Abstract

Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age: Evidence-Based Clinical Practice Guideline is based on a systematic review of the current scientific and clinical research. This guideline has been endorsed by the Society of Diagnostic Medical Sonography, the Society for Pediatric Radiology, American Academy of Pediatrics, and the Pediatric Orthopaedic Society of North America. The purpose of this clinical practice guideline is to help improve treatment and management based on the current evidence. This guideline contains nine recommendations, including both diagnosis and treatment. In addition, the work group highlighted the need for better research in the early diagnosis and treatment of developmental dysplasia of the hip.

Overview and Rationale

The American Academy of Orthopaedic Surgeons (AAOS), with input from representatives from the American Academy of Pediatrics, American Academy of Family Physicians, Society of Diagnostic Medical Sonography, and Society for Pediatric Radiology, recently published its clinical practice guideline (CPG), Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age.¹ This CPG was approved by the AAOS Board of Directors on September 5, 2014, and has been officially endorsed by the American Academy of Pediatrics (AAP), Pediatric Orthopaedic Society of North America, Society of Diagnostic Medical Sonography, and the Society for Pediatric Radiology.

The purpose of this clinical practice guideline is to help improve treatment and management based on the current evidence.

This guideline differs from the AAP technical report guideline methodology as developed in 2000.² The AAP technical report guideline was based on an extensive literature review and expert opinion. The current AAOS evidence-based guideline utilized a rigorous, standardized methodology that led to nine recommendations based on the quality of the evidence. Review articles, textbooks, animal studies, and retrospective articles without appropriate controls were not used in this guideline, in keeping with utilizing the best available evidence. Each recommendation included an indication of the strength of the evidence,
a rationale, and a brief discussion of potential risks or harms.

Both this guideline and the 2000 AAP technical report support continuing clinical screening of children for developmental dysplasia of the hip (DDH). The 2014 AAOS CPG has several important differences from the 2000 AAP guideline. First, the target population is shifted from all normal infants up to walking age to include only those up to 6 months of age. The two most significant recommendations are of moderate strength and serve to inform the screening process for detection of DDH. Universal ultrasonography screening of newborn infants is not recommended; however, performing an imaging study before 6 months of age in infants with significant risk factors is recommended. Risk factors deemed significant by this analysis are breech presentation, family history, and a history of clinical instability. In comparison, the 2000 AAP guideline included sex of the infant as a risk factor and did not include history of clinical instability. The remaining seven recommendations are of limited strength and focus on early intervention and management of children with DDH. The limited strength recommendations reflect the ambiguity in the literature resulting from center variations in screening, diagnosing, and treating children with DDH.

Substantial work remains to be done to strengthen the existing evidence supporting recommendations for the early detection and management of DDH. Of the 3,990 citations found in the peer-reviewed literature on the topic of DDH, 42 articles (1.05%) met the rigorous inclusion criteria required to be included as evidence related to recommendations in the guideline, and 18 (0.45%) met inclusion criteria for an assessment of the natural history for DDH in infancy. A concerted and collaborative research effort among the orthopaedic surgeon community will be required to improve the evidence and strengthen the recommendations made in this guideline in a future update.

During the development of this guideline, the work group prioritized identifying the natural history of clinically unstable or ultrasonographically or radiographically abnormal hips detected in infancy with natural self-correction over time. The natural history of DDH has been difficult to clearly delineate because of inconsistent terminology used throughout the literature to describe hip abnormalities. Specifically, recognized abnormalities of the hip in newborns and infants have not been fully characterized and categorized either as progressive and pathologic or as self-resolving. The natural history of DDH appears to be dependent on both the type and severity of the hip abnormality, with mild dysplasia often resolving without any evident clinical manifestation. The natural history studies reviewed for development of this guideline indicated that most DDH cases discovered by clinical examination or imaging study in newborns represent hip laxity and immaturity. Sixty percent to 80% of clinically identified abnormalities and 90% of ultrasonographic abnormalities spontaneously resolved without surgery.

Dr. Mulpuri or an immediate family member has received research or institutional support from DePuy and serves as a board member, owner, officer, or committee member of the American Academy of Orthopaedic Association, the International Hip Dysplasia Institute, and the Pediatric Orthopaedic Society of North America. Dr. Song or an immediate family member serves as a board member, owner, officer, or committee member of the American Academy of Orthopaedic Surgeons, the Pediatric Orthopaedic Society of North America, and the Scoliosis Research Society. Dr. Goldberg or an immediate family member serves as a paid consultant to BioMarin and serves as a board member, owner, officer, or committee member of the American Academy of Orthopaedic Surgeons. Neither Ms. Sevarino nor any immediate family member has received anything of value from or has stock or stock options held in a commercial company or institution related directly or indirectly to the subject of this article.

This clinical practice guideline was approved by the American Academy of Orthopaedic Surgeons Board of Directors on September 5, 2014.

The complete document, Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age: Evidence-Based Clinical Practice Guideline, includes all tables, figures, and appendices, and is available at http://www.aaos.org/guidelines.
treatment in early infancy. Consequently, these findings raise important questions regarding treatment decisions, including the potential to overtreat hips that may self-correct, optimal treatment timing, and course of treatment action. In contrast, severe dysplasia can present clinically during infancy and adversely affect normal hip growth and development, extending through childhood into adulthood. Interventions to ameliorate the natural history of DDH have depended upon the severity of dysplasia and on the age of diagnosis or presentation. Bracing during infancy can be an extremely effective treatment option; however, more drastic manipulative or surgical measures may be necessary as severity or age advances. The recommendations in this CPG serve to provide guidance to the practitioner on these specific issues.

Recommendations

This summary of recommendations of the AAOS Detection and Non-operative Management of Pediatric Developmental Dysplasia of the Hip in Infants up to Six Months of Age contains a list of the evidence-based treatment recommendations for the practicing physician. Discussion of how each recommendation was developed and the complete evidence report are contained in the full guideline, available at www.aaos.org/guidelines. Readers are urged to consult the full guideline for the comprehensive evaluation of the available scientific studies. The recommendations were established using methods of evidence-based medicine that rigorously control for bias, enhance transparency, and promote reproducibility.

This summary of recommendations is not intended to stand alone. Medical care should be based on evidence, a physician’s expert judgment, and the patient’s circumstances, values, preferences, and rights. For treatment procedures to provide benefit, mutual collaboration with shared decision-making between the patient and her or his physician/allied healthcare provider is essential.

A Strong recommendation means that the quality of the supporting evidence is high. A Moderate recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the quality/applicability of the supporting evidence is not as strong. A Consensus recommendation means that expert opinion supports the guideline recommendation even though there is no available empirical evidence that meets the inclusion criteria of the guideline’s systematic review. A Limited recommendation means that there is a lack of compelling evidence that has resulted in an unclear balance between benefits and potential harm.

Universal Ultrasound Screening
Moderate evidence supports not performing universal ultrasound screening of newborn infants.

Strength of recommendation: Moderate.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and feel little constraint in following a recommendation labeled as Limited.

Evaluation of Infants with Risk Factors for DDH
Moderate evidence supports performing an imaging study before 6 months of age in infants with one or more of the following risk factors: breech presentation, family history, or history of clinical instability.

Strength of recommendation: Moderate.

Imaging of the Unstable Hip
Limited evidence supports that the practitioner might obtain an ultrasound in infants less than 6 weeks of age, with a positive instability examination to guide the decision to initiate brace treatment.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

Imaging of the Infant Hip
Limited evidence supports the use of an AP pelvis radiograph instead of an ultrasound to assess DDH in infants beginning at 4 months of age.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

Surveillance after Normal Infant Hip Exam
Limited evidence supports that a practitioner re-examine infants previously screened as having a normal hip examination on subsequent visits prior to 6 months of age.

Strength of recommendation: Limited.
Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

**Stable Hip with Ultrasound Imaging Abnormalities**

Limited evidence supports observation without a brace for infants with a clinically stable hip with morphologic ultrasound imaging abnormalities.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

**Treatment of Clinical Instability**

Limited evidence supports either immediate or delayed (2 to 9 weeks) brace treatment for hips with a positive instability examination.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

**Type of Brace for the Unstable Hip**

Limited evidence supports use of the von Rosen splint over Pavlik, Craig, or Frejka splints for initial treatment of an unstable hip.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

**Monitoring of Patients During Brace Treatment**

Limited evidence supports that the practitioner perform serial physical examinations and periodic imaging assessments (ultrasound or radiograph based on age) during management for unstable infant hips.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

**References**
