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Assessment of Developmental Hip Dysplasia Ultrasound Protocol

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Last review date: January 2015

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Indications:

Indications for ultrasound of the infant hip include, but are not limited to:

- Abnormal or equivocal findings on physical or imaging examination of the hip.
- Any family history of DDH.
- Breech presentation regardless of gender.
- Oligohydramnios and other intrauterine causes of postural molding.
- Neuromuscular conditions.
- Monitoring patients with DDH being treated with a Pavlik harness or other splint device.

Two of the strongest risk factors for DDH are: a female newborn with frank breech presentation at birth and a family history of a parent and/or a sibling with DDH. It is recommended that these patients undergo ultrasound screening 4 to 6 weeks after birth.

There are no absolute contraindications to ultrasound of the infant hip for DDH, but as discussed above, the study becomes less reliable compared to radiography as ossification of the femoral head progresses. Due to the presence of physiologic laxity, hip sonography is not performed on patients younger than 3 to 4 weeks of age, unless there are clinical findings indicative of dislocation or significant instability.

Required Images:

Both hips should be examined. The diagnostic examination for DDH incorporates two orthogonal planes: a coronal view in the standard plane at rest, and a transverse view of the flexed hip with and without stress. This enables an assessment of hip position, stability, and morphology when the study is correctly performed and interpreted. If position, stability, and/or morphology cannot be assessed when attempting to perform a complete examination, the report should note the portion not done. It is acceptable to perform the examination with the infant in a supine or a lateral decubitus position.

Morphology is assessed at rest. The stress maneuver (posterior push maneuver) is performed to evaluate for hip instability with the hip and knee flexed and the thigh adducted (Barlow maneuver). If the femoral head is subluxated, subluxable, dislocated, or dislocatable,

reducibility can be assessed by abducting and externally rotating the hip (Ortolani maneuver). If the examiner chooses, additional views and maneuvers can be obtained. It is important that the infant be relaxed when hips are assessed for instability. Feeding the infant during the examination can increase comfort and cooperation. (Caution: application of stress is omitted when hips are being examined in a Pavlik harness or splint device unless otherwise requested by the orthopedic surgeon).

➤ *Coronal View*

The anatomic coronal plane is approximately parallel to the posterior skin surface of an infant. If the superior edge of the transducer is rotated 10 to 15 degrees (usually posteriorly) into an oblique coronal plane, the ilium will appear straight. After adjustment to assure that the imaging plane is through the deepest part of the acetabulum (which includes visualization of the triradiate cartilage and the ischium posteriorly), the resulting image will be a coronal view in the standard plane.

The standard plane is defined by identifying a straight iliac line, the tip of the acetabular labrum, and the transition from the os ilium to the triradiate cartilage (see Figure 1). The coronal view in the standard plane can be obtained with the hip in the physiologic neutral position (15 to 20 degree flexion) or in the flexed position. Femoral head position and displacement are noted. Acetabular morphology is assessed in this view and may be validated by measuring the acetabular alpha angle (≥ 60 degrees). Validation by angle and femoral head coverage measurement is optional. Performance of stress in this plane is also optional.

➤ *Transverse Flexion View*

The examination is performed with the hip flexed at 90 degrees. The transverse plane is the anatomic transverse or axial plane (similar to the plane of an axial computed tomography (CT) image) (Figure 2). The femoral shaft is seen anteriorly, terminating in the femoral head which rests on the ischium. The hip is tested for position at rest with passive abduction and adduction. Next, gentle stress is applied to assess stability. The transducer is placed in a posterolateral position so that imaging can be accomplished while the hip is abducted and adducted (Ortolani and Barlow maneuvers). If the relationship of the femoral head to the posterior acetabulum changes with gentle stress, the hip is unstable. Transverse view of the hip flexed 90 degrees at the hip.

Modification of the Diagnostic Examination

The supervising physician may modify the examination depending on clinical circumstances, such as during or following treatment for DDH.