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Each practice guideline and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review, requiring the approval of the Commission on Quality and Safety as well as the ACR Board of Chancellors, the ACR Council Steering Committee, and the ACR Council. The practice guidelines and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice guideline and technical standard by those entities not providing these services is not authorized.

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ACR PRACTICE GUIDELINE FOR THE PERFORMANCE OF THE ULTRASOUND EXAMINATION FOR DETECTION OF DEVELOPMENTAL DYSPLASIA OF THE HIP

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict

with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

The clinical aspects of this guideline (Introduction, Indications/Contraindications, Specifications of the Examination, and Equipment Specifications) were developed collaboratively by the American College of Radiology (ACR) and the American Institute of Ultrasound in Medicine (AIUM). Recommendations for physician requirements, procedure documentation, and quality control vary between the two organizations and are addressed by each separately.

This guideline has been developed to assist practitioners performing sonographic studies for detection of developmental dysplasia of the hip (DDH). (The term DDH has replaced the term congenital dysplasia (dislocation) of the hip [CDH].) Adherence to the following standard will maximize the probability of detecting most of the abnormalities that relate to hip position, hip stability, and development of the acetabulum.

Ultrasound is an excellent method for diagnostic imaging of the immature hip. It affords direct visualization of the cartilaginous components of the hip joint. The value of ultrasound diminishes as the femoral head ossifies. For patients between 6 months and 1 year of age, radiography becomes more reliable. Usually by 1 year of age the femoral head is sufficiently ossified to prevent good visualization of the acetabulum with ultrasound.

II. INDICATIONS/CONTRAINDICATIONS

Ultrasound of the infant hip can be used both in the diagnosis of DDH and in monitoring treatment (when performed using customary splint-type devices).

Clinical indications for ultrasound of the infant hip¹ include, but are not limited to:

1. Abnormal findings on physical exam of the hip.
2. Family history of DDH.
3. Breech presentation at birth.
4. Postural molding conditions (torticollis, foot deformity).
5. Monitoring of treatment of DDH.

There are no absolute contraindications to ultrasound of the infant hip for DDH, but as discussed above, the study becomes less reliable relative to radiography as ossification of the femoral head progresses. Due to the presence of physiologic laxity, imaging is usually not performed on patients less than 2 weeks old.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

See the [ACR Practice Guideline for Performing and Interpreting Diagnostic Ultrasound Examinations](#).

IV. SPECIFICATIONS OF THE EXAMINATION

The diagnostic examination for DDH incorporates two orthogonal planes. It is customary to examine both hips. The diagnostic exam should include 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. It is acceptable to perform the standard exam with the infant in a supine or lateral position. It should be noted that additional views and maneuvers can be obtained and that these may enhance the confidence of the examiner. Morphology is assessed at rest. Stress maneuvers follow those prescribed in the clinical examination of the hip (Barlow and Ortolani tests) and assess femoral stability. It is important that the infant be relaxed when hips are assessed for

instability. Feeding the infant during the examination can increase patient comfort and cooperation.

A. Coronal View

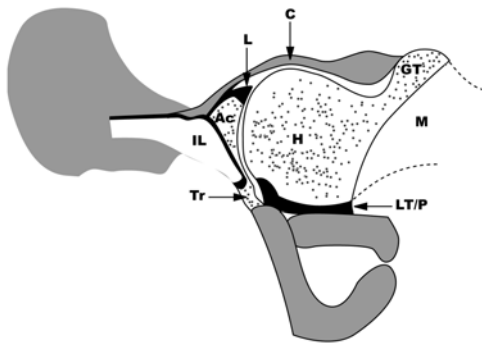
The anatomic coronal plane is approximately parallel to the posterior skin surface of an infant. If the superior edge of the transducer is rotated 10-15 degrees (usually posteriorly) into an oblique coronal plane, the ilium will appear straight, and after adjustment to assure that the imaging plane is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

The standard plane is defined by identification of a straight iliac line, the tip of the acetabular labrum, and transition from the os ilium to the triradiate cartilage (see Figure 1). Since the femoral head is almost spherical, the position of the femur is unimportant in this view, but the view is most easily obtained with the femur in a neutral position. The coronal view in the standard plane at rest can be performed with the hip in the flexed position during treatment. Femoral head position and displacement are noted. Acetabular morphology is assessed in this view. Validation by measurement is optional. Performance of stress in this view is optional.

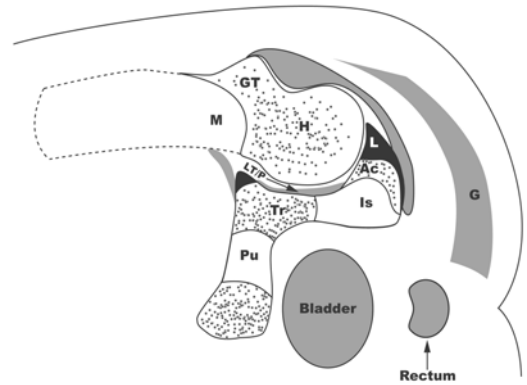
B. Transverse Flexion View

The examination is performed with the hip flexed. The hip is tested for position at rest with passive abduction and adduction. This is followed by the application of gentle stress to assess stability. (Caution: application of stress is omitted when hips are being examined during treatment.) The transverse plane is the anatomic transverse or axial plane (similar to the plane of a primary CT image). The transverse view is obtained when the femur is in flexion and the transducer is in the transverse plane (Figure 2). The transducer is posterolateral so that imaging can be accomplished while the hip is abducted and adducted (Ortolani and Barlow maneuvers). The hip should be evaluated with the femur in flexion, at rest, and during application of gentle posteriorly directed force (stress) to assess stability. If the relationship of the femoral head to the posterior acetabulum changes with gentle stress, the hip is unstable. Other orthopedic stress maneuvers described in the literature are optional.

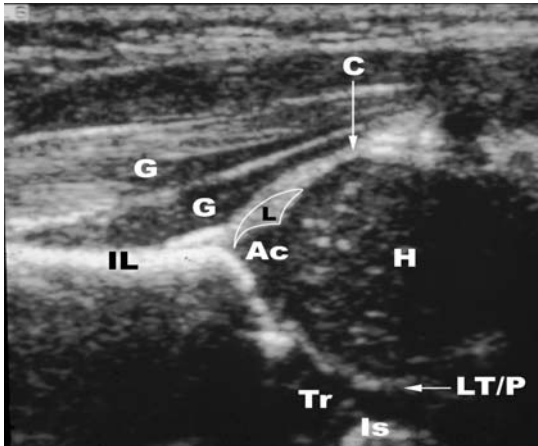
¹Embedded numbers refer to reference list.



Concept by Neil Johnson, MD
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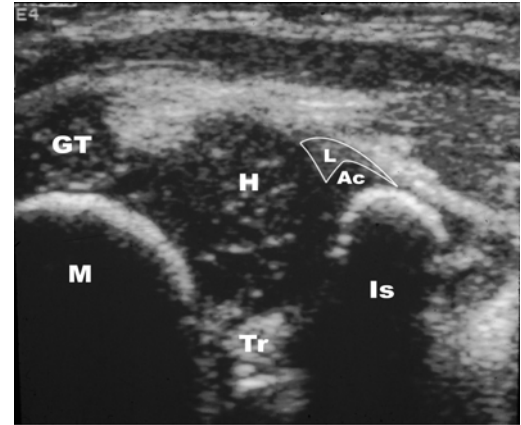
Concept by Neil Johnson, MD
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Concept by Neil Johnson, MD Illustration by Glenn Miñano

Figure 1

Coronal view of left hip joint in the standard plane. The femoral shaft is in the position of rest (usually 15-20 degrees of hip flexion).



Concept by Neil Johnson, MD Illustration by Glenn Miñano

Figure 2

Transverse view of the left hip with the femoral shaft flexed 90 degrees at the hip.

Ac	Acetabular Cartilage
C	Capsule
G	Gluteus Muscles
GT	Greater Trochanter
H	Cartilaginous Femoral Head
IL	Ilium
Is	Ischium
L	Labrum
LT/P	Ligamentum Teres/Pulvinar Complex
M	Femoral Metaphysis
Pu	Pubis
Tr	Triradiate Cartilage

C. Modification of the Diagnostic Examination

The supervising physician may modify the examination depending on clinical circumstances, such as during or following treatment for DDH. In such cases, a coronal view in the standard plane can be performed and, if abnormal, a complete diagnostic examination is recommended.

V. DOCUMENTATION

Adequate documentation is essential for high-quality patient care. There should be a permanent record of the sonographic examination and its interpretation. Comparison with prior relevant imaging studies is recommended when these are available. Images can be recorded in any of the standard storage formats. When optional measurements are performed, it is essential that they be obtained from images that meet the criteria for a standard plane. Images should be labeled with the examination date, patient identification, hip being imaged, image orientation, and whether stress is being applied. A report of the sonographic findings should be included in the patient's medical record, indicating acetabular morphology, position of femoral head, and stability. Retention of the sonographic examination should be consistent both with clinical needs and with relevant legal and local health care facility requirements.

Reporting should be in accordance with the [ACR Practice Guideline for Communication: Diagnostic Radiology](#).

VI. EQUIPMENT SPECIFICATIONS

Hip ultrasound for the detection of developmental dysplasia of the hip should be performed with the highest frequency transducer that permits penetration of the soft tissues. Broadband linear transducers are preferable. Acetabular measurements should only be made on images produced with a linear transducer. Total ultrasound exposure should be kept as low as reasonably achievable (ALARA), while optimizing diagnostic information.

VII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns appearing elsewhere in the ACR Practice Guidelines and Technical Standards book.

Equipment performance monitoring should be in accordance with the [ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Real Time B-Mode Ultrasound Equipment](#).

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