Ultrasound in the Diagnosis of Developmental Hip Dysplasia and Dislocation – A Protocol

Introduction and Aim

- The aim of the protocol is to provide a clear guideline to staff in the UHB regarding the undertaking of hip ultrasound in the diagnosis of developmental hip dysplasia and dislocation.

Objectives

- To improve the efficiency and efficacy of the UHB diagnostic ultrasound in diagnosis of developmental hip dysplasia and dislocation.
- To make best use of the clinical expertise of the Sonographer.
- To encourage and foster the further development of such staff.
- To ensure that such role extension is properly managed and audited in line with sound clinical governance principles.
- To support CPD (continual professional development).

Scope

This protocol applies to all staff undertaking hip ultrasound in the diagnosis of developmental hip dysplasia and dislocation within the Cardiff and Vale University Health Board (CV UHB)

Equality Impact Assessment

An Equality Impact Assessment has been completed as part of a EHIA.

It did not appear relevant and proportionate at this time to undertake a full Equality Impact Assessment

Equality Statement - Section 1.8 of the protocol document agreed as sufficient information.

Health Impact Assessment

A Health Impact Assessment (HIA) has been completed as part of the EHIA.
Documents to read alongside this Procedure

- Standards for the provision of an Ultrasound service
  https://www.rcr.ac.uk/sites/default/files/publication/BFCR%2814%2917_Standards_ultrasound.pdf

- Standards and recommendations for the reporting and interpretation of imaging investigations by non-radiologist medically qualified practitioners and teleradiologists
  https://www.rcr.ac.uk/standards-and-recommendations-reporting-and-interpretation-imaging-investigations-non-radiologist

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Disclaimer
If the review date of this document has passed please ensure that the version you are using is the most up to date either by contacting the document author or the Governance Directorate.

Summary of reviews/amendments

<table>
<thead>
<tr>
<th>Version Number</th>
<th>Date of Review Approved</th>
<th>Date Published</th>
<th>Summary of Amendments</th>
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<tr>
<td>1</td>
<td>05/04/2017</td>
<td>07/06/2017</td>
<td>New Protocol</td>
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1.0 INTRODUCTION
The early and accurate diagnosis of developmental hip dysplasia and dislocation in young infants remains a significant problem. There are inadequacies in radiologic examination of the hip while the femoral head and portions of the acetabulum remain cartilaginous, and it may be difficult to decide on the basis of clinical signs alone which infants will benefit from treatment. Both under-treatment and over-treatment of this condition can result in morbidity, while early diagnosis and treatment are associated with good results.

Ultrasound examination has played a significant role in improving the display of hip anatomy and dynamics during infancy, and in improving the selection of patients for treatment. All those involved in these studies, or contemplating involvement, should however be aware that the accuracy and reliability of results produced are dependent on the training and experience of those involved. Inadequacy in either the technique of the examination or its interpretation can readily lead to incorrect conclusions and serious long term consequences for the infant.

2.0 EQUALITY STATEMENT

Cardiff and Vale UHB is committed to ensuring that, as far as is reasonably practicable, the way we provide services to the public and the way we treat our staff, patients and others reflects their individual needs and that we will not discriminate, harass or victimise individuals or groups unfairly on the basis of sex, pregnancy and maternity, gender reassignment, disability, race, age, sexual orientation, disfigurement, religion and belief, family circumstances including marriage and civil partnership. These principles run throughout our work and are reflected in our core values, our staff employment policies, our service delivery standards and our Strategic Equality Plan and Equality Objectives. We believe that all staff should have fair and equal access to training as highlighted in both the Equality Act 2010 and the 1998 Human Rights Act. The responsibility for implementing the Plan falls to all employees and UHB Board members, volunteers, agents or contractors delivering services or undertaking work on behalf of the UHB.

The scheme of work categorises the type of report that can be issued by a Sonographer dependent on their agreed level of working. At no time should a Sonographer work outside their agreed Level of Work.

3.0 AIM
3.1 The aim of the protocol is to provide a clear guideline to staff in the UHB regarding the remit of UHB newborn hip screening Sonographers.

3.2 To outline the method used for diagnosing dysplasia of the hip in the newborn period.

3.3 To outline the reporting pathway for the newborn hips.

4.0 OBJECTIVES

4.1 To make the best use of the clinical expertise of the Sonographer.

4.2 To improve the efficiency and efficacy of the UHB diagnostic ultrasound service.

4.3 To encourage and foster the further development of such staff

4.4 To ensure that such role extension is properly managed and audited in line with sound clinical governance principles.

4.5 To support CPD (continual professional development).

5.0 ROLES AND RESPONSIBILITIES

5.1 All Sonographers wishing to undertake hip scanning for the diagnosis and management of developmental dysplasia must be in possession of, or under supervision of a Sonographers who possess the following:

Diploma of the Royal College of Radiographers or BSc in Diagnostic Radiography or equivalent graduate status.

Current State Registration with the Health Professions Council.

Diploma in Medical Ultrasound or postgraduate equivalent approved by The Consortium for the Accreditation of Sonographic Education

Certificate of attendance and completion from the Graf Hip Ultrasound Course.

5.2 Sonographers will be expected to comply with regulations imposed by their own statutory body and to heed the advice given by that professional body.

5.3 Sonographers should hold professional indemnity insurance. The UHB will formally indemnify the sonographer who performs work which has
been appropriately delegated and carried out in accordance with the terms of the delegation and the departmental protocols which may be revised from time to time.

6.0 SCOPE

6.1 The optimal time for scanning infant hips is between 2 and 6 weeks of age. Infants up to the age of approx 6 months can be scanned. For infants over 6 months age an x-ray may be indicated (depending of the ossification of the femoral head nucleus)

6.2 All babies that are clinically symptomatic at post natal checks (e.g. positive Ortholani test), should be scanned.

6.3 Screening for DDH will be performed in all high risk babies. This includes all babies with one or more the following risk factors;
- Breech presentation in the third trimester
- Oligohydramnious in utero
- Family history of DDH (parent or sibling)
- Neuromuscular abnormality (e.g. Spina Bifida or arthrogryposis)
- Paediatric or Orthopaedic consultant referral
- Babies over 4.5Kg
- Multiple births

6.4 Babies are ideally referred via the electronic CAVUHB Pathway for Neonatal Hip Screening (Appendix 1)

7.0 CONSENT
7.1 The consent process is a continuum beginning with the referring health care professional who requests the ultrasound examination and ending with the Sonographer who carries it out.

7.2 It is the responsibility of the referring professional to provide sufficient information to the patient or their parent/guardian to enable the latter to consent to the ultrasound examination taking place.

7.3 It is the responsibility of the Sonographer to ensure that the patient or their parent/guardian understands the scope of the ultrasound examination prior to giving consent.

8.0 EXAMINATION PREPARATION

8.1 No specific patient preparation is required for this scan. The parent is asked to remove the baby’s clothing down to his/her vest once in the ultrasound room. The vest should be pulled up to above the waist and the nappy removed at the time of the scan.

8.2 Decontamination
The machine and transducers should be cleaned in accordance with the UHB SOP.

9.0 ULTRASOUND SCANNING TECHNIQUE
The Graf technique is a recognised method to obtain reproducible, standardised images of the paediatric hip. This is based on a coronal image and the use of measurements to qualify the coverage of the femoral head.

9.1 The ‘Graf Cradle’ and probe holder should ideally be used for all examinations. This ensures the baby lies in the correct position and reduces tilting of the probe.

9.2 A linear transducer 5-7.5MHz should be used.

9.3 An incontinence sheet should be used to line the cradle.

10.0 MEASUREMENT TECHNIQUE

Measurements must only be carried out in the Graf method ‘Standard Plane’ – Stored images must comply to the Graf anatomical and usability checklists.

10.1 Measurement lines should be drawn on the images using the measurement package on the PACS system and saved if possible.

• The bony roof line - drawn from the lower limb of the ilium (using the lower limb as a pivot point). A tangential is placed laterally from the pivot point just touching the bony roof.

• The base line – The uppermost point of the cartilaginous roof should be used as the pivot point and a tangential line is drawn cranial to caudal along the echo of the ilium.

The alpha angle is the value of the angle between the bony roof line and the base line.

It is possible to also measure the beta angle but at present this is not used by the UHB.

• The cartilage roof line is drawn from the turning point/bony rim (point of concavity/convexity) through the middle of the labrum.

The beta angle is the value of the angle between the cartilage roof line and the base line.

• There is no need to measure the angles if the hip is decentred.
11.0 IMAGES TO BE STORED

11.1 At least two coronal images of each hip, (to include the lower limb of the os ilium, plane and labrum), should be stored and saved to PACS. If for any reason the images cannot be stored onto the hard drive/PACS system then thermal images should be printed and scanned into Radis.

12.0 REPORTING

12.1 The report should include;
- Name of patient
- Date of birth/age at scan
- Whether the hip is centred or decentred.
- Angle measurement and hip type
- Referral pathway/ further management.

Below is an example of the report proforma to be followed;

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NORMAL
Diagnosis: Sonographically IMMATURE } CENTRED
HIP

UNSTABLE

DISLOCATED/DECENTRED

This AGE infant attended for a neonatal hip ultrasound in line with Cardiff and Vale UHB hip screening guidelines.

Report

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<thead>
<tr>
<th></th>
<th>Centred/Decentred</th>
<th>Alpha angle</th>
<th>Type</th>
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<tr>
<td>RIGHT</td>
<td></td>
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<td>LEFT</td>
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Further management: DISCHARGED
REPEAT SCAN in 4 weeks
URGENT BABY HIP CLINIC APPOINTMENT

Please put this report in the Baby’s Health Record Book
12.2 Sonographer reporting of hip ultrasound examinations

Sonographers performing hip ultrasound scans may provide a report for the examinations depending on their particular training and experience. Each individual will need to be able to demonstrate such competence to the satisfaction of the UHB and in line with local protocol, and in agreement with the orthopaedic hip ultrasound DDH team and the supervising Radiologist.

The UHB must be informed in writing of those individuals who will be undertaking Sonographer hip reporting.

Those charged with assessing competency must be in possession of either the;

Fellowship of the Royal College of Radiologists (FRCR) and competent in paediatric hip scanning,

Fellowship of the Royal College of Surgeons (FRCS) and competent in paediatric hip scanning

Senior Sonographer with PGDip in Medical Ultrasound who is competent in paediatric hip scanning.

All examinations and reports will be carried out according to departmental protocols.

The report may be recorded using the various departmental systems: -

- RADIS – Radiology Information System.
- Digital (G2 interactive and sign off).

The report should be issued by the reporting Sonographer, except where service provision and patient care/safety would be compromised should a second opinion not be given.

Additional communication of the report may be made verbally to the referring clinician and/or written in the patient’s notes where appropriate and in accordance with local policy.

For further information on Sonographer reporting and audit please refer to the Sonographer reporting protocol.

13.0 STAND ALONE SONOGRAPHER HIP CLINIC

Senior Sonographer led clinic that follows the same working pattern as described above however there is not a consultant available to immediately see the patient following the scan. The Sonographer will decide whether the hip is centred or decentred and whether urgent action is required. If the hip is decentred the Sonographer will arrange for the patient to see a paediatric orthopaedic hip consultant in the next orthopaedic consultant clinic.

The same reporting protocol as above applies.
Appendix 2

Graf Grading system
• Graf type I: A normal hip. Alpha angle is greater than 60°. The child is discharged and a copy of the report is sent back to the referring clinician.

• Graf type IIa: An immature hip. Alpha angle is less than 60° before 12 weeks of age and the alpha angle demonstrates the minimal degree of maturity expected. Rebook the patient for a rescan in 4 weeks. Send a copy of the report back to the referring clinician. If remains less than 60° at the repeat scan consider the hip dysplastic and refer to the Paediatric Orthopaedic Consultant.

• Graf type IIb: Dysplastic hip. Alpha value is between 50-59° but infant is older than 12 weeks. Refer to the Paediatric Orthopaedic Consultant.

• Graf type IIc: Dysplastic hip. Alpha value is between 43-49°. The hip is severely dysplastic and close to centring. (Note if the beta angle is greater than 77° the hip is close to decentring and is a type D). Refer to the Paediatric Orthopaedic Consultant.

• Graf type III: Dysplastic hip. The hip is decentred and the cartilage is displaced upwards. No need to measure the angles. Refer to the Paediatric Orthopaedic Consultant.

• Graf type IV: Dysplastic hip. The hip is decentred and the cartilage is displaced downwards. No need to measure angles. Refer to the Paediatric Orthopaedic Consultant.

Appendix 3
Sonographer competency levels for hip scanning

Level 1
- Hip scans performed under the supervision of a level 3 reporter.

Level 2
- Completion of the basic Graf hip course.
- Minimum of 50 hip scans performed and a
- Minimum of 6 months training in hip scanning.
- Competency audit completed and signed off by a level 3 reporter.
- Independent practise with proformer reporting.

Level 3
- Completion of the basic and update Graf hip course.
- Competency and reporting audit (50 images) completed and signed off by a level 3 reporter.
- Independent practise and reporting to comply with current agreed remit.