- If the placenta is entirely covering the cervical os at the anomaly scan the scan should be repeated at 26 -28 weeks by the sonographer and if the placenta continues to cover the cervical os, the woman should be referred for an ANC in either AMH or DGH for a plan of care in 14 days.

Diagnosis of Placenta Praevia during a routine third trimester scan

- If the placenta is found to be <2.5 cms from the internal os during a third trimester scan, the woman has a diagnosis of major placenta praevia and should be referred to medical staff either in the ANC or in Westburn Ward within 7 days to formulate a plan of care

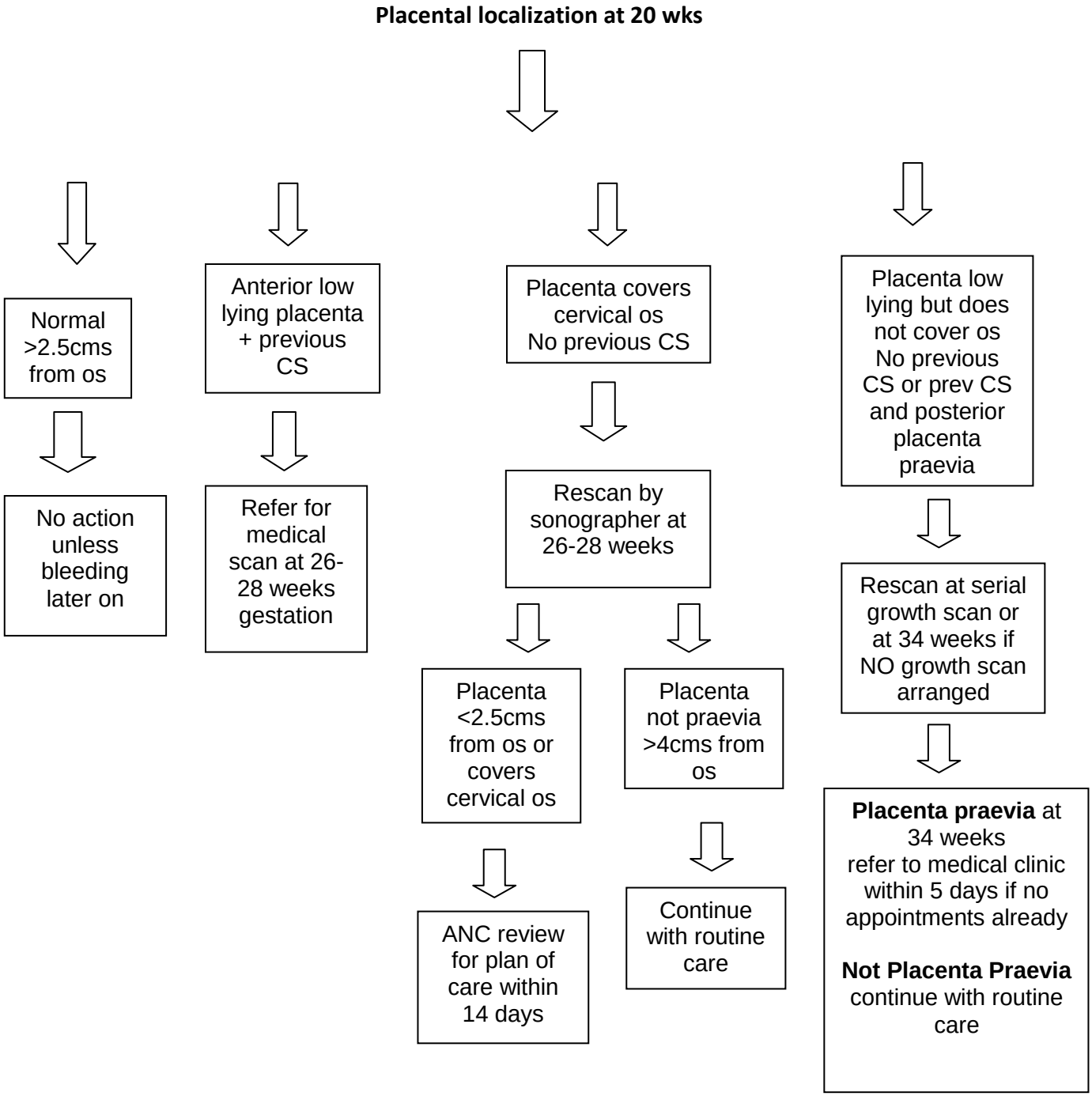
- If the placental edge is >2.5cms and <4cms the woman has a diagnosis of minor placenta praevia and although suitable for vaginal delivery should be counselled by medical staff within 7 days, regarding the risks of bleeding during vaginal delivery

Diagnoses of Placenta Accreta

- If a woman is diagnosed with a major placenta praevia, in the presence of a previous CS, placenta accrete should be considered at the time of the medical scan review using the criteria below and the findings documented in Badgernet

Criteria	**yes**	**no**
Long irregular vascular spaces with high turbulence		
Thickness of lower uterine segment (<1 mm)		
Loss of clear space between the placenta and uterus		
Interruption of bladder wall line (dot and dash line)		

PLACENTA PRAEVIA FLOW CHART



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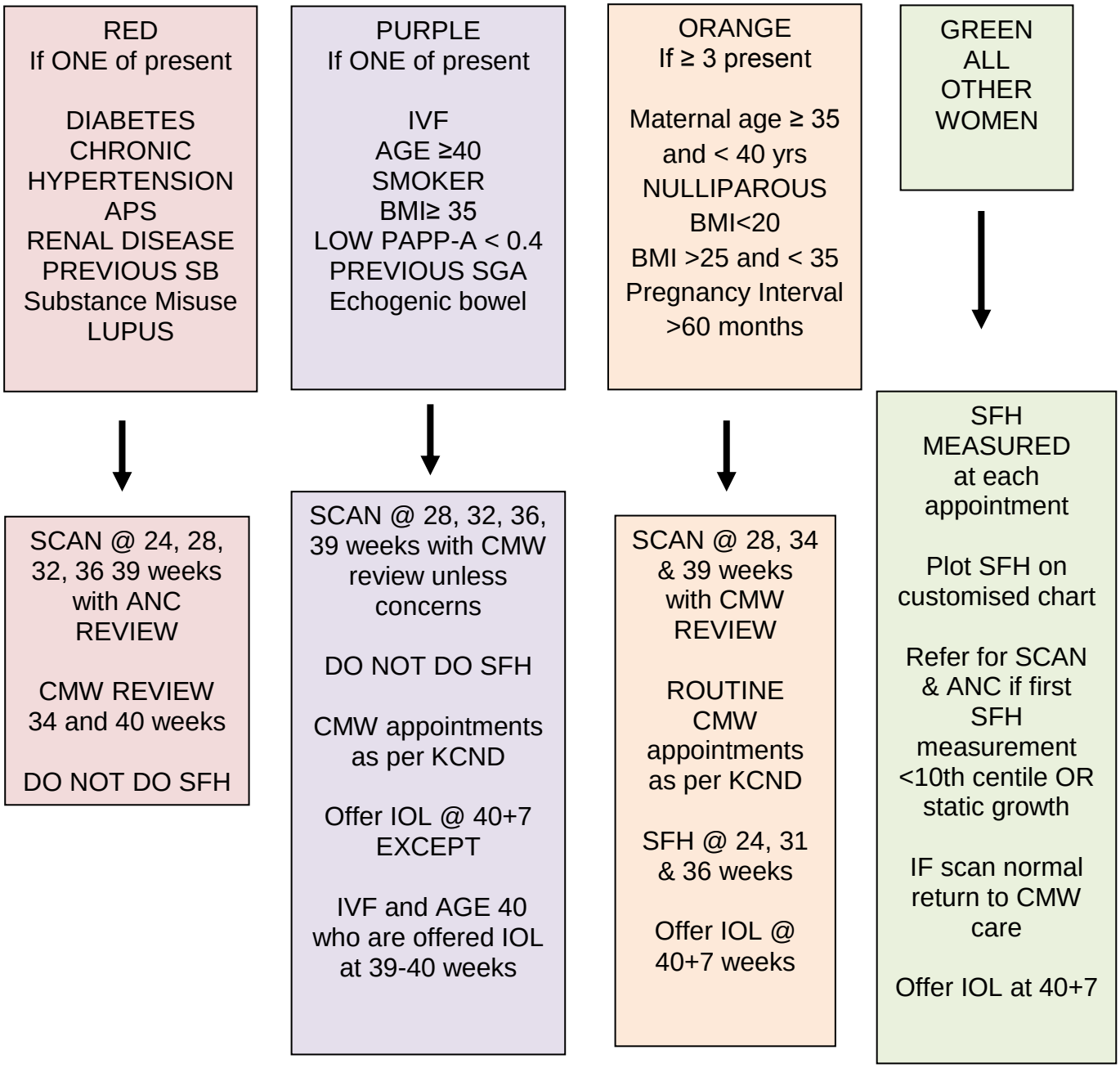
19. IDENTIFYING PATIENTS AT RISK OF SGA AND THE SCAN SURVEILLANCE NEEDED DURING PREGNANCY

COMPLETE RISK ASSESSMENT ONCE EDD CONFIRMED

COMPLETE CUSTOMISED GROWTH CHART IN BADGER



RED PATHWAY: The following very high risk women should have serial growth scans at least every 4 weeks from 24 weeks gestation :

- Previous severe SGA baby
- Previous Stillbirth
- Chronic hypertension on treatment
- Diabetes
- Renal disease (eg nephropathy)
- Antiphospholipid syndrome
- Lupus positive

Patients should be seen for serial scans and ANC review at 24, 28, 32, 36 and 39 weeks gestation

PURPLE PATHWAY

- IVF
- Age 40
- Fibroid > 6cms
- Smoker
- Low PAPP-A <0.4 MOM
- BMI ≥35
- Echogenic Bowel
- Previous SGA baby

Serial growth scans at 28, 32, 36 and 39 weeks but managed by CMW

ORANGE SCAN PATHWAY

- If 3 or more of the following risk factors are present
- BMI< 20
- BMI ≥ 25 <35
- Nulliparous

- Pregnancy interval ≥ 60months
- Maternal age ≥35

Serial scans at 28 and 34 and 39 weeks – managed by the CMW

20. LIQUOR ASSESSMENT: DEEPEST POOL

Amniotic fluid is an important factor to consider when assessing fetal and maternal well-being and can be measured easily by ultrasound. It is as essential part of EVERY growth assessment scan, (see protocol 16).

The preferred assessment of the amniotic fluid is by measuring the deepest pool of liquor (DP)

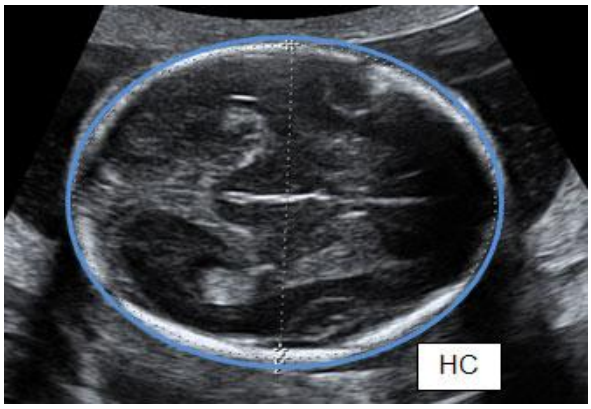
To do this properly you should:-

- Measure the single deepest pool of liquor in the uterus, keeping the ultrasound probe longitudinal and upright. DO NOT use excess pressure or angle the probe as this can give inaccurate results.
- If the DP <3cms refer to medical staff within 24 hours
- If the DP is ≥3cms this is a **normal** measurement
- If the DP is >10cms, reassure the patient that this is a common finding. Check that the fetal stomach and bladder are present and normal. If the patient is ≤36 weeks gestation arrange an OGTT and organise a repeat scan for LV and growth (and medical review) 2 weeks later. If the patient is >36 weeks there is no indication to arrange an OGTT.

21. ASSESSMENT OF FETAL GROWTH FROM 24 WEEKS GESTATION.

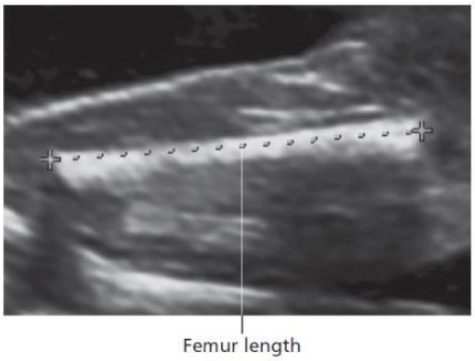
Technique for fetal assessment scan.
Having confirmed fetal viability and orientation, obtain "technically good" measurements of the following structures, as described in Chitty (2009)

- **Head Circumference (HC)**
  - A cross-sectional view of the skull at the level of the ventricles
  - Rugby football shape
  - Centrally positioned with a continuous mid-line echo broken at one third of its length by the cavum septum pellucidum
  - Anterior walls of the lateral venticles centrally placed around the mid-line
  - The choroid plexus should be visible within the posterior horn of the ventricle in the distal hemisphere
  - Calipers should be placed on the outer border of the occipital and frontal edges of the skull at the mid-point
  - If a good image is obtained a single measurement is adequate

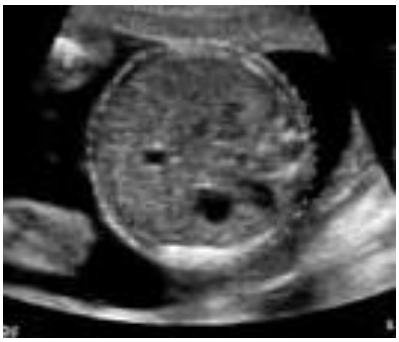


- **Femur length (FL)**
  - The femur should be imaged lying as close as possible to the horizontal plane such that the angle of insonation of the ultrasound beam is about 90^0
  - Ensure the full length of the bone is visible and measured
  - A single measurement is adequate

Femur length (FL)



- **Abdominal Circumference (AC)**
  - Obtain a transverse section of the fetal abdomen as close as possible to circular in shape
  - Visualise the spine posteriorly, the stomach bubble and the umbilical vein in the anterior portion of the abdomen
  - Place callipers on the outer borders of the body outline, from the skin covering the spine to the anterior abdominal wall
  - If a good image is obtained a single measurement is adequate



Abdominal Circumference (AC).

- Measure liquor using the DP as per SOP 20 p43 .

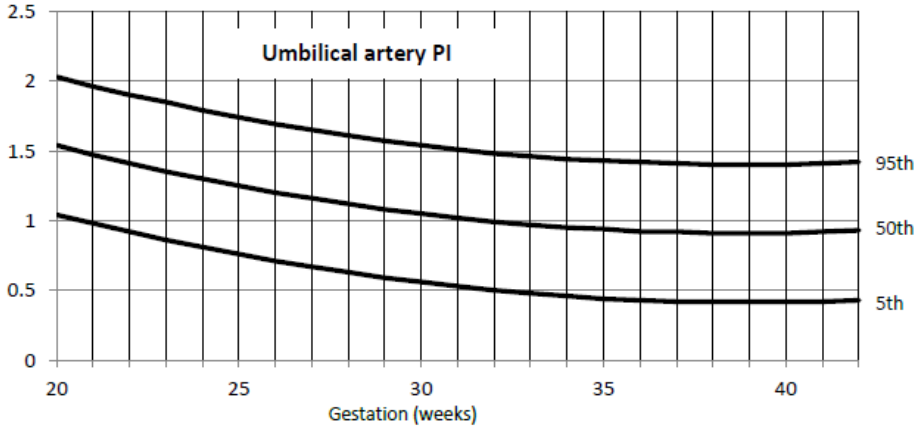
- The flow velocity in the umbilical artery should be assessed. The umbilical cord with 2 umbilical arteries and one umbilical vein should be identified. The pulsed wave (PW) calliper should be placed over one artery and the vein at an angle of 90 to the cord. If there is reduced or absent end diastolic flow velocity (EDFV) ensure that the Doppler filter is at its lowest setting to ensure that any low levels of flow are detected.

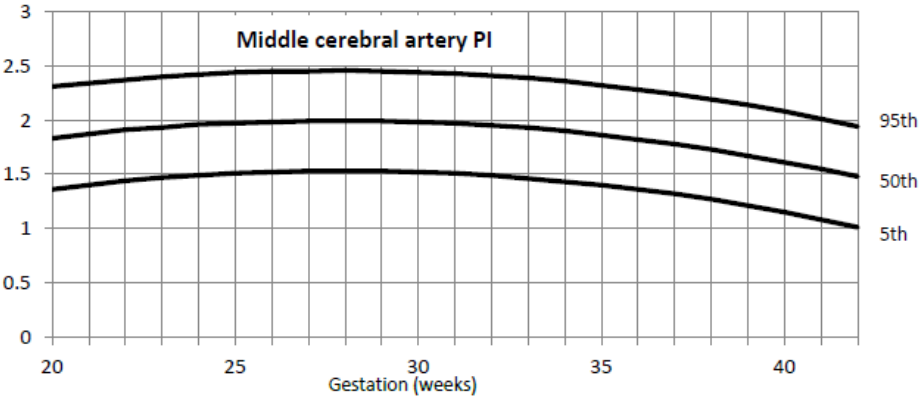
- Assess appearance of fetal stomach, kidneys and bladder.
- Check localisation of the placenta.
- Document scan findings in Badgernet .

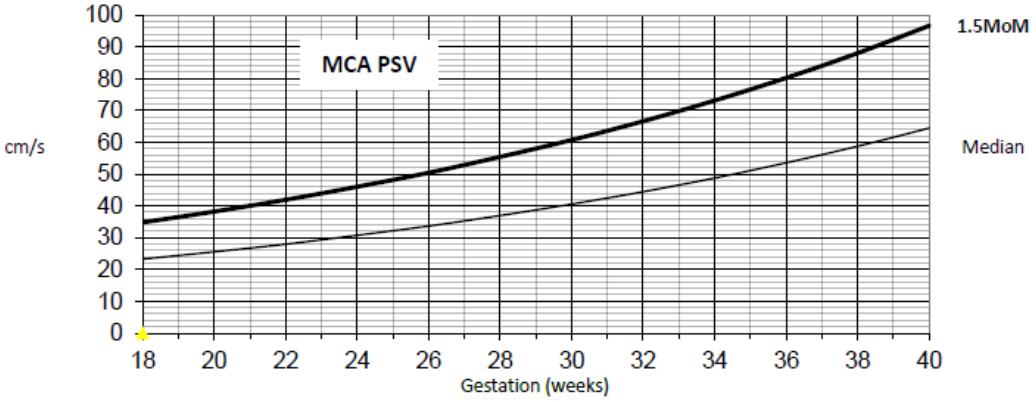
Name:

CHI no:

NHS Grampian







Management of Fetal Assessment scans

Normal Scan Findings

If measurements and EFW, liquor and Doppler recordings are within normal ranges please check scan management plan and arrange any future growth scans as per guidance outlined above.

Abnormal scan findings are defined as.

- Static growth with normal liquor and Doppler – refer to medical staff either in ANC or Westburn Ward or the consultant on duty at DGH within 3 working days.
- EFW less than or equal to the 10th centile (refer to SFD SOP 22 p48)
- EFW greater than the 90th centile : (Refer to LFD SOP 25 p53)
- DP of liquor <3cms (Refer to Liquor SOP 20)
- DP of liquor >10cms (Refer Liquor SOP 20)
- Doppler demonstrating absent or reversed end diastolic flow velocity, admit to Westburn ward and refer to on call medical staff the same day.
- If HC, FL or AC <5th centile at 24 or 28 weeks and amniotic fluid /Doppler are normal refer for medical scan in 1 week
- If HC, AC or FL <5th centile beyond 30 weeks but they have previously been in the normal range – continue with serial growth scans

22. MANAGEMENT OF SMALL FOR GESTATION PREGNANCIES

Definition
A SFD pregnancy is a pregnancy in which the EFW is ≤ 10th centile but >5th centile

Management
Pregnancies identified to be ≤ 10th centile should be managed by medical staff through the ANC.

(1) First growth scan identifies a baby SFD
Where the first growth scan identifies a SFD baby but the LV and Doppler are normal, it is likely that the baby is simply constitutionally small. In order to assess the growth velocity, in the absence of other risk factors such as significant APH, a repeat scan and clinic review should be booked in 14 days

(2) Growth tailing off through the centiles and crossing the 10th centile
Where the growth velocity is tailing off and then cross the 10th centile, this is highly indicative of a compromised baby that is growth restricted not simply small for dates. These pregnancies are much more concerning.

These pregnancies are at high risk of antenatal compromise and stillbirth and a senior ST6/7 or consultant should make a clear plan of management in Badgernet
If <36 weeks gestation, these ladies should be given antenatal steroids to promote fetal lung maturity. They should be seen twice weekly for a growth scan and medical review by an ST6/7 or Consultant at the ANC. At each visit the case should be reviewed to assess if delivery is indicated. If there are any additional risk factors such as unexplained APH, smoking substance misuse, delivery should be considered from 32 weeks onwards. Once the pregnancy is >36 weeks delivery should be planned and documented in Badgernet

23. MANAGEMENT OF SEVERE SMALL FOR GESTATIONAL AGE (SGA) PREGNANCIES

Definitions

Severe SGA: a baby with an EFW <5th centile for gestational age

Management of severe SGA pregnancies <23 weeks gestation

The case should be referred directly to one of the fetal medicine consultants (LMC, TF, SB, AS, PJD or GF in AMH or GC/NM in DGH) within 72 hours for further assessment and planning. This consultant will be the **lead for care** unless otherwise documented.

Conduct a full assessment of the fetus to identify if a structural fetal abnormality is present and document results fully

Umbilical artery Doppler should be assessed and the results documented

In pregnancies ≤24weeks gestation with severe SGA, and particularly if the uterine artery Doppler is normal, the incidence of chromosome abnormalities is up to 20%. Amniocentesis should therefore be offered.

Offer screening for CMV and Toxoplasmosis

The woman should be seen on a weekly basis until 23 weeks gestation. There is international consensus that 22+6 weeks should be considered the cut-off for human viability and therefore intervention in the fetal interest should not be considered prior to 23 weeks gestation.

Outcome	22-23 weeks	23-24 weeks	24-25 weeks	25-26 weeks
Signs of life at birth	100%	100%	100%	100%
Survived to discharge from hospital	1%	11%	26%	44%
Survived to 6 years	1%	10%	26%	43%
Survived at 6 years SEVERE DISABILITY	0.7%	2%	5%	6%
Survived at 6 years MODERATE DISABILITY	0%	4%	4%	8%

Survived at 6 years MILD DISABILITY	0.7%	2%	7%	12%
Survived at 6 years NO DISABILITY	0%	1%	3%	8%

At 23 weeks, the parents should have a formal meeting with the lead obstetric consultant and a consultant from the neonatal team. Using the information available at the time (ie gestational age, EFW, presence of abnormalities) the parents should be counselled on the likely survival and morbidity for this pregnancy as per EPIcure2 Cohort data. This meeting should be documented in the maternity care record, the figures quoted recorded, the parents wishes noted and the medical plan clearly outlined in the notes.

In the event that the parents wish everything possible done for the pregnancy, ante-natal steroids should be given at 24 weeks gestation with full recourse to caesarean section and resuscitation, if indicated.

Beyond 25 weeks gestation and with an EFW>600g the pregnancy is mature enough to initiate intensive care treatment as the majority of babies survive without major long term disability.

Infants born at the threshold of viability between 22+6 weeks and 25 weeks gestation have the greatest uncertainty and therefore documentation on discussions between parents and medical staff must clearly outline the plan of care

Management of severe SGA pregnancies >24 weeks gestation

- After 24 weeks gestation, the woman should be reviewed weekly for LV and Doppler assessments, as long as there is normal Umbilical Artery Doppler.
- Once the Umbilical artery Doppler end-diastolic flow is reduced (>95th centile), the woman should be seen twice weekly for UA Doppler and LV
- The Ductus Venosus (DV) Doppler should be obtained at each visit once the umbilical artery Doppler becomes abnormal
- As fetal growth restriction worsens, the DV a-wave is reduced, signalling acidaemia in the fetus, until the presence of reversed/retrograde a-waves signals the onset of cardiac compromise.

- Serial Doppler measurements should be recorded on the Doppler Recording sheets
- Decisions around admission and CTG is a medical decision by the team responsible on the day

Time of Delivery for severe SGA pregnancies

- In pregnancies >24 weeks and <28 weeks gestation, providing the EFW >500g, and antenatal steroids have been administered, delivery is recommended when the DV Doppler becomes abnormal or the UA Doppler is reversed.

24. SGA REFERRED FROM THE COMMUNITY (AS ASSESSED BY FUNDAL HEIGHTS ON CUSTOMISED GROWTH CHARTS)

- Women who are not on serial scan surveillance will be monitored in the community with serial symphysial fundal height measurements that will be plotted and monitored on the customised growth chart.
- Indications for a referral growth scan are:
    - First SFH measurement below 10th centile (ideally 26-28 weeks gestation)
    - Static growth (no increase in sequential measurements)
    - Slow growth (the curve linking plots on the growth chart noted to be crossing centiles in a downward direction)

- Women should be directly referred for an ultrasound scan within 72 hours of being seen (this means that they can be seen in any of the outreach scanning services, CMUs or Consultant Units). If there are no appointments available within this time frame the woman should be referred directly to the Day Assessment Unit or Westburn Ward (AMH) for review by medical staff or Ward 3 Dr Gray's (Elgin) for ultrasound scan then review by medical staff.

- At the time of ultrasound examination the fetal size, liquor volume and Umbilical artery Doppler will be assessed. If the fetal size is >10th centile, the woman should be reviewed by her community midwife in 3-4 weeks time. If the indications for a scan are met again at this appointment, she should be re-referred to assess the pattern of growth. There is no value in a repeat US assessment any sooner than 3 weeks after the initial scan referral unless bleeding, PET or additional pathology presents.

- If the fetal size is <10th centile or the sonographer has any other concerns, the woman will be sent directly to an obstetric antenatal clinic for medical review and a plan of management. If there is no ANC running locally, the woman will be referred to either the Day Assessment Unit / Westburn Ward (AMH) or Ward 3 Dr Gray's (Elgin) for further review and a plan of care by medical staff.

- Women on scan surveillance should not have their symphysial fundal height measured between scan appointments and should not be referred in for a growth scan between appointments. New concerns such as bleeding or reduced fetal movements would warrant an obstetric review but not a direct scan referral

25. LARGE FOR DATES PREGNANCIES

Definition: A pregnancy with a SFH measuring >90th centile on the customised growth chart

Ultrasound Assessment

- Women should have their SFH measured first between 26 and 28 weeks gestation. They should not be referred for a scan if the first plot is >90th centile unless there is a clinical suspicion of polyhydramnios
- Women who have excessive growth on serial SFH measurements (curve linking up plots on the customised chart is shown to cross centiles in an upward direction) or there is a clinical suspicion of polyhydramnios should be referred for a growth scan
- An ultrasound scan should be organised within 7 days via the ultrasound scan department
- Ultrasound scans can be performed from 24 weeks gestation
- For accurate assessment scans should not be repeated < two weeks from the previous scan
- Follow the instructions in **SOP 21** (Fetal assessment scan) for the scan parameters to be assessed

Management

If measurements are within normal range, 10th – ≤90th centile:

- Refer back to community midwife

If EFW is > the 90th centile and the woman is ≤ 35 weeks gestation:

Arrange an OGTT (oral glucose tolerance test) within 7 days. Also arrange a repeat growth scan and antenatal clinic review for three - four weeks' time

.**Liquor Volume DP >10cms and the woman is ≤ 35 weeks gestation**

- Arrange an OGTT within 7 days and arrange a repeat scan and medical review in 14 days.

If EFW is > the 90th centile or the DP is >10cms and the woman is > 35 weeks gestation

- There is no indication for an OGTT unless there has been a sudden acceleration of growth or liquor

- Arrange repeat growth scan and ANC review for 39 weeks or refer to medical staff within 72hours if already 38-39 weeks gestation

26. WOMEN ATTENDING FOR ROUTINE POST-DATES ULTRASOUND ASSESSMENT

Women who choose to await the onset of labour past Term (T) +7 or decline induction of labour (IOL) at T+7 or where there is no capacity to accommodate the IOL, are advised to have an ultrasound scan to assess fetal well-being between T+4 and T+8 days

ASSESSMENT OF LIQUOR VOLUME : SINGLE DEEPEST POOL

The uterus should be scanned in a perpendicular plane to the maternal spine and the single deepest pool of amniotic fluid (AF) identified. The deepest pool measurement should be recorded. A measurement of >3cms or 30mm should be recorded as normal. A measurement of ≤30mm or 3cms is out with the normal range and a plan of care should be made either directly by medical staff or via telephone discussion with the on-call consultant or senior bleep holder (2524).

ASSESSMENT OF UMBILICAL ARTERY DOPPLER

Recordings should be obtained during absence of fetal breathing and body movements. Color flow mapping is not mandatory, although it is very helpful in the identification of the vessel of interest and in defining the direction of blood flow. For the assessment of fetal wellbeing in routine post date assessment, end diastolic flow velocity (EDFV) in the umbilical artery should be visually assessed and recorded as present, reduced or absent. Pregnancies with Reduced or Absent EDFV should be referred directly to medical staff for review and a plan of care.

ASSESSMENT OF FETAL WEIGHT

As assessment of fetal weight in the term pregnancy is fraught with error, there is NO indication to assess fetal size unless there is a clinical indication (e.g. fundal height reduced or exceptionally large). Any assessment of fetal weight in the post dates pregnancy must be used with caution due to the recognised margins of error for all fetal measurements at this stage of pregnancy.

27. PRESENTATION SCAN

Indication

1. Direct referrals from 36 weeks gestation for suspected malpresentation Direct referrals to the ultrasound department from community midwives, GP's or any hospital area for suspected malpresentation following abdominal palpation from 36 weeks gestation.

2. **Patients identified to have breech presentation at the time of a routine scan ≥32 weeks gestation, should have a rescan booked at 36 weeks gestation to establish presentation and allow adequate time to decide mode of delivery if the baby remains breech at 36 weeks**

Ultrasound Assessment

Identify and document the following

- Fetal lie
- Fetal presentation
- Location of placenta
- Liquor volumes using DP measurement
- Fetal AC, HC and FL then plot EFW on customised growth chart and follow guidelines as per SOP16

Ongoing Management

1. Cephalic Presentation

The woman should return to community care if on the green pathway or continue with her care plan as per the clinical area.

2. Breech Presentation

The woman should be referred to medical staff either in the ANC or Westburn Ward within 72 hours to discuss her ongoing options namely ECV if not contraindicated or elective CS. If she is clear that she wishes an ECV please book

The woman should be given the "Hip screening for babies in breech presentation" form and the woman's electronic record updated to "POSTNATAL HIP ULTRASOUND" in the Antenatal Management Plan to ensure that it is clear that the baby needs to be referred following delivery.

3. Transverse Lie/Oblique Lie

The woman should be referred to the ANC or Westburn ward within 24 hours if > 38 weeks gestation and within 7 days if <38 weeks to discuss her ongoing management plan

28. EXTERNAL CEPHALIC VERSION (ECV)

ECV is the manipulation of the fetus, through the maternal abdomen, to a cephalic presentation. Breech presentation complicates 3-4% of term deliveries and is more common in nulliparous women and in preterm deliveries (RCOG 2017). ECV is successful for about half of all women (50%).

Absolute Contraindications:

- Where Caesarean delivery is indicated (e.g. Placenta praevia)
- Antepartum haemorrhage within last 7 days
- Abnormal CTG
- Severe pre-eclampsia
- Abnormal fetal doppler
- Major uterine anomaly
- Amniotic fluid abnormalities (e.g. ruptured membranes/oligohydramnios)
- Multiple pregnancy (except after delivery of first twin)

On the day of the ECV:

- Consent should be obtained for the procedure and documented in Badgernet
- Abdominal examination should be performed by dayward Midwife. If any query as to presentation then USS to be performed to confirm presentation.
- Maternal observations (BP, T, P, RR) should be carried out and the fetal heart should be monitored on a Cardiotocograph (CTG) for at least 20 minutes prior to the ECV and be classified as normal before proceeding.
- Tocolysis should be offered to women undergoing ECV as it has been shown to increase the success rate (RCOG 2017). Terbutaline 250mcg S/C should be prescribed and administered prior to commencing the procedure.

Post procedure:

- Maternal observations should be carried out and the fetal heart should be monitored on a Cardiotocograph (CTG) for at least 20 minutes following the ECV and be classified as normal before discontinuing.
- Note maternal blood group and administer prophylactic Anti-D 500iu if the maternal blood group is Rhesus negative

If ECV is successful

- Arrange follow up care with CMW, for antenatal check including abdominal examination to ensure fetal position remains cephalic

If ECV is unsuccessful

Unless Consultant/Woman wishes and timing allows further attempt;

- Book elective caesarean section on OPERA for 39 weeks gestation onwards
- Arrange pre-section assessment clinic appointment for Friday before caesarean section date
- Ensure woman is aware that should she start contracting or have spontaneous rupture of membranes, to contact Westburn ward as soon as possible and advise of breech presentation.

Further care:

Instruct the woman to phone or return to the hospital if any of the following occur:

- Vaginal bleeding/APH
- Rupture of membranes
- Commencement of labour
- Change in pattern or decreased fetal movements
- Abnormal abdominal pain

NB: If breech presentation after 35 weeks gestation, regardless of ECV outcome, a task should be created in the maternal notes on Badgernet to arrange a postnatal hip USS for baby.

References:

IMPEY, L., et al., 2017. On behalf of the Royal College of Obstetricians and Gynaecologists. *External Cephalic Version and Reducing the Incidence of Term Breech Presentation.* BJOG 2017; 124, pp 178-192.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS (RCOG). 2008. *Turning a breech baby in the womb (external cephalic version). Information for you* [online]. RCOG [viewed 31 January 2018]. Available from: https://www.rcog.org.uk/en/patients/patient-leaflets/turning-a-breech-baby-in-the-womb/

29. TWIN PREGNANCIES

Booking (all cases):	• Dating scan for diagnosis; **determination of chorionicity**. • if chorionicity uncertain or higher order multiple – refer to AMH **as soon as possible**; if remains uncertain manage as monochorionic • *offer* nuchal screening for Down's syndrome (**Protocol 8)** • If patient declines NT screen, book first twin clinic appointment as detailed below, according to chorionicity/higher multiple). • Give **low dose aspirin** (75mg daily) unless patient allergic to aspirin

Thereafter:

Monochorionic:	• **16 weeks - first twin clinic visit**. • scans **fortnightly** from 16 weeks • If any suspicion of TTTS (perinatal mortality >80%) – refer to twin clinic or Dr Shetty/Dr Danielian/Dr Maclean *as soon as possible*. Scan at least weekly. • Offer delivery and give steroids at 36+0 weeks; if declined, weekly appointments until delivery.

Dichorionic:	• **20 weeks** - detailed anomaly scan + **first twin clinic visit**. • scans (AC, AFV) at 24 weeks, then 4-weekly to 32 weeks, and 2-weekly till 36 weeks. • Offer delivery at 37+0 weeks; if declined, weekly appointments until delivery

Triplets or higher:	• **Refer to twin clinic ASAP** (to discuss reduction) • scans 2-weekly • Offer delivery and give steroids at 35+0 weeks; if declined, weekly appointments until delivery

Note:

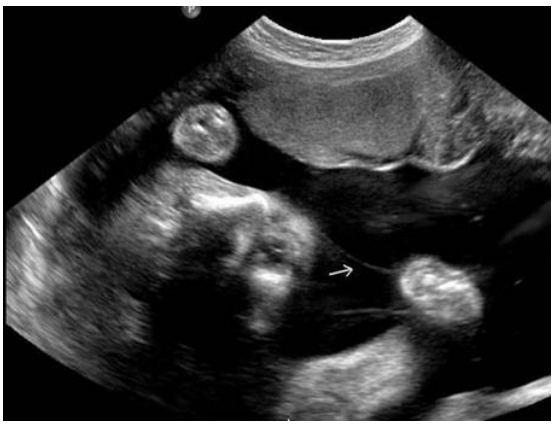
This is a general guide; if problems develop then more frequent or earlier visits may be indicated, and earlier delivery may be necessary.
Patients who live distant from AMH with dichorionic twins may be scanned and seen in peripheral clinics, with referral if problems are encountered.

Recognising Twin-Twin Transfusion Syndrome (TTTS)

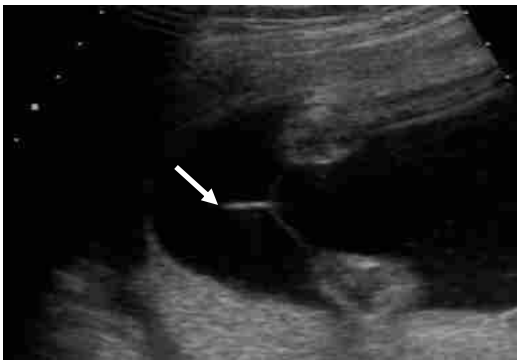
- Discordant fetal size – especially AC
- Discordant amniotic fluid volume – membrane folding, stuck twin (see below)
- Absent bladder

Membrane folding:

In this picture the membrane (arrowed) can be seen "folded" around the limbs of the donor twin



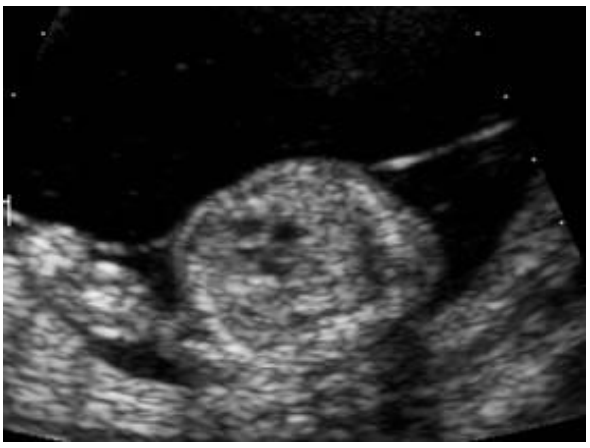
In this picture, because the membrane is now too long to enclose the severe oligohydramnios, it becomes folded to itself and can be seen as the thicker line (arrowed)



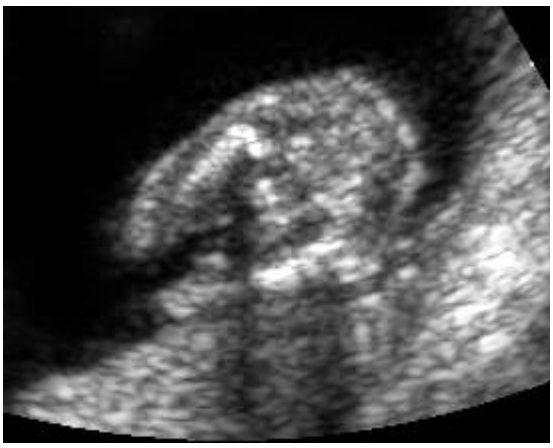
"Stuck twin"

As the donor twin AF becomes reduced, the twin becomes "stuck" to the wall of the uterus and cannot move away. If any twin is seen next to the uterine wall and does not move away, then assume it is a stuck twin and refer immediately for consultant review. If there is no amniotic fluid it may be impossible to see the dividing membrane which is adherent to the fetus (see B below) and mistakenly thought to be plentiful AF – wait and see if baby moves away from uterine wall.

A. Stuck twin –membrane still visible



B. Stuck twin – no visible membrane



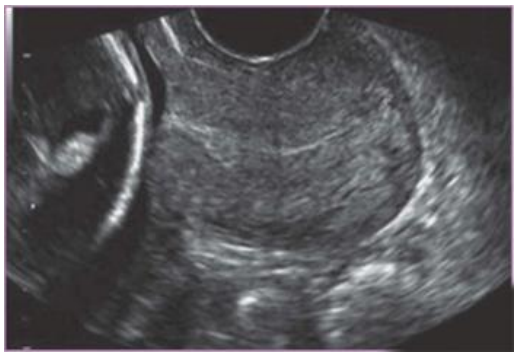
30. MEASUREMENT OF CERVICAL LENGTH

Indications

- Women with a cervical suture in situ
- Women with suspected cervical incompetence
- Women with ≥ x2 LLETZ procedure (and no term deliveries since) (or cone biopsy for early stage cervical cancer
- Women with a previous mid-trimester loss of uncertain aetiology

Technique

- All assessments of cervical length should be done by Transvaginal Ultrasound and ideally should be done in the main department in AMH
- Cervical length assessments in women with ≥ x2 LLETZ should be at 20-22 weeks gestation, or at the time of the anomaly scan.
- Assessments to identify suspected cervical incompetence should begin at 18-20 weeks gestation unless indicated by the clinical history
- The cervix should be identified and the image zoomed to fill the screen
- The cervical canal should be clearly seen to ensure that a true cervical length is measured
- At times fluid may be seen within the cervical canal – this is NOT an abnormal finding
- The cervical length should be measured and an image of the measurement attached to the scan card and the report recorded in Badgernet. Ideally the measurement should be a single line but where the cervical canal is curved 2 separate measurements may be taken and added together or a trace measurement used



Management of results

- If the cervical length is >30 mm no follow up is required

- If the cervical length measurement is around 25-30 mm please refer to medical staff within 72 hours for a repeat TV scan
- If cervical length measurement is ≤25mm refer to on call medical staff the same day

31. ASSESSMENT OF FETAL ANAEMIA BY MCA

In the majority of cases the underlying problem will already have been identified and the patient will be being managed by the fetal medicine team. **Fetal anaemia** is uncommon, and can result from many different causes:

- **fetal haemolysis** (or marrow-suppression) by antibodies (iso-immunisation): usually Anti D (Rhesus), c, K, etc but any possible
- **fetal infections**: typically parvovirus B19, but other viral illness (TORCH etc) possible
- **(major) fetal haemorrhage**: e.g. after major trauma, invasive medical procedures, but occasional idiopathic feto-maternal haemorrhage
- **haematopoetic abnormalities:** e.g. α-thalassaemia
- **genetic syndromes**: e.g. Fanconi anaemia
- **fetal tumours**: if large amount of fetal blood sequestered in tumour mass: e.g. placenta/cord chorioangioma, sacrococcygeal teratoma

Ultrasound findings:

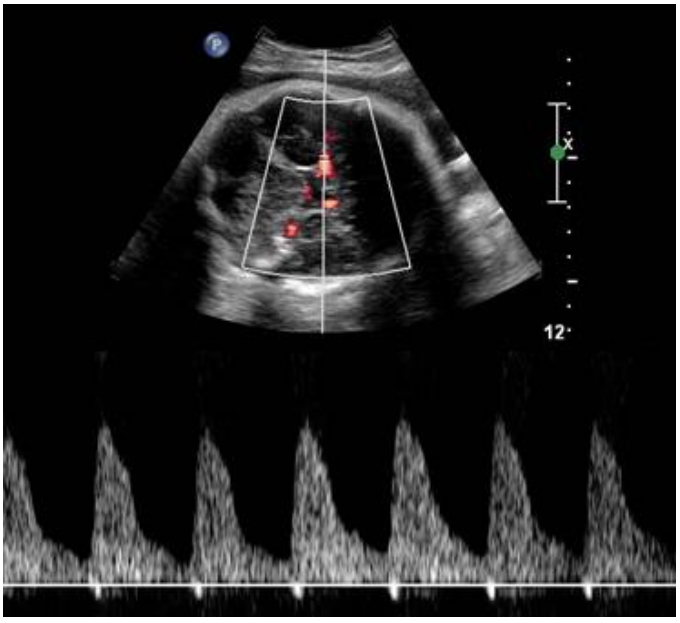
- (If mild, may be no signs visible)
- Lack of **fetal movements**
- Hepato/spleno-megaly
- Subcuticular edema – esp. scalp/abdomen
- Ascites, hydrothorax, pericardial effusion → hydrops
- Increased peak systolic velocity (PSV) on middle cerebral artery (MCA) doppler
- Remember UA Doppler may show *increased* EDF because the fetus has hyperdynamic circulation to compensate for anaemia in early stages - so not helpful in diagnosis.

Action:

- If fetal anaemia suspected – check with patient re possible causes – viral infections, bleeding, trauma, known antibodies etc.

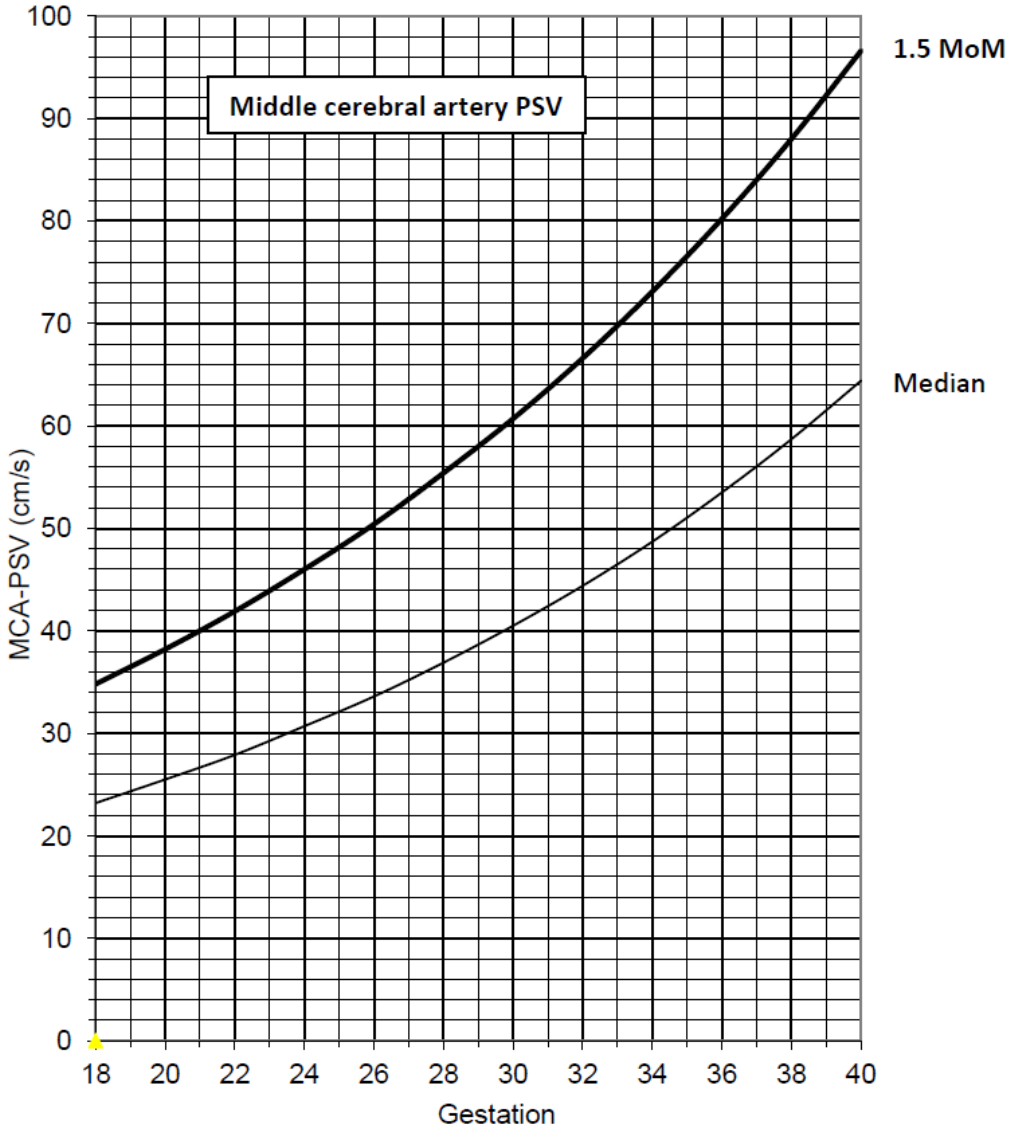
- Check fetal/placental/cord anatomy to exclude obvious tumours, calcification of liver/spleen/brain
- Refer to AMH/DGH *immediately* for CTG (if over 24 weeks) (including out of hours) and to fetal medicine team for confirmation / investigation
- Measure MCA peak systolic velocity and record on relevant (Mari et al) chart as follows :

    - Obtain a transverse section of the fetal head at the level of the basal cisterns
    - Apply colour Doppler to highlight the Circle of Willis
    - The middle cerebral artery is the middle branch of the Circle of Willis that course anteriorly and temporarily
    - Magnify the image to occupy 75% of the screen
    - Align the vessel parallel to the ultrasound beam, as close to 0^0 as possible (angle of insonation can be corrected once an image is obtained)
    - Measure near the vessel close to the exit point of the internal carotid
    - Avoid measuring during fetal breathing, hiccups, or movements



A transverse section of the fetal head illustrating the MCA and a normal MCA waveform.

The MCA PSV should be plotted on the Mari chart and if the results are close to or cross the action line (>2MOM) the case should be discussed with a fetal medicine consultant in Aberdeen or discussed with the Fetal Medicine Team in the Queen Elizabeth University Hospital and a plan of care confirmed.



MARI chart for MCA PSV to assess risk of fetal anaemia

32. MICROCEPHALY

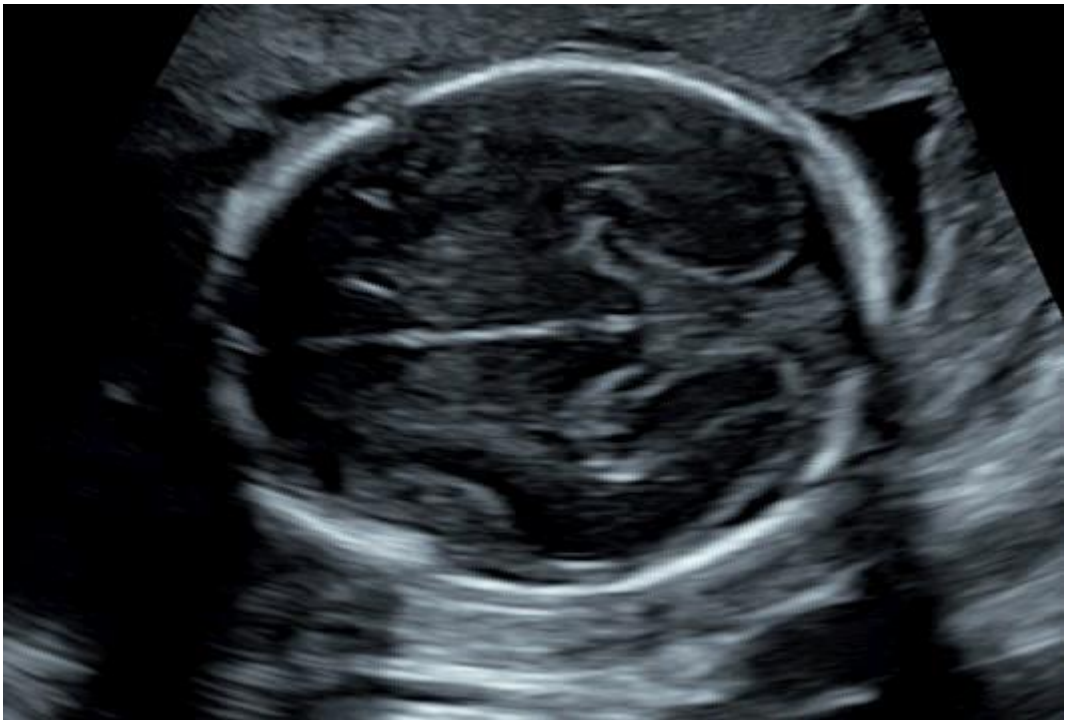
Definition : Head circumference ≤3 standard deviations below the mean for Gestation. (if HC ≤5th centile on Badgernet, plot HC on the HC SD chart)

Frequency : 0.1% of population

Diagnosis

- Measure the head circumference by obtaining a cross sectional view of the fetal head at the level of the lateral ventricles with the midline echo as close to horizontal as possible. The following landmarks should be clearly seen:
  - Rugby shaped skull
  - Centrally positioned, continuous midline echo broken at one third of its length by the cavum septum pellucidum
  - Anterior walls of the lateral ventricles centrally placed around the midline
  - Choroid plexus visible within the posterior horn of the ventricle in the distal hemisphere
- Ensure images are stored at each scan assessment illustrating the HC measurement
- Often microcephaly is not evident until the third trimester

Correct section for a HC measurement

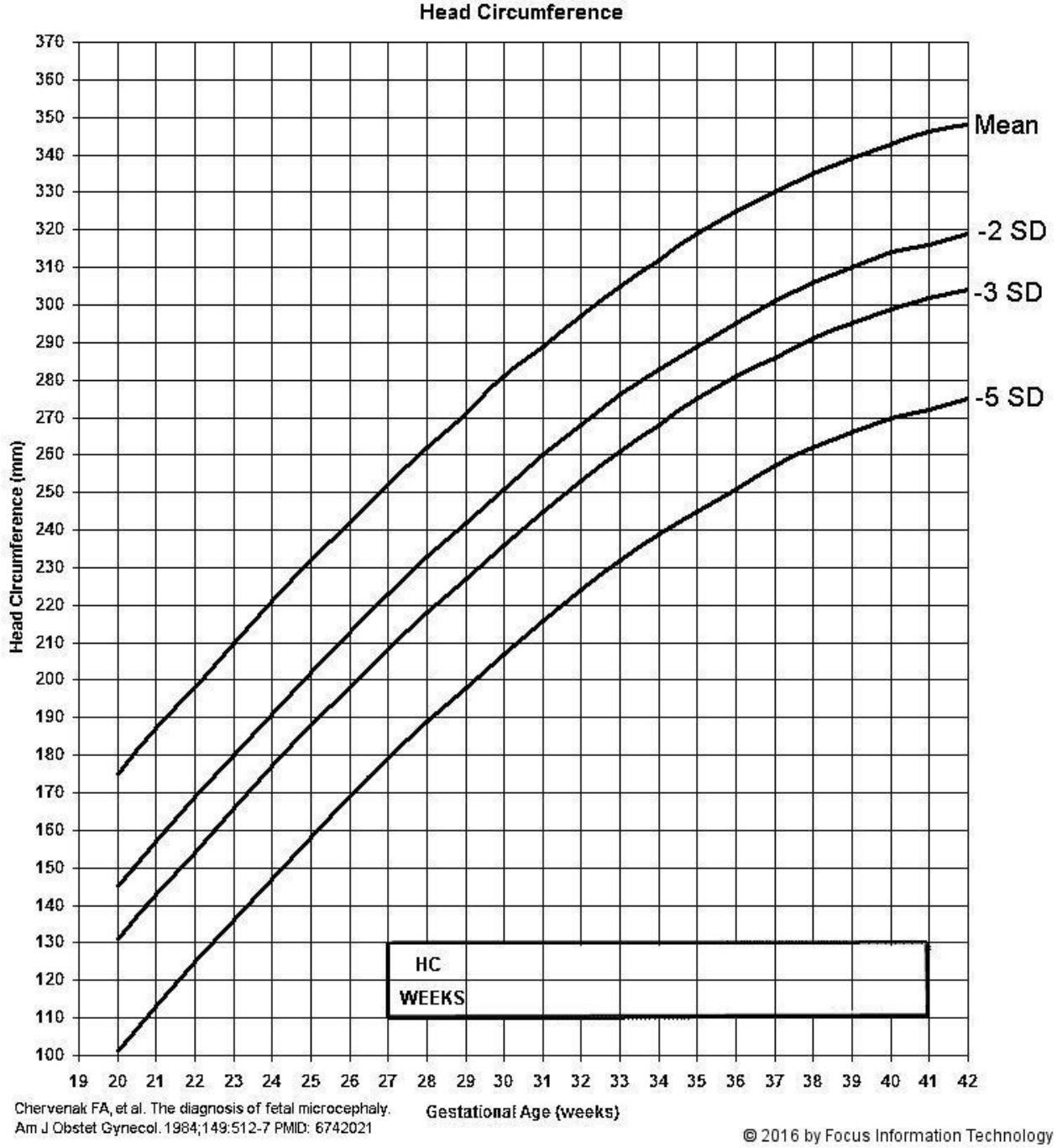


Initial Management:

- Complete structural anomaly scan including HC/AC/FL measurements
- Refer to fetal medicine consultant for review within 72hours depending on availability of medical staff

Table 2: Head circumference (mm) throughout gestation					
weeks	mean	mean-2SD	mean-3SD	mean-4SD	mean-5SD
16	126	96	82	67	52
17	138	109	94	80	65
18	151	121	107	92	77
19	163	133	119	104	89
20	175	145	131	116	101
21	187	157	143	128	113
22	198	169	154	140	125
23	210	180	166	151	136
24	221	191	177	162	147
25	232	202	188	173	158
26	242	213	198	183	169
27	252	223	208	194	179

Jeanty P, Cousaert E, Hobbins JC, Tack B, Bracken M, Cantraine F. A longitudinal study of fetal head biometry. *Am J Perinatol* 1984; **1**: 118–128.


Head Circumference
Mean
-2 SD
-3 SD
-5 SD
HC
WEEKS
Head Circumference (mm)
Gestational Age (weeks)
370
360
350
340
330
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
Chervenak FA, et al. The diagnosis of fetal microcephaly. Am J Obstet Gynecol. 1984;149:512-7 PMID: 6742021
© 2016 by Focus Information Technology

Associations:

- Primary microcephaly
- Chromosomal disorders : consider Trisomy 21, 13, 18, 22
- Single gene disorders : consider Meckel-Gruber syndrome, lissencephaly syndrome and many others
- Infection : Consider cytomegalovirus, rubella, herpes, toxoplasma, Zikka
- Other cranial abnormalities eg holoprosencephaly, neural tube defects
- Maternal alcohol use
- Maternal phenylketonuria

Counselling and Management :

- Full structural scan and repeat growth measurements by fetal medicine consultant
- Discuss with woman the above possible causes depending on anomaly survey
- Offer TORCH screen and amniocentesis including micro-array testing
- Offer Fetal MRI to exclude other brain abnormalities
- A HC of 2 SD below mean will include 5% of the normal population and it is therefore difficult to accurately predict outcome unless there are other structural abnormalities seen on MRI
- Once HC <1st centile (3SD below normal), less than 1% of the normal population will fall in this category, and the prognosis is poor in terms of learning difficulties and slow development.
- Arrange review by neonatology consultant
- Serial growth scans from 24 weeks
- Ensure appropriate images are recorded at each visit
- The frequency of review will be determined by the scan findings at the discretion of the consultant. Women booked in Elgin should be referred for delivery in AMH
- Some of the fetuses will be globally small and may be managed more appropriately by the ‘small for gestational age’ guideline (**SOP 22 p48)**
- Dictate letter to inform NNU/GP/CMW

References:

NHS Fetal Anomaly Screening Programme; www.fetalanomaly.screening.nhs.uk

Der Hollander NS, Wessels MW, Los FJ, Ursem NTC, Niermejer MF, Wladimiroff JW. Congenital microcephaly detected by prenatal ultrasound: genetic aspects and clinical significance. Ultrasound Obstet Gynecol 2000; 15: 282-287.

Malinger G, Lev D, Lerman-Sagie T. Assessment of fetal intracranial pathologies first demonstrated late in pregnancy: cell proliferation disorders. Repro Biol and Endocrin 2003;1: 110

Chervenal FA et al. The diagnosis of fetal Microcephaly. Am J Obstet & Gynaecol 1984: 149;512-517

Jeanty P, Cousaert E, Hobbins JC, Tack B, Bracken M, Cantraine F. A longitudinal study of fetal head biometry. *Am J Perinatol* 1984; **1**: 118–128.

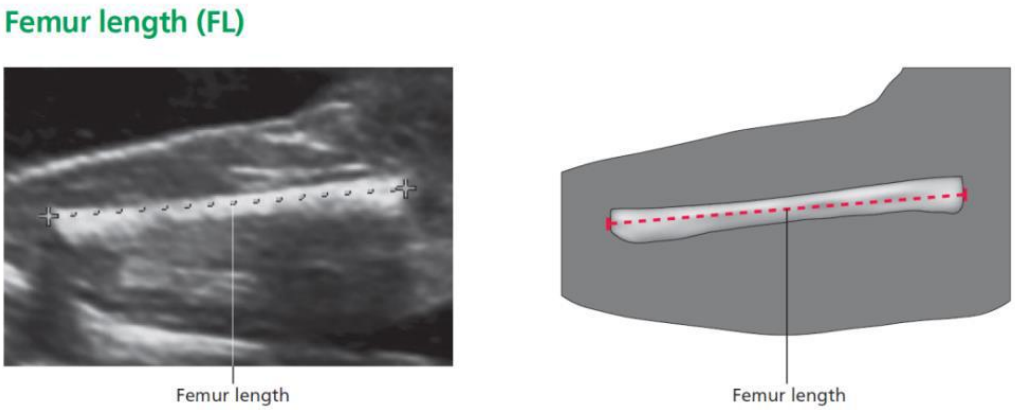
33. ISOLATED SHORT FEMUR

Definition: femur length <5th centile a second trimester ultrasound (18-24 weeks) in a fetus that has abdominal and head circumference >5th centile **and** no other structural abnormalities picked up on detailed ultrasound scan. Pregnancies identified with a short femur from 28 weeks onwards who previously had a normal sized femur are NOT included in this group and should be managed as outlined in SOP

Frequency: 0.3% of population

Method of diagnosis:

- Visualise the femur in a horizontal plane such that the angle of isonation is 90^0
- Measure the full length of the bone, taking care to ensure the ends are not obscured by shadowing
- One measurement is sufficient if the image is of good quality



Initial Management:

- Complete structural anomaly scan including HC/AC measurements
- Refer to medical consultant in scan within 5 working days depending on availability of medical staff

Associations:

- Small for gestational age/low birth weight neonates
- Preterm birth
- Abnormal umbilical artery Doppler indices
- Pre-eclampsia

- Intrauterine death
- Short limb dwarfism
- Chromosome disorders such as Trisomy 21 may present with an isolated short femur at a 20 week anomaly scan and therefore amniocentesis should be offered

Counselling and Management –

- Full structural scan and repeat growth measurements by consultant
- If other structural abnormalities are identified, care should be individualised depending on the range of problems detected as per protocols
- If global growth restriction is identified, care should follow the 'small for gestational age' guideline (**SOP 21 p44**)
- Discuss with the patient the above possible causes for an isolated short femur
- Serial growth scans from 24 weeks
- The frequency will be determined by the scan findings at the discretion of the consultant.

References:

NHS Fetal Anomaly Screening Programme; www.fetalanomaly.screening.nhs.uk
Papageorghiou AT, Fratelli N, Leslie K, Bhide A, Thilaganathan B. Outcome for fetuses with antenatally diagnosed short femur. Ultrasound Obstet Gynecol 2008; 31: 507-511.
Ventura W, Huaman J, Nazario CE, Ingar J, Huertas E, Antonio Limay O. Perinatal outcomes after sonographic detection of isolated short femur in the second trimester. J Clin Ultrasound 2012; 40(2): 63-6**7**

34. ISOLATED MILD CEREBRAL VENTRICULOMEGALY

Definition

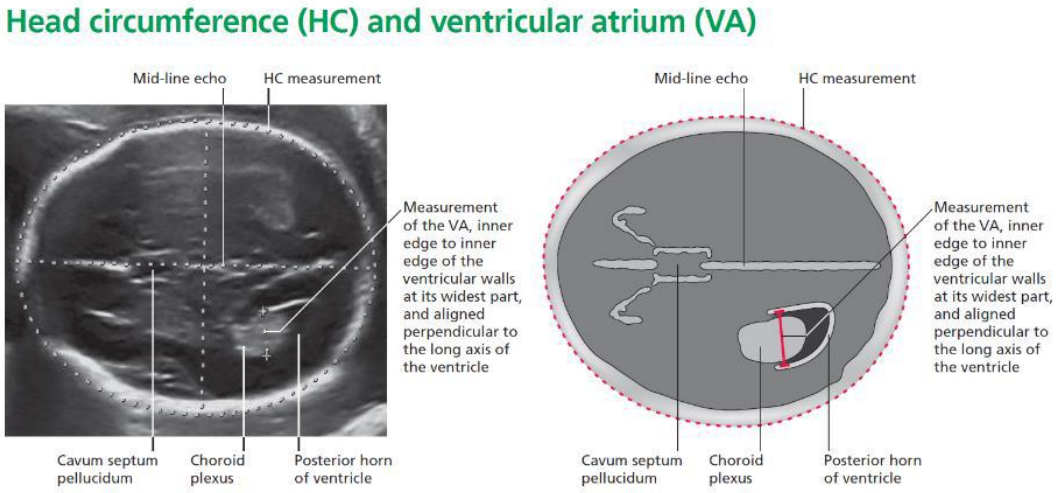
Mild cerebral ventriculomegaly is when the posterior horn of the lateral ventricles of the fetal brain measure 10.1 to 15mm **at the 20 week detailed** scan. If the posterior horn of the lateral ventricle measures >15 mm, this is defined as severe ventriculomegaly. Unless obviously dilated during a routine scan, the lateral ventricles should not be measured out with the routine 20 week anomaly scan

Incidence

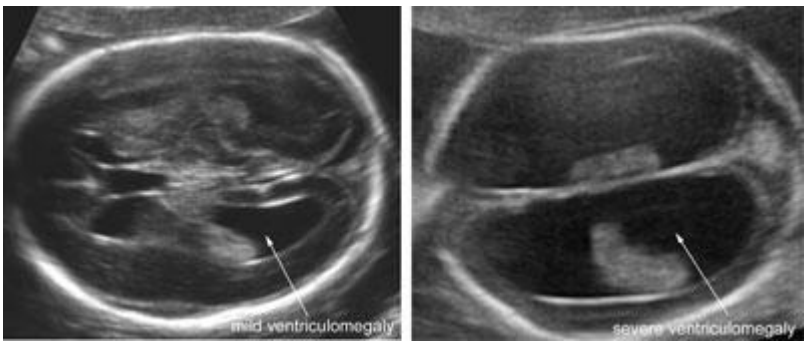
Mild cerebral ventriculomegaly is seen in fewer than 1% of pregnancies.

Diagnosis

- A cross-sectional view of the fetal head should be obtained at the level of the ventricles, with the mid-line in a horizontal plane.



- Fetal ventriculomegaly is defined as a lateral ventricular diameter measuring greater than 10 mm at the level of the atria on an axial plane at any point during gestation.
- Efforts should be made to visualise both ventricles and determine if the ventriculomegaly is unilateral or bilateral



Management

The majority of fetuses with mild cerebral ventriculomegaly are normal. Mild ventriculomegaly may be isolated and non-progressive.

- Document findings on scan sheet
- Ensure relevant images are recorded and attached to scan sheet
- Discuss with patient the ultrasound findings and offer information leaflet
- It can be associated with one or more of the following conditions

    - abnormal cerebral development
    - neural tube defect such as spina bifida
    - congenital infection
    - underlying chromosomal or genetic condition

- The woman should be referred for a medical review within 5 working days
- A TORCH screen should be offered
- Amniocentesis should be offered
- The woman should be offered another appointment 2-4 weeks after the initial diagnosis to measure the atrial width. Those that increase in size within a short time period have a poorer neonatal outcome
- If the atrial width remains stable, an MRI scan should be booked around 28 weeks gestation and the patient given a return appointment for review.
- If brain abnormalities are identified on the fetal MRI and/or the lateral atrial width is enlarged, the woman should have a joint meeting with the neonatal and obstetric team to discuss long term implications.
- The findings should be clearly documented in Badgernet and a relevant letter completed for both the GP and NNU.

References

NHS Fetal Anomaly Screening Programme (2012) Information for health professionals - Isolated mild cerebral ventriculomegaly

Magnetic Resonance Volumetric Assessments of Brains in Fetuses With Ventriculomegaly Correlated to Outcomes (2011) Danielle B. Pier, et al, Journal of Ultrasound in Medicine, vol. 30 no. 5, 595-603
http://www.jultrasoundmed.org/content/30/5/595.full

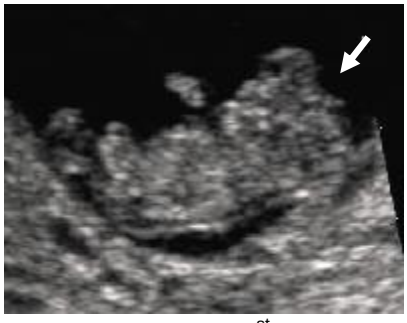
D'Addario V, Rossi A. Mild Fetal Ventriculomegaly : Diagnostic work-up and Management. Donald School Journal of Ultrasound in Obs & Gynaecol. April –June 2011:5(2) 119-12

35. ANENCEPHALY

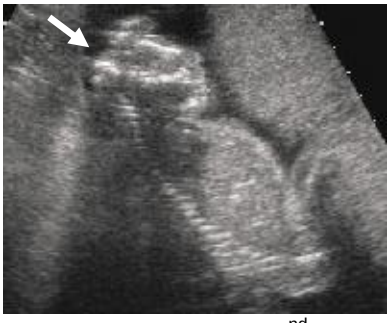
Definition:
Absence of the fetal skull bones.

Diagnosis:

- The sonographer is unable to get a satisfactory HC measurement due to incomplete/missing cranial bones.
- Brain tissue may be seen but it is often herniated.
- The CRL and HC will be small for gestational age compared to the FL.
- There is often a 'frog like' appearance of the face
- Increased liquor volumes may be present, even in the first trimester.



Absence of fetal vault 1st Trimester



Absence of fetal vault 2nd Trimester

Management

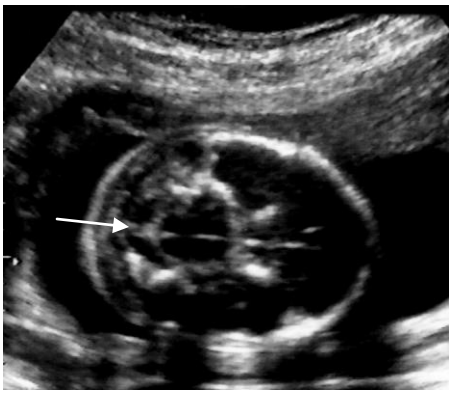
- If Anencephaly suspected, refer to a member of Medical staff for repeat scan and confirmation. If no medical staff are available at the time, book for the next available medical scan list, within 72 hours.
- Record and print images for CRL, FL and HC
- Once diagnosis confirmed, discuss in full with woman +/- partner, outlining that the condition is incompatible with life.
- Counsel regarding the options for the pregnancy : TOP or to await events
- If woman wishes TOP, refer to Rubislaw ward for ongoing care. Complete Green and Yellow TOP form.
- If after counselling, woman wishes to continue with pregnancy, ask 2nd on call Neonatal consultant to meet with patient to discuss palliative care. Options of organ donation are available in some circumstances and should be explored if the couple wish to consider

- There is no indication for serial growth scans, however IUD is common and you may wish to organize periodic viability scans.

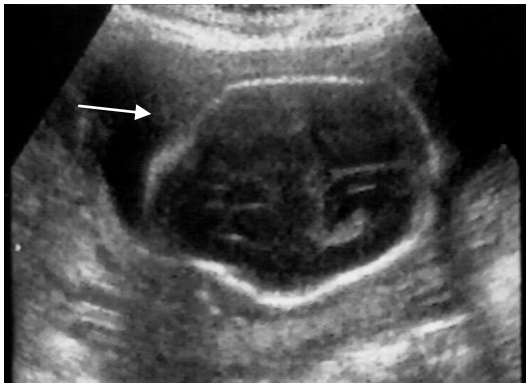
36. SPINA BIFIDA

Definition
Failure of the neural tube to close completely at any level of the spinal cord

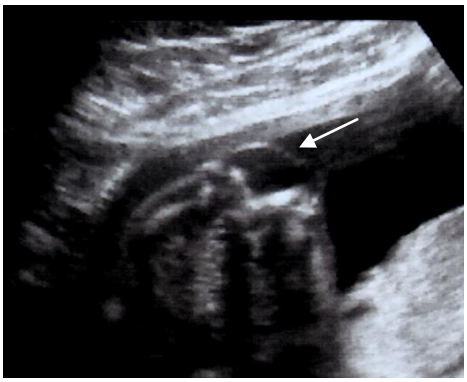
Diagnosis
- The fetal spine should be visualized in 3 planes, lateral, longitudinal and transverse.
- On a transverse section of the spine the ossification centres of the spine appear disrupted +/-tissue/ sac protruding through
- A compressed cerebellum (banana's sign),
- Absent cisterna magna
- Hydrocephalus.
- Lemon shaped skull



A compressed cerebellum



Lemon shaped skull



Transverse section of fetal spine demonstrating splaying of the fetal vertebral bodies and a meningocoele (arrow)

Management

- Refer to a member of Medical staff for a repeat scan and confirmation. If no medical staff are available at the time, book for the next available medical scan list within 72 hours.
- Confirm diagnosis
- Record the number and level of vertebrae affected
- Perform a full anatomy survey to look for any other abnormalities. All abnormal features should be documented and representative images stored and printed off.
- If other abnormalities are present, offer amniocentesis.
- Discuss findings with patient +/- partner, including implications for pregnancy and childhood.
- Offer woman the patient information leaflet on Spina Bifida
- Discuss options of care with parents, either to continue with the pregnancy or termination of the pregnancy (TOP) or the possibility of fetal surgery if applicable (UCLH –pages 76 for inclusion criteria).
- For queries, more information or to refer patients please contact
- UCLH.FMUmidwife@nhs.net or a.sacco@nhs.net**.**
- http://www.ucl.ac.uk/womens-health/research/maternal-fetal-medicine/centre-for-prenatal-therapy
- If continuing with pregnancy or unsure how to proceed, arrange review with 2nd on call neonatal consultant and Pediatric Surgeon (Mr C Driver), to discuss implications and treatment once delivered in more detail.
- If continues with pregnancy arrange serial growth scans for third trimester. Discuss mode of delivery and ensure patient is aware that delivery will be at AMH.
- If parents opt for TOP, call Rubislaw ward for suitable time to attend for Mifepristone. Complete Green and Yellow TOP forms
- Document the discussions and the parents decision in the Badgernet Record
- Dictate letter to GP and neonatal team

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Information for Fetal Medicine Doctors Considering Referral for Fetal Repair of MMC – FAQs

Inclusion Criteria (as per MOMs criteria[1])

- Maternal age ≥18 years
- Gestational age <26+0 weeks' gestation
- Normal genetic testing (conventional karyotype and microarray)
- Spinal lesion T1-S1
- Confirmed Chiari type II malformation on prenatal ultrasound and magnetic resonance imaging (UCLH will perform MRI if not already done so)

Exclusion Criteria (as per MOMs criteria[1])

- Multiple pregnancy
- Poorly controlled insulin-dependent pre-existing diabetes
- Additional fetal anomalies unrelated to MMC
- Fetal kyphosis ≥30 degrees
- History of incompetent cervix and/or short cervix <20mm by ultrasound scan in index pregnancy
- Placenta praevia
- Other serious maternal medical conditions
- Obesity defined by body mass index of ≥40
- Previous spontaneous singleton delivery <37wks' gestation
- Maternal–fetal Rh iso-immunization
- Positive maternal human immunodeficiency virus or hepatitis B or known hepatitis C positivity
- Uterine anomalies and previous uterine surgery other than lower segment caesarean section
- Psychosocial limitations

Optimal Timing for Referral

Initial notification of a case from 20 weeks onwards is helpful to provide sufficient time to counsel families and to plan the assessment and surgery. If planned in advance we may be able to provide a single visit to London for the whole assessment (fetal ultrasound, fetal MRI if needed and counselling from fetal surgery team).

Optimal Timing for Surgery

23+0 to 25+6 weeks, as earlier surgery is associated with increased risks of chorioamniotic membrane separation/ PPROM, and outcomes from later surgeries have not been shown to be as good.

Prenatal assessment at the referring centre and at UCLH:

- Referral PowerPoint form: to facilitate referrals and prevent needless travel of patients who are unsuitable, we have made a PowerPoint referral template, which we request you to fill out and return.
- Counselling: Please document all counselling that has been performed locally (e.g. paediatric neurologist, neurosurgeon, neonatologist etc.) and forward them to us, or give them to the patient in her handheld notes to bring to UCLH.
- Initial patient discussion: we will call the patient initially to briefly explain the surgery and the process of further review at UCLH to assess if they are suitable; we will emphasise that it is their choice whether to proceed at all points and we have written a patient information leaflet which we will signpost them to if they do not already have it.

- First assessment at UCLH: we will do a complete independent assessment including ultrasound, MRI and fetal medicine consultation. When proceeding to surgery there is an anaesthetic consultation as well.
- Time point: patients can be assessed either at a time point remote from the ideal surgery time point, or in the days before the surgery would be planned. That is dependent on patient preferences and practicalities such as travel, gestational age etc.

Financial aspects

- Fetal MMC repair is currently funded by a charitable grant and so neither the patient nor the referring institution/ local health authority will be charged for the surgery.
- Travel for initial assessment in London will not be funded by the charitable grant.

Stay in London

- Patients are admitted to UCLH the night before surgery. The typical stay is 5-7 postoperative days, initially in the close observation unit on labour ward and then on the antenatal ward.
- Accommodation will be provided nearby for family members if needed, funded by a charitable grant.

Postoperative care and long term follow up

- Following fetal MMC repair, the delivery of this pregnancy and future pregnancies must be by Caesarean section.
- Patients who have had fetal surgery repair at UCLH will be able return to their home hospital for antenatal care and delivery. Patients choosing to return to their home unit must have a local FMU willing to provide antenatal care according to our protocol (including frequent ultrasound scans) and plan delivery by CS by 37 weeks at the latest. In this option we will be in close contact with the local unit to provide advice and to receive details on the patient's progress.
- If the local unit is unable to provide ongoing antenatal care as above, the patient may be able to stay in London until delivery in accommodation provided by charitable funding.
- Babies will be offered long-term follow up at the Great Ormond Street Hospital Spina Bifida clinic. If the patient prefers local follow up, we recommend that this is done at a tertiary centre with experience caring for patients with spina bifida, and that the follow up centre keeps us informed of all follow up consultations (send copies) and provide us feedback when requested.
- We adhere to the recommendations made by IFMSS[2] to keep a register of all patients.

Contacts for further information:

For further information:
Dr Adalina Sacco: a.sacco@nhs.net
Professor Jan Deprest: Jan.Deprest@uzleuven.be

References

[1] Adzick NS, Thom EA, Spong CY, Brock JW, 3rd, Burrows PK, Johnson MP, et al. A randomized trial of prenatal versus postnatal repair of myelomeningocele. N Engl J Med. 2011; 364(11):993-1004

[2] Cohen AR, Couto J, Cummings JJ, Johnson A, Joseph G, Kaufman BA, et al. Position statement on fetal myelomeningocele repair. Am J Obstet Gynecol. 2014; 210(2):107-11. 3

37. DANDY WALKER MALFORMATION OR SYNDROME

Definition

An association of ventriculomegaly, increase of the cisterna magna and a defect of the cerebellar vermis with a communication of the cyst with the fourth ventricle

Diagnosis

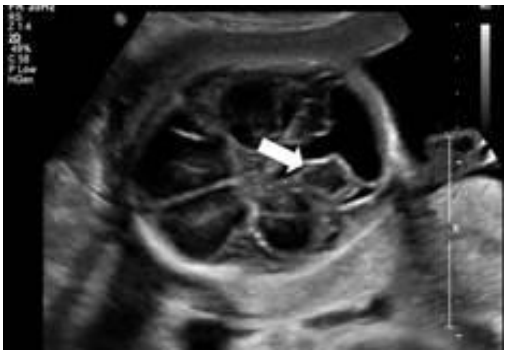
- Dandy–Walker syndrome (DWS), is a congenital brain malformation involving the cerebellum and the 4th ventricle. The key feature of this syndrome is the partial or complete absence of the cerebellar vermis (the part of the brain located between the two cerebellar hemispheres).

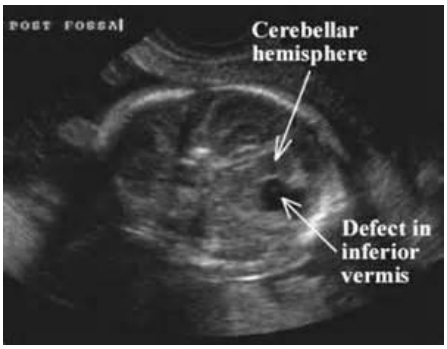
- It is a sporadic disorder occurring in approximately 1:25,000 live births but slightly higher incidence at 20 weeks.

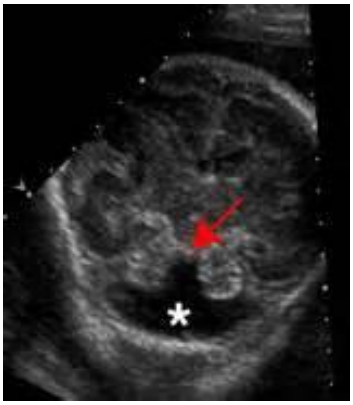
- Diagnosis may be difficult

Key features

- hypoplasia or absence of the cerebellar vermis/separation of the cerebellar hemispheres
- ventriculomegaly
- dilatation of the cisterna magna (>10mm AP)
- defect of the cerebellar vermis with a communication of the cyst with the fourth ventricle.
- hydrocephaly
- enlargement of the 4th ventricle (but may be mild)
- enlargement of the cisterna magna (>10mm) (but may be mild)
- a partial or complete absence of the cerebellar vermis
- frequently associated with other disorders of the central nervous system including absence of the corpus callosum and malformations of the heart, face, limbs & digits
- increased risk for fetal karyotype abnormality (especially Trisomy 13,18)







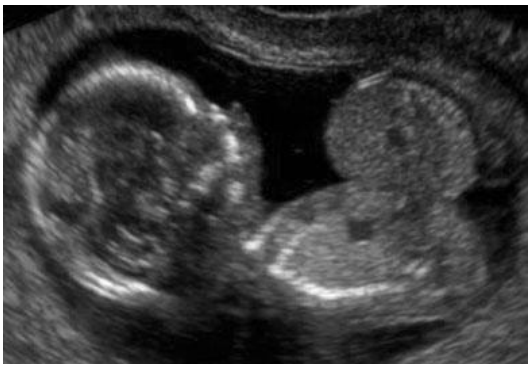
Action

- Careful detailed scan of whole fetus to list any other anomalies
- Refer to fetal medicine team for confirmatory scan and counselling within 5 working days
- Refer if any suspicion of D-W abnormality, even if very mild/uncertain diagnosis
- Offer Amniocentesis or CVS to exclude chromosome abnormality
- Discuss findings with patient +/- partner, including implications for pregnancy and childhood.
- Discuss options of care with parents, either to continue with the pregnancy or termination of the pregnancy (TOP). If continuing with pregnancy or unsure how to proceed, arrange review with 2nd on call neonatal consultant or clinical genetics to discuss implications and treatment once delivered in more detail.
- If continues with pregnancy arrange serial growth scans for third trimester.
- If parents opt for TOP, call Rubislaw ward for suitable time to attend for Mifepristone. Complete Green and Yellow TOP forms
- Document the discussions and the parents decision in the Badgernet record
- Dictate letter to GP and neonatal team

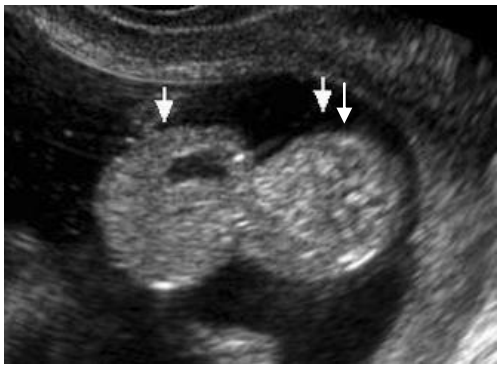
38. EXOMPHALOS

Definition
Exomphalos is a defect of the anterior fetal abdominal wall, in the region of the umbilicus, resulting in herniation of the intra-abdominal contents into the amniotic cavity.

Diagnosis:
- It can be detected at a dating scan or detailed anatomy scan.
- The diagnosis is made on a transverse section of the fetal abdomen.
- The abdominal contents will be seen herniating into the base of the umbilical cord, within a sac.
- The sac should be easily visualised on scan and may contain liver and/or small bowel
- The AC will be small for dates.



Long section of fetus with liver herniating



Transverse section of fetal abdomen with stomach bubble and herniated liver in peritoneal sac (double arrow)

Management
- If exomphalos is suspected book for the next available medical scan list within 72 hours.
- Print and store images of the abdominal wall.
- 75% of babies with an exomphalos will have another abnormality therefore a full detailed anatomy survey should be performed and the findings documented
- 15% of babies with exomphalos will have a chromosomal abnormality. Discuss and offer CVS/amniocentesis.
- If possible try to determine and document which organs are herniating into the sac as this can affect outcome.

- Discuss options of care with the parents either to continue with the pregnancy or termination of pregnancy (Parents may wish to wait until all results available)
- If continuing with the pregnancy or unsure, arrange review with 2nd on call neonatal consultant and Paediatric Surgeon, to discuss implications/ treatment once delivered.
- If continues with pregnancy arrange for serial growth scans for third trimester.
- Discuss mode, gestation and site of delivery. LUSCS may be required and occasionally delivery at QEUH in Glasgow is indicated.
- If woman wishes TOP, refer to Rubislaw ward for ongoing care. Complete Green and yellow TOP form.
- Document discussions and parents decision in the Badgernet record
- Dictate letter to GP and neonatal team to confirm diagnosis and decision

36. GASTROSCHISIS

Definition

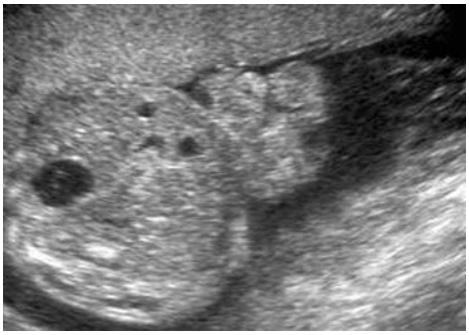
Periumbilical defect, generally at the right side of umbilicus. Left sided defects are extremely rare

- Incidence: 1 /3000
- Common in younger mother
- Associated with recreational drug misuse: mainly poly drug. Also associated with use of ibuprofen, aspirin, pseudo ephedrine

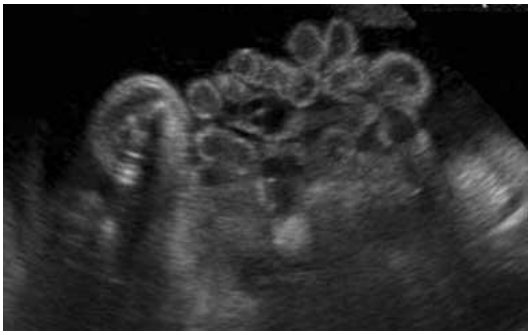
Diagnosis:

Ultrasound findings:

- Right Periumbilical lesion
- Bowel floats
- Small bowel always eviscerated , sometimes large bowel
- Liver can also be eviscerated



Transverse section of fetal abdomen with right sided peri-umbilical defect and bowel loops protruding



Free floating loops of bowel

Management:

- If suspected refer to a consultant list within 5 working days
- Rule out other anomalies, especially cardiac defects
- Clearly document findings
- Offer amniocentesis if there is uncertainty about the views or the parents wish to know specifically about chromosome abnormalities
- Serial growth scans 24, 28, 32 and alternate weeks from 32 weeks as increased incidence of IUGR and fetal compromise
- Monitor bowel dilatation : >10 mm at 28 -32 wks associated with poor neonatal outcome; >18 mm dilatation is more likely to require bowel resection
- Liquor volume is usually normal but oligohydramnios occurs in 30% cases (associated with fetal distress in late pregnancy and during delivery.

- Polyhydramnios may suggest bowel obstruction/atresia
- Ensure parents meet with Mr C Driver paediatric surgeon and neonatal team to discuss care after delivery
- Near term the bowel is thickened and matted due to exposure to fetal urine resulting in a chemical peritonitis
- Vanishing gut : In severe cases the gut becomes necrosed and reabsorbed secondary to necrosis resulting in bowel atresia – short bowel syndrome :
- Offer IOL between 36-38 weeks due to increased incidence of SB >38 weeks
- Dictate letter to GP and NNU team for the case-records

Prognosis

- Increased incidence of fetal distress &IUD
- 10 -20% bowel complication like atresia, necrosis, perforation
- Developmental/neurological abnormalities
- Overall survival is good (80-90%)

Recurrence
Sporadic but sibling recurrence rate is 3.5%

37. ECHOGENIC BOWEL

Definition : bowel which has the same echogenicity as surrounding bone
Frequency : <1% of pregnancies

Diagnosis

- Reduce the gain until only the fetal bone is seen on the scan image.
- If the bowel is still visible and of comparable brightness to the femur or iliac crest, it can be diagnosed as echogenic bowel
- Ensure transducer is <5MHz frequency (higher frequency transducers can exaggerate the finding of echogenic bowel)

Initial Management

- Complete structural anomaly scan including HC/AC/FL measurements
- If all normal Refer to fetal medicine consultant for repeat scan and review in 2 week

Associations

- Isolated finding in ~72% of cases
- Infection (0-10%)
- Most commonly cytomegalovirus but also toxoplasma, varicella, rubella, herpes and parvovirus
- Intra-amniotic bleeding (usually occurring within the first trimester)
- Cystic fibrosis (0-13%)
- Chromosomal disorders (3.3-16%)
- Most commonly Trisomy 21 but also Trisomy 13,18, Triploidy and Turner's syndrome
- Intrauterine growth restriction
- Intrauterine fetal demise

Counselling and Management

- Discuss with patient the above possible causes
- Offer information leaflet
- Offer TORCH screen and patient/partner cystic fibrosis testing
- Offer amniocentesis
- Serial growth scans from 28 weeks

References:

NHS Fetal Anomaly Screening Programme www.fetalanomaly.screening.nhs.uk

Goetzinger KR, Cahil AC, Macones GA, Odibo AO. Echogenic bowel on 2nd trimester ultrasound: evaluating the risk of adverse pregnancy outcome. Obstet Gynecol 2011; 117(4): 1341-8.
De Oronzo MA. Hyperechogenic fetal bowel: an ultrasonographic marker for adverse fetal and neonatal outcome? J Prenatal Med 2011; 5(1): 9-13.

38. DILATED BOWEL

Definition:

- Dilated loops of bowel on transverse section of the abdomen; Small bowel >7mm or Large bowel loops >20mm

Frequency:

- 1:2000 births
- Commonest distal ileum (35%)
- Proximal jejunum (30%)
- Distal jejunum (20%)
- Proximal ileum (15%)
- Multiple sites (5%)

Diagnosis:

Usually suspected on ultrasound >25 weeks gestation by observing progressive distension of the intestinal lumen. It can be slow to evolve. The fetal abdomen appears distended and active peristalsis may be visible. Jejunal and ileal obstruction is usually evident as large fluid filled loops of bowel often with associated polyhydramnios. Anorectal atresia is less easy to detect as there is usually a normal liquor volume and the proximal bowel is less distended

Initial Management:

- Complete structural anomaly scan including HC/AC/FL and AF measurements
- Refer to fetal medicine consultant for review within 72hours depending on availability of medical staff

Associations with proximal bowel obstruction

- Genitourinary
- Other GI abnormalities
- Chromosome defects

Management & Counselling

- Offer amniocentesis (depending on gestation and degree of polyhydramnios (increased risks of preterm labour if excess liquor)
- Discuss with patient the above possible causes
- Serial growth scans from 24 weeks Consider steroids to promote fetal lung maturity if excess liquor present

- Document a critical alert in Badgernet

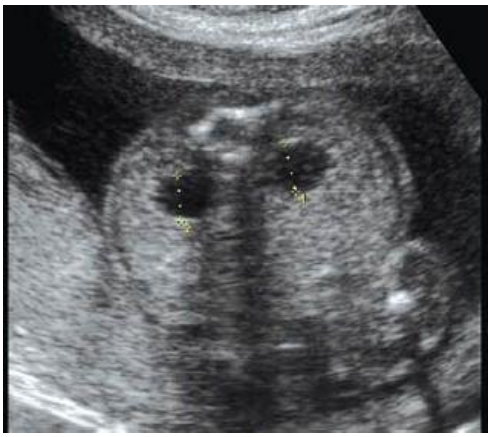
39. RENAL PELVIS DILATATION (RPD)

Definition

The anterior-posterior diameter of the fetal renal pelvis measures greater than 7mm and <10mm

Diagnosis

- Transverse section of the fetal abdomen at the level of the fetal kidneys
- Measure the Renal Pelvis in an AP direction
- RPD in second trimester
    - ≤7mm = Normal
    - >7mm and <10 mm = mild renal pelvis dilatation (RPD)
    - >10mm severe RPD
- In third trimester RPD of <10mm is normal



Frequency

1% of fetuses in the UK.

Initial Management

- Further assessments of the fetus including a complete structural survey, HC/AC/FL measurements is indicated if the RPD is enlarged .
- Note other factors such as fetal wellbeing, gestational age, unilaterality versus bilaterality, amniotic fluid volume.
- Take image.
- Complete Antenatal Management Plan to make paediatric team aware of need for post natal renal scan in newborn baby.

Counselling and Management

- Offer information leaflet
- RPD often resolves during pregnancy but may persist until later pregnancy and into childhood. Occasionally it can be due to structural abnormalities in the renal tract.

Although RPD may persist in about a third of babies after birth, the vast majority of those babies are healthy. In those cases where it does persist, treatment is usually mild (eg, the baby may need to take antibiotics) with only the more severe cases requiring longer term follow-up or surgery.

- If there is normal amniotic fluid, no other fetal abnormality, and the kidney is not hydronephrotic, the sonographer can counsel and give renal pelvis dilatation information. Arrange repeat scan at 30 weeks or at next serial growth scan.
- If first detected at a gestation later than 26 weeks, arrange for a repeat scan four weeks later.
- If dilatation is > 10mm in the third trimester, refer to medical staff within 7 days for reassessment.
- Complete the Badgernet scan documentation and complete the Antenatal Management Plan

Associations especially if RPD >10mm or renal images are abnormal

Prenatal hydronephrosis may be caused by various obstructive and non obstructive etiologies

- ureteropelvic junctions obstruction
- vesicoureteral reflux
- ureterocele
- ureterovesical junction obstruction
- ectopic ureter
- posterior urethral valves
- megacystis megaureter
- physiologic dilatation
- multicystc dysplastic kidney
- autosomal recessive polycystic kidney disease
- exstrophy
- Prune- Belly Syndrome

References:

NHS Fetal Anomaly Screening Programme; www.fetalanomaly.screening.nhs.uk

Cavaliere, A. et al. Ultrasound Scanning in Fetal Renal Pelvis Dilatation: not only Hydronephrosis. J Prenat Med. 2009 Oct-Dec; 3(4): 60–61.

40. MULTICYSTIC DYSPLASTIC KIDNEYS

Definition
Multicystic dysplastic kidney (MCDK) is a condition where there are multiple smooth-walled non-communicating cysts of variable sizes in the kidney.

Incidence
1:3000-5000 (unilateral)- 77% of all cases
1: 10,000 (bilateral)

Diagnosis

US finding of unilateral MCDK	US finding of bilateral MCDK
Multiple cysts of varying size	Multiple cysts of varying size
Large hyperechogenic kidney	Large hyperechogenic kidneys
Liquor volume normal	Liquor volume very low or no liquor
Bladder normal	Bladder very small or absent
May affect the whole kidney or a part of it	May affect the whole kidney or a part of it

Differential diagnosis include hydronephrosis and pelvic kidneys

Management

- If unilateral refer to consultant list in the next available slot (within 7 days)
- if bilateral refer to consultant clinic within 72hours as bilateral MCDK has very poor prognosis (risk of pulmonary hypoplasia)
- Can be associated with Trisomy13, Meckel Gruber syndrome: offer amniocentesis
- Check the contralateral kidney as the risk of renal agenesis, vesico-urethral reflux and renal hypoplasia is high
- If unilateral - serial growth scans in mid and third trimester by medical staff. The affected kidney should be monitored for size.
- Monitor liquor volume
- Inform neonatal team
- Offer woman the option of speaking to neonatal team and/or Mr. Chris Driver neonatal surgeon.
- If there is an early diagnosis of bilateral MCDK and concerns about lung developement, offer the woman option of TOP

- If woman wishes TOP, refer to Rubislaw ward for ongoing care. Complete Green and yellow TOP form.
- Document discussions and parents decision in Badgewrnet
- Dictate letter to GP and neonatal team to confirm diagnosis and decision

41. CONGENITAL HEART DEFECTS

Definition

Any abnormality of the 4 chambers of the heart, the outflow tracts or veins associated with the heart

Incidence

All CHD is approximately 5-8/1000 pregnancies
Severe CHD approximately 3/1000

Diagnosis

A Diagnosis of CHD should be suspected at the time of the 20 week anomaly scan if there is an inability to get a normal 4CV of the heart or normal R & L outflow tracts views

Initial Management

- Refer to medical staff within 72 hours for a further opinion
- Perform a full detailed survey of the fetus
- Identify 4CV and record any abnormalities, store relevant images
- Check both outflow tracts and likewise record and image any abnormalities
- Ensure venous connections are correct
- Assess doppler flow velocity of both pulmonary artery and aorta
- Peak flows in both outflow vessels should be <80cm/sec at <26 weeks but can be up to 100cms/sec after 26 weeks
- Increased peak flow is suggestive of narrowing or obstruction within the vessel

Ongoing management

- Inform parents of findings
- As the incidence of chromosome abnormalities is significant, >1% , amniocentesis and microarray testing should be offered
- Discuss diagnosis and likely outcome
- Offer option to speak to one of neonatal team regarding immediate resuscitation and treatment
- Discuss options for pregnancy either TOP or to continue with pregnancy
- Document diagnosis, discussions and parents choices in Badgernet

- If parents are undecided, or the views not clear, or there is major CHD, the parents should be referred for an urgent appointment to the Fetal Medicine unit at the Queen Elizabeth University Hospital Glasgow (0141 232 4339) for further review.
- Patients with a duct dependent lesion should ideally be delivered in Glasgow
- As some parents may have an unplanned delivery in Aberdeen it is important that Badgernet is kept updated and the Antenatal Management Plan completed to make all staff aware of the cardiac concerns

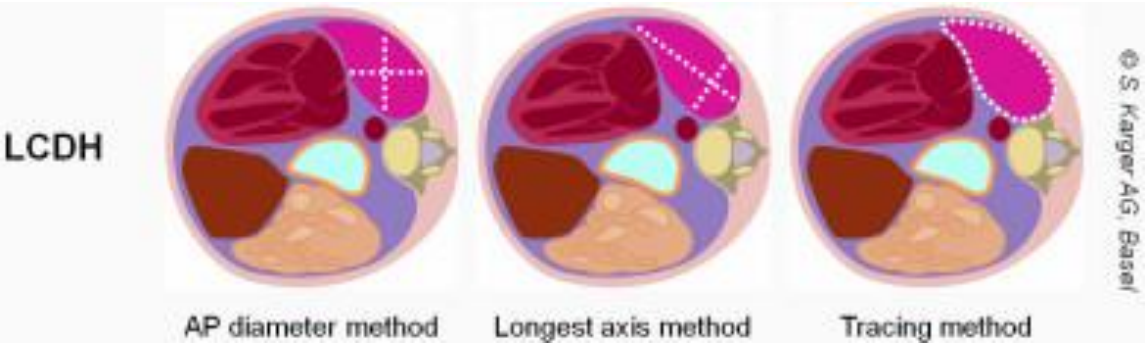
42. PROTOCOL FOR THE MANAGEMENT OF CONGENITAL DIAPHRAGMATIC HERNIA [CDH]

Congenital diaphragmatic hernia (CDH) occurs in 1 per 3,000-5,000 live births, with over half of the cases diagnosed antenatally.

All patients with cardiac deviation or a suspected CDH at the time of a routine anomaly scan or at any other scan visit must be reviewed by one of the Fetal Medicine Consultants, within 72 hours.

At the initial appointment with fetal medicine, the side of defect, liver and stomach position should be assessed and a full anatomical survey completed including examination of the fetal heart and the findings documented. Full details of the service available in Scotland are available at http://www.sdhcn.scot.nhs.uk/publications/sdhcn-guidelines/

A lung-head ratio of the contra-lateral CDH lung should be obtained as per described in the TOTAL trial. This LHR is obtained by measuring the area occupied by the largest lung in the chest and dividing it by the head circumference.



Three techniques for measuring the lung area are available as outlined above, though most studies to date have used the longest axis method. The LHR of the individual baby with CDH can be compared to the LHR of normal babies (observed to expected [O/E LHR] which indicates the difference between LHR in the fetus with CDH to that expected in a normal baby) and is expressed as a percentage. It is a predictor of neonatal morbidity and mortality and can be used to counsel women on prognosis (see table below). Basically the lower this percentage, the smaller the fetal lung is and the poorer the chances of survival. An online calculator for O/E LHR is available on the TOTAL trial website or at http://www.perinatology.com/calculators/LHR.htm

Degree of Lung Hypoplasia	O/E LHR	Liver Position	Survival
Extreme	<15%	-	<5%
Severe	15-25%	Up	10%
	15-25%	Down	25%
Moderate	26-35%	Up	30%
	26-35%	Down	60%
	36-45%	Up	60%
Mild	36-45%	Down	75%
	>45%	-	>95%

Table: Prognostic values for left sided CDH (Based on data from the Antenatal-CDH-Registry Group in Europe).

Other factors linked with good prognosis are; left-sided CDH, liver in abdomen, and isolated CDH with no other anomalies. A fetus with liver herniation has a poorer prognosis. Associated anomalies can occur in 30-60% cases, these include cardiac defects (52%), genitourinary (23%), gastrointestinal (14%) and central nervous system anomalies (10%).

An information leaflet available from the Scottish Diaphragmatic Hernia Clinical network (SDHCN) can also be used for counselling at this stage. If leaflets are not available locally, a copy can be downloaded from the SDHCN website (www.sdhcn.scot.nhs.uk).

Amniocentesis (including micro-array testing should be offered

The woman should be advised of the findings and an outline of how the cases are assessed and managed discussed with her. A review appointment should be made for the following week after the Perinatal Group Meeting (PGM) has taken place.

The case should be discussed at the Wednesday PGM, the following week, the severity of the case confirmed by both neonatal and paediatric surgical staff and the classification documented in the notes

The parents should have the opportunity to meet with the neonatal and paediatric surgery staff to discuss prognostic indicators/ anticipated neonatal care (including where the delivery might be advised eg Aberdeen or Glasgow) and prognosis.

Options for management of pregnancy can then be discussed and will be influenced by parental preference, scan findings, and presence of associated anomalies

The Antenatal management plan should be updated within Badgernet

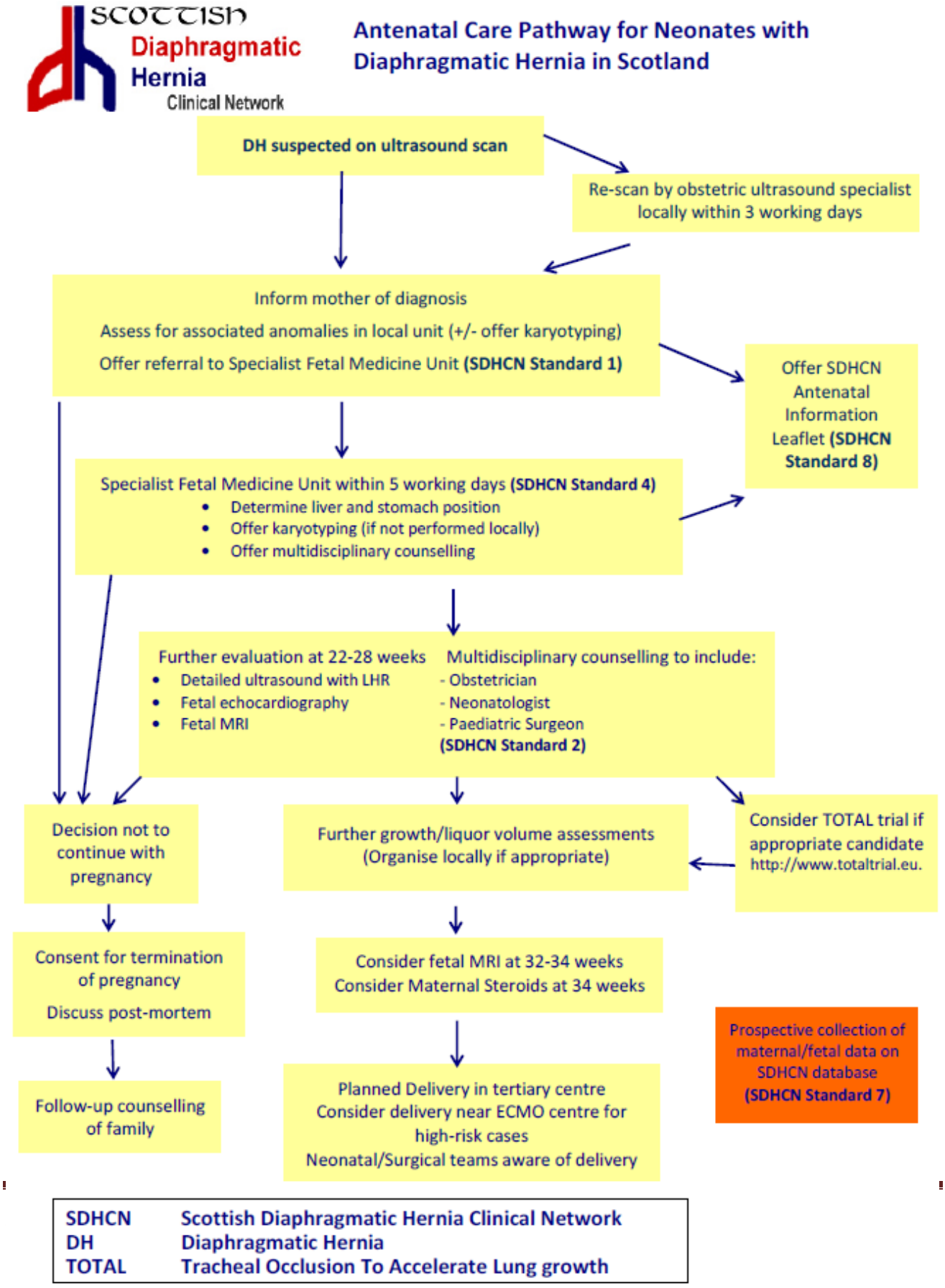
While there is currently no good evidence that fetal MRI is superior to ultrasound at predicting outcome, fetal MRI for lung volume may yield additional useful information, and should be offered at 28 and 34 weeks gestation.

Multidisciplinary counselling by obstetrician, neonatologist and paediatric surgeon should ideally be planned to occur during two separate sessions in the second and third trimester (but not necessarily with all three specialists during one visit). The place of delivery should be confirmed in good time (? early third trimester) to allow appropriate arrangements to be made and taking into account any risks of preterm labour.

The woman should be reviewed at least every 4 weeks or more frequently if required as there is a strong possibility of polyhydramnios developing.
In order to promote lung maturity optimally, steroids are advised at 36 weeks gestation or earlier if there is evidence of significant polyhydramnios.

The mode of delivery is dependent on obstetric indications and ensuring neonatologist presence, as there is no difference in neonatal outcomes between either mode of delivery provided that there is optimal neonatal support. Other practical factors that can influence delivery planning include; geographical location of the woman, risk factors for preterm labour such as polyhydramnios, and past obstetric history. The woman may be asked to stay near the tertiary centre if her usual residence is too remote or rural.

Delivery is advised at around 38-39 weeks gestation, with consultant neonatologist presence at delivery.


Scottish Diaphragmatic Hernia Clinical Network
Antenatal Care Pathway for Neonates with Diaphragmatic Hernia in Scotland
DH suspected on ultrasound scan
Re-scan by obstetric ultrasound specialist locally within 3 working days
Inform mother of diagnosis
Assess for associated anomalies in local unit (+/- offer karyotyping)
Offer referral to Specialist Fetal Medicine Unit (SDHCN Standard 1)
Offer SDHCN Antenatal Information Leaflet (SDHCN Standard 8)
Specialist Fetal Medicine Unit within 5 working days (SDHCN Standard 4)
Determine liver and stomach position
Offer karyotyping (if not performed locally)
Offer multidisciplinary counselling
Further evaluation at 22-28 weeks
Detailed ultrasound with LHR
Fetal echocardiography
Fetal MRI
Multidisciplinary counselling to include:
- Obstetrician
- Neonatologist
- Paediatric Surgeon
(SDHCN Standard 2)
Decision not to continue with pregnancy
Further growth/liquor volume assessments (Organise locally if appropriate)
Consider TOTAL trial if appropriate candidate http://www.totaltrial.eu.
Consent for termination of pregnancy
Discuss post-mortem
Consider fetal MRI at 32-34 weeks
Consider Maternal Steroids at 34 weeks
Prospective collection of maternal/fetal data on SDHCN database (SDHCN Standard 7)
Follow-up counselling of family
Planned Delivery in tertiary centre
Consider delivery near ECMO centre for high-risk cases
Neonatal/Surgical teams aware of delivery
SDHCN Scottish Diaphragmatic Hernia Clinical Network
DH Diaphragmatic Hernia
TOTAL Tracheal Occlusion To Accelerate Lung growth

43. SKELETAL ABNORMALITIES

Definition

The osteochondrodysplasias and dysostoses comprise a group of more than 350 disorders of the skeleton. By definition, the osteochondrodysplasias, or skeletal dysplasias, refer to disorders with generalized abnormalities of the skeleton, whereas the dysostoses are those disorders that have a single or group of abnormal bones.

Prevalence

Although each type of skeletal dysplasia is rare, the overall birth prevalence of skeletal dysplasias is estimated to be 2.4 per 10,000 births. 3-5% affected fetuses are stillborn and about 30% die in neonatal period.

Aim

Differentiating these disorders in the prenatal period can be challenging because they are rare and many of the ultrasound findings are not necessarily pathognomic for a specific disorder. However, differentiating known lethal disorders from nonlethal disorders, providing differential diagnoses before delivery, determining post delivery management plans and ultimately determining accurate recurrences risks to the at-risk couples improves patient care.

Lethality occurs in most skeletal dysplasias as a result of a small chest circumference and resultant pulmonary hypoplasia. However, not all skeletal dysplasias associated with small thoracic circumferences are associated with immediate lethality. By using ultrasound criteria for lethality, chest-to-abdominal circumference ratio of <0.6 and femur length-to-abdominal circumference ratios of <0.16 are strongly suggestive of lethality. When concomitant abnormalities in other organ systems are visualized, there is increased morbidity and mortality in these disorders. It is important to note that the accuracy of prenatal diagnosis of the skeletal dysplasias using routine ultrasound approaches 40% and misdiagnosis can lead to inaccurate recurrence risk information and suboptimal management of the patients

Method of diagnosis

Diagnosis of prenatal-onset skeletal dysplasias can be accomplished by ultrasound evaluation and confirmed by both molecular testing using invasive procedures and post delivery radiographs and autopsy.

Ultrasound Check list

- Confirm Gestational Age based on LMP or first trimester ultrasound
- Measure and record the length of the long bones (femurs, humerus, radius, ulna, tibia, fibula, and clavicle)
- Shape of long bones (straight, curved, bilateral vs. unilateral)
- Appearance of the metaphyseal ends (spikes, irregularities)
- Echodensity of long bones (well mineralized, poorly mineralized)
- Foot size and shape
- Hands (number of digits, shape of phalanges, mineralization patterns)
- Circumferences (head, abdomen, and chest)
- Lateral view of the chest
- Mineralization and shape of the cranium
- Mineralization and shape of the vertebral bodies
- Size and shape of scapula
- Presence of the secondary epiphyses (calcaneus [>20 wk] and knee epiphyses [>28 wk])
- Mandibular size and shape
- Fetal profile (frontal bossing, presence of nasal bone, micrognathia)
- Abnormal posturing of the extremities
- Other congenital anomalies
- Evaluation of amniotic fluid volume (hydramnios)
- Evaluation of fetal movements
- Hydrops

Management

- Record all measurements from Scan check list above
- Inform patient
- If lethal abnormality suspected – discuss options of prenatal testing with amniocentesis
- If lethal abnormality suspected and chest circumference is small offer options for pregnancy, to continue or TOP
- If woman wishes TOP, refer to Rubislaw ward for ongoing care. Complete Green and yellow TOP form.

- If parents wish to continue with pregnancy arrange serial scans in third trimester and ensure parents have been counselled by paediatric staff
- Document as a critical alert in Badgernet for attention of paediatricians
- Document discussions and parents decision as a Specialist review in Badgernet
- Dictate letter to GP and neonatal team to confirm diagnosis and decision

Important points to note

1. Any fetus showing femoral or humeral length measurements less than 5th centile or −2 SD from the mean in the second trimester (<24 weeks) should be evaluated in a centre that has expertise in evaluating the entire fetal skeleton and has the ability to provide genetic counselling.

2. All fetuses suspected of having a skeletal dysplasia should have the diagnosis confirmed by post delivery clinical and radiologic evaluation. Mothers who themselves have skeletal dysplasias need consultation with obstetricians and anesthesiologists regarding optimal management, including mode of delivery.

3. For fetuses suspected as having a skeletal dysplasia delivered at a viable gestational age, pre-delivery consultations and management plan should be initiated between the obstetrical, neonatal, anaesthetic, and genetics consultants

References

Chapter 9 Skeleton: from the 18-23 week scan http://www.fetalmedicine.com/old/fmf/18-23_Weeks_Scan.pdf
Guidelines for the prenatal diagnosis of fetal skeletal dysplasias
Krakow et al. Genet Med. Feb 2009; 11(2): 127–133.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2832320/

44. AMNIOCENTESIS

Amniocentesis is a pre-natal invasive diagnostic test that can be performed at or over 15 weeks gestation to assess fetal chromosomes for evidence of a karyotypic abnormality and/or for the fetal diagnosis of certain hereditary genetic conditions. If there is a structural abnormality such as a cardiac abnormality or exomphalos, the patient should be counselled about the option of micro-array testing and the relevant information leaflet given

Risks

1. The risk of miscarriage is quoted as 1%, although it is lower at around 0.5% with experienced operators
2. The risk of infection following an invasive test is <1:200, the risk of severe sepsis <1/1000
3. The risk of a failed culture is approximately 1:200

Procedure

- All women should be given the patient information leaflet entitled “Amniocentesis” and counselled fully about the procedure and its risks
- If the procedure is performed because of increased NT or a suspected fetal abnormality the couple should be offered the option of micro-array testing and if accepted, give written consent for this
- Women should give written consent for the amniocentesis.
- The prenatal Invasive checklist should be completed
- A sample of maternal blood (5mls EDTA purple top bottle) should be obtained for PCR and the woman moved to the scan room
- If microarray testing is indicated and accepted 10mls of blood in an EDTA should be obtained from both parents and transported to the lab along with the amniotic fluid sample
- The procedure should be done under sterile conditions with the operator and the assistant wearing sterile gloves
- The maternal abdomen should be adequately exposed, cleaned with chorhexadine and allowed to dry
- Sterile gel should be placed on the maternal abdomen
- The ultrasound probe should be placed in a sterile poly bag
- A good pool of amniotic fluid should be identified. While it is preferable to avoid a trans-placental approach, this is not contraindicated if it provides the best access to an appropriate liquor pool

- There is usually no requirement for local anaesthetic
- A 22 gauge (or no larger than a 20 gauge) needle should be progressively inserted through the layers of the maternal abdomen and uterus, into the amniotic fluid pool under continuous ultrasound guidance avoiding the fetus and the cord; once in, either the operator or the assistant should withdraw about 15 mls or more (approximately corresponding in mls to period of gestation in weeks) of amniotic fluid, again under continuous ultrasound guidance. In women with a larger BMI, longer needles of 12cms or 15cms with an echotip may be used.

Following the procedure

- All samples MUST be labelled in the room, with the woman's details
- The amniotic fluid sample and the blood sample for PCR should be placed in a plastic bag with the completed ERF form and taken to genetics as soon as possible by the portering staff
- The invasive procedure form should be completed by the operator within the ultrasound portion of badgernet
- The woman's notes should be kept in the Day ward until the results of both the PCR (microarray if indicated) and the full karyotype are returned
- Appropriate contact details must be taken and arrangements made with regards to conveying the results of the amniocentesis to the woman.

∗ The woman's blood borne virus antenatal screening results should be available pre procedure. There is no clear evidence of increased vertical transmission with Hep B or Hep C although 'e' antigen +ve state or a high viral load may potentially increase this risk. With a +ve HIV state if the woman is already on anti retrovirals with a low viral load the risk of transmission is very low; but if not the procedure should be deferred until anti retrovirals are commenced and viral load suppressed. If the procedure cannot be delayed anti retrovirals (HAART) that includes raltegravir should be commenced and a single dose of nevirapine should be given 2 to 4 hours pre procedure (See HIV in Pregnancy guidelines).

The women's blood group should also be available around the time of the procedure. If Rh negative, Anti D (250IU if procedure done before 20 weeks, and 500 IU if after 20 weeks) should be given IM as soon as is possible after the procedure and definitely within 72 hours of procedures

45. CHORIONIC VILLOUS SAMPLING

Chorionic villous sampling (CVS) is a pre-natal diagnostic test used to assess fetal chromosomes for evidence of a karyotypic abnormality and/or to look for specific proteins linked to diseases such as sickle cell, cystic fibrosis or myotonic dystrophy. If there is a structural abnormality such as increased NT or exomphalos, the patient should be counselled about the option of micro-array testing and the relevant information leaflet given. CVS can be performed between 10 and 15 weeks gestation, as long as the placenta is accessible

Risks

1. 1.The risk of miscarriage is quoted as 1-2% but recent studies suggest that in experienced hands it is as low as 0.7%
2. The risk of infection following an invasive test is <1:200
3. The risk of a failed culture or a mosacic result is approximately 1:200

Procedure

- All women should be given the patient information leaflet entitled “Chorionic Villous Sampling” and counselled fully about the procedure and its risks
- Women should give written consent for CVS and micro-array testing if indicated
- A sample of blood (5mls EDTA purple top bottle) should be obtained for PCR
- If microarray testing is accepted 10mls of blood in an EDTA should be obtained from both parents and transported to the lab along with the amniotic fluid sample
- The Prenatal invasive testing checklist should be completed and the woman moved to the scan room
- The maternal abdomen should be adequately exposed, cleaned with chorhexadine and allowed to dry
- Sterile gel should be placed on the maternal abdomen
- The ultrasound probe should be placed in a sterile poly bag
- The placental position should be localised and seen to be accessible without entering the gestation sac
- Local anaesthetic (lidocaine) should be infiltrated into the abdominal skin
- Once effective, an 18 gauge needle should be progressively inserted through the layers of the maternal abdomen and uterus, into the placenta under ultrasound guidance

(i) For a double lumen technique

1. The scan probe is held by an assistant, keeping the needle tip in view
2. The stylet is removed and a 20 gauge needle inserted through the 18 gauge lumen into the placenta
3. A 20ml syringe is attached to the 20 gauge needle and suction applied to aspirate a sample.
4. Once obtained, the 20 gauge needle and attached syringe is removed from the woman, leaving the 18 gauge needle in situ
5. The sample is inserted into culture medium and examined
6. If insufficient chorionic villi are present, the 20 gauge needle is reinserted through the 18 gauge needle as many times as is required until sufficient villi are obtained

For a single lumen technique

1. The operator holds the scan probe and needle
2. The assistant removes the stylet and attaches a 20 ml syringe
3. Suction is applied to the syringe and maintained by the assistant, while the needle is moved within the placenta by the operator for approximately 40 seconds
4. The needle and attached syringe are removed from the woman by the operator
5. The sample is transferred to culture medium within a petri dish and examined
6. If sufficient villi are present the sample is transferred to the culture medium bottles

Following the procedure

- All samples MUST be labelled in the room, with the womans' details
- The CVS sample and the blood sample for PCR / micro-array should be placed in a plastic bag with the completed ERF form and taken to genetics as soon as possible by the portering staff
- The Ultrasound record should be completed on Badgernet
- The woman's notes should be kept in the Day ward until the results of both the PCR
- and the full karyotype are returned
- The women's blood group should also be available around the time of the procedure. If Rh negative, Anti D (250IU if procedure done before 20 weeks, and 500 IU if after 20 weeks) should be given IM as soon as is possible after the procedure and definitely within 72 hours of procedures

46. MANAGEMENT OF ILLNESS WITH OR A CONTACT WITH SLAPPED CHEEK INFECTION (PARVOVIRUS) IN PREGNANCY

If a pregnant woman reports concern about possible parvovirus/erythrovirus exposure and/or possible illness, send a blood sample to the VIRUS lab for IgM and IgG testing. Retrospective testing of a stored blood sample (e.g. booking blood sample) is less appropriate for this infection. Phoning the Virus Lab should not normally be necessary - tests are usually done twice weekly. If discussion is needed, phone 01224 552452 Mon-Fri 08:30 – 5:00 or 01224 552444 at weekends.
The following details must be included on the request form:

Date of contact with parvovirus OR date of onset of rash
Current gestational age pregnancy

The most critical time period for exposure in pregnancy is before 20 weeks gestation

BLOOD RESULTS

1. IgG POSITIVE: PATIENT IS IMMUNE TO PARVOVIRUS

If IgG is positive (and IgM negative), the patient can be reassured that there is no risk to the pregnancy. Approximately 50% of pregnant women will already be immune to parvovirus.

2. IgG & IgM NEGATIVE: NO EVIDENCE OF INFECTION

If IgM and IgG are both negative, the patient is not immune to parvovirus. Although there is no sign of current infection, a repeat sample should be sent 2 weeks after the last date of contact, i.e. after the full incubation period has elapsed, or sooner should symptoms develop, to ensure that no infection has occurred.

3. IgM POSITIVE: EVIDENCE OF RECENT INFECTION

If the IgM is positive, there are potential risks that the pregnancy may also be affected, particularly if the exposure is between 12 and 20 weeks gestation. Problems usually develop within 6 weeks of exposure, but can rarely occur as long as 12 weeks after parvovirus infection.

(a) Management of patient at <12 weeks gestation

If the infection occurs at less than 12 weeks gestation, the chances of a complication are extremely small. An ultrasound scan to check fetal viability should be offered on the routine scan list within a week and repeated at 17-18 weeks gestation to ensure the pregnancy is ongoing. If all is well at that stage the routine detailed scan should be performed at 20 weeks and if all well then no additional scans are required.

(b Management for women with confirmed parvovirus infection at 12-20 weeks

All women should be referred for a viability scan on the routine list within 1 week of a positive result to ensure no hydrops is visible. Ideally this should be on a medical scan list..

At 18 weeks gestation, all these pregnancies should be seen by a fetal medicine specialist so that they can be counselled on the risks and ongoing management for the pregnancy. The fetal middle cerebral artery (MCA) peak velocity (PSV) should be checked and plotted serially from around 18 weeks to ensure that fetal anaemia does not develop. (See Ultrasound protocol 25 for additional guidance). Should the diagnosis occur after 16 weeks, then the woman should get her first and subsequent scan with a fetal medicine specialist

Follow up is advised for a total of 8-10 weeks, depending on the timing of presentation

Scan findings:

Active baby and NO hydrops

If the baby is active and shows no sign of hydrops – the baby is not severely anaemic. Ideally the middle cerebral artery peak systolic velocity [MCA PSV] should be measured from 18 weeks onwards. If this is normal it is very reassuring and the pregnancy can be monitored by weekly ultrasound for at least 8 weeks post exposure.
If the MCA PSV is elevated, this suggests a degree of fetal anaemia. Providing the baby is active and there is no sign of hydrops, the pregnancy can be monitored by ultrasound, with twice weekly review until the values return to normal range or the situation deteriorates.
In the event that MCA estimation is not available at a scan visit and the baby is both active and shows no sign of hydrops – weekly ultrasound should be sufficient – and the patient asked to attend earlier if there is any change in fetal movement.

Hydropic baby

If the MCA PSV is elevated and there is evidence of hydrops, the baby is likely to be severely anaemic. Although spontaneous resolution of hydrops has been documented,

there is significant risk of intrauterine fetal death unless the anaemia is corrected. The patient should therefore be referred to Glasgow for consideration of intrauterine transfusion [IUT] to correct the fetal anemia.

Management of a patient with confirmed parvovirus infection >20 weeks gestation

The risks of significant fetal anaemia with infection contracted beyond 20 weeks gestation are small. An initial ultrasound scan should be performed by a fetal medicine doctor, ideally within 1-2 weeks of confirmation of infection, to confirm no evidence of hydrops and assessment of MCA Doppler. Thereafter providing the baby is active the mother can be reassured that the risk of a problem developing is small. As a precaution scans every 7-14 days should be offered for the following 8 weeks after exposure unless there is a change in the fetal movement pattern.

Gilbert Bain Maternity Unit

Choices for delivery information booklet

For most women pregnancy, labour and birth is a normal and healthy process. However, we do recognise that there will be some women who may require more specialised care during their pregnancy and labour due to additional risk factors. This information leaflet will provide you with information about the care we can provide at Gilbert Bain that will enable you to make choices about choosing the place of birth.

The maternity unit is located on the 1st floor at Gilbert Bain and has 2 labour rooms (one with a birthing pool), 4 inpatient rooms and the unit's scan room.

We have another room that we use for assessments. Care is provided by a team of Midwives supported by Maternity Support Workers and Consultant Obstetricians.

The Maternity Team

You will be allocated a named Midwife who will coordinate your care. All of our Midwives have a 'buddy' so if your Midwife is away you will be seen by her 'buddy'. This is to ensure that there is continuity of care by limiting the number of professionals you meet during your pregnancy.

In addition to your named Midwife you will also meet our Scan trained Midwives who will scan you during your pregnancy. Normally this will be at 12 weeks for your dating scan and at 20 weeks for your more detailed scan. Your Midwife will discuss these with you at the first visit.

The rest of the care during your pregnancy will be provided by your named Midwife. Your named Midwife maybe on duty to care for you during your labour, but if not, care will be provided by another member of the Midwifery team.

Once you have been discharged from hospital your named Midwife will visit you at home before handing over the care of you and your baby to the Health Visiting Team.

If you have any known medical conditions or have had problems during previous pregnancies, you will see one of our consultants. The consultant will review your history and make a plan of care for your pregnancy and delivery. This may include additional blood tests, additional scans or referral to the maternity unit in Aberdeen. Your named Midwife will still be your main carer.

Considerations

Although Gilbert Bain is classed as a general hospital, we do have limited facilities. Therefore, in some circumstances, delivery in Aberdeen may be recommended as the safest place for you to receive care during your pregnancy and to deliver there.

Inclusion criteria for Gilbert Bain:

To deliver at Gilbert Bain, to ensure that we can provide safe care for you and your baby you must fulfil the following criteria.

1. Have an uncomplicated pregnancy with no medical or obstetric conditions that require consultant care such as high blood pressure or be a known diabetic
    - Although we have consultant cover in Gilbert Bain to provide some level of consultant input, your risk of complications during pregnancy and labour will be assessed at booking, 28 weeks, 36 weeks and 40 weeks. If there is suspected or anticipated complications, particularly for your baby, you will be advised to deliver in Aberdeen. This is because there are no resident Neonatologists (baby doctors) or neonatal unit at Gilbert Bain
2. Be expected to deliver between 37 to 42 weeks of pregnancy
3. Have a singleton pregnancy (one baby)
4. Baby to have Cephalic presentation (head first)
5. Have had up to four previous pregnancies without complication or where the reoccurrence of the complications is not anticipated

Aberdeen Royal Infirmary

You will be referred to Aberdeen if you have any of the following:

1. A multiple pregnancy (e.g. twins or triplets)
2. Your placenta is found to be too low lying
3. High Blood pressure
4. BMI over 40
5. Your baby is measuring small
6. There is either too much or too little water around your baby
7. You have an infection that will mean your baby needs treatment when born

All of the above problems can result in your baby needing specialist care and this is something that we cannot provide at Gilbert Bain. To ensure your baby is in the best place with the best people to provide that care we will refer you to

Aberdeen. Your named Midwife will provide care during your pregnancy and liaise with the team in Aberdeen to ensure continuity of care.

Other reasons we may recommend delivery in Aberdeen:

1. You have had a previous Caesarean section and would like a normal delivery
2. You had a heavy bleed and required a blood transfusion after a previous delivery
3. You have had pre-eclampsia resulting in a pre-term birth
4. You are diabetic
5. You have heart, liver or kidney disease
6. You have high blood pressure
7. You have severe asthma
8. You have bleeding or clotting disorders
9. You have hyperthyroid
10. You are epileptic
11. You have a known infection
12. You have had a previous preterm delivery

We cannot provide epidurals for pain relief in labour at Gilbert Bain. If this is your pain relief of choice please talk to your midwife about pain relief in labour and delivery in Aberdeen.

Choices for delivery in Shetland

Your named Midwife will discuss choices for place of delivery with you. If you meet the criteria for delivery in Shetland this can be a home birth or delivery in the Maternity Unit at Gilbert Bain.

Home birth

Being at home can help you to feel more in control and more able to relax. It is also known to reduce the need for pain relief. However, with this choice, you need to know that if there is a problem during your labour you will need to be transferred to hospital. How far you live away from the hospital and the time it could take to transfer you, will need to be a consideration.

For pain relief, you can hire or buy TENS machine and birthing pools, we can provide Entonox (gas and air) and we can provide pain relief by injection. Your midwife will provide care for you during your labour. After delivery, if all observations for you and your baby are normal, you will both remain at home. If, however more observations are needed you be advised to transfer to hospital.

Delivery in hospital

We have 2 delivery rooms. One with and one without a birthing pool. We also have birthing balls available for you to use. We can offer Entonox for pain relief and this can be used while in the pool if needed. We also offer pain relief by injection. The Midwife caring for you in labour will be able to discuss your options with you.

If your labour has been assessed as being low risk we will use hand held devices to monitor your baby's heart beat during labour. If we have any concerns, we will continuously monitor your baby's heart beat and your contractions using a Cardio Tocograph (CTG) monitor.

If any problems develop during your labour you will be assessed by a Consultant who will discuss your care with you, your partner and the Midwife looking after you. If necessary Consultants in Aberdeen (particularly if there are concerns about your baby) will be contacted and asked for their input into your care. Once you are in labour, you will deliver in Gilbert Bain. The Consultant caring for you will discuss whether this will be a normal delivery, forceps or caesarean section. However if there are complications that mean your baby, once delivered, will need additional support or treatment, arrangements will be made for transfer to Aberdeen. We have a specialised retrieval team with Doctors and Nurses who come up from Aberdeen or Glasgow with special equipment for the transfer. As there is a lot of equipment and staff this means, unfortunately, you may be unable to accompany your baby on this flight. The Midwife looking after you will liaise with our Patient Travel team to arrange for you to travel on the next available commercial flight. Patient Travel will also be able to discuss accommodation in Aberdeen with you.

Once your baby is discharged from Aberdeen your named midwife will visit you both at home.

Your named Midwife will be seeing you at various stages during your pregnancy. They will risk assessment you at your first visit, at 28 weeks, 36 weeks and 40 weeks to determine suitability for delivery and identify any causes for concern so we can provide you with appropriate safe care.

The contact number for the Maternity Unit is 01595 743012