



Developmental Dysplasia of the Hip

Connor Liggett, MD, Nicole Martin, MD, Joseph Lopreiato, MD, MPH

Department of Pediatrics, Uniformed Services University of the Health Sciences

INTRODUCTION

There is no consensus definition for developmental dysplasia of the hip (DDH) among the medical literature. Historically, the condition was referred to as “congenital hip dislocation,” reflecting the belief that all cases were present at birth. However, longitudinal studies revealed that many cases develop or become apparent after birth, prompting a terminology shift to DDH to more accurately reflect its varied timing and presentation. Currently, DDH is used as a broad term to describe a spectrum of hip joint findings ranging in clinical significance from mild hip joint laxity that can self-resolve to chronic hip dislocation that can lead to early osteoarthritis, limb-length discrepancy, hip pain, labral tears, and hip surgery. The condition can arise in utero, perinatally, or during infancy (typically within the first 12–18 months), but is most often associated with improper alignment or instability in the articulation of the femoral head and the acetabulum of the pelvis. In the United States, DDH is the leading cause of hip arthritis and accounts for a significant proportion of total hip replacements. Early detection and management are crucial for preventing long-term complications.

NATURAL HISTORY AND RISK FACTORS

At birth, the femoral head and acetabulum are primarily cartilaginous, with further development and ossification occurring postnatally. Development of a stable hip joint requires proper articulation between the femoral head and the acetabulum. DDH is thought to arise from disruptions in this relationship due to either genetic, developmental, or environmental factors (eg, intrauterine crowding). More typically, dislocations can occur prenatally or postnatally usually due to mechanical forces in otherwise healthy newborns. Risk factors for this type of DDH include breech presentation, family history of DDH, female sex, and twin gestation. Additionally, improper swaddling techniques have also been implicated as a risk factor. Breech presentation is considered a particularly strong risk factor, with female infants born in frank breech position (hips flexed and knees extended) at highest risk. The majority of DDH discovered in newborns represents hip laxity and immaturity, with a high percentage resolving spontaneously. However, findings of DDH on examination or through imaging in older infants near the age of walking (typically 9–12 months) are often more concerning, less likely to resolve spontaneously, and are more likely to require interventions.

PHYSICAL EXAMINATION

Screening for DDH is a key component of the newborn physical examination, with the goal of identifying instability or malalignment of the hip joint as early as possible.

AUTHOR DISCLOSURE: Drs Liggett, Martin, and Lopreiato have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device. The opinions and assertions expressed herein are those of the authors and do not reflect the official policy or position of the Uniformed Services University of the Health Sciences or the Department of Defense.

Clinical Practice Guideline: Early Detection of Developmental Dysplasia of the Hip. Committee on Quality Improvement, Subcommittee on Developmental Dysplasia of the Hip. American Academy of Pediatrics. *Pediatrics*. 2000;105(4):896–905

Evidence-Based Clinical Practice Guideline for the Detection and Nonoperative Management of Pediatric Developmental Dysplasia of the Hip in Infants Up to Six Months of Age. American Academy of Orthopaedic Surgeons. American Academy of Orthopaedic Surgeons; 2022. Accessed [August 4, 2025]. <https://www.aaos.org/globalassets/quality-and-practice-resources/pddh/pddhpcpg.pdf>

Using an Innovative Model to Improve Performance of the Infant Hip Examination. Joshi NS, Zven S, Graziop B, et al. *Hosp Pediatr*. 2024;14(8):666–673

Although techniques may vary, the most commonly used physical examination maneuvers include the Ortolani maneuver, the Barlow maneuver, and the Galeazzi sign.

The Ortolani maneuver is designed to test for reduction of a dislocated hip. With the infant in the supine position, the examiner flexes the hips and knees to 90 degrees and gently abducts the thigh while applying anterior pressure to the femoral head. A palpable “clunk” suggests that the femoral head is relocating into the acetabulum, indicating a positive Ortolani sign. A “clunk” is distinguishable from a “click,” which is a softer sound and sensation that is an equivocal finding and alone does not indicate a dislocated hip. These “clicks” can be followed serially.

The Barlow maneuver tests for the ability of the hip to be dislocated, suggesting instability. The examiner adducts the hip, flexes the knee to 90 degrees, and applies gentle posterior pressure. A positive Barlow test occurs when the maneuver results in dislocation of the femoral head posteriorly from the acetabulum. Both the Ortolani and Barlow maneuvers are difficult to perform in infants older than 6 months of age because of increasing muscle mass. In these infants, full abduction of both hips would suggest a stable hip joint. The Galeazzi sign is performed with the hips flexed to 90 degrees and adducted to midline and knees flexed so that the infant’s feet are flat on the examination surface. Unequal knee height is considered a positive Galeazzi sign and may indicate a unilateral hip dislocation. This maneuver can be performed at any age. Assessing for asymmetry of the infant’s thigh folds may also indicate the presence of a hip dislocation, but this finding alone is generally not sensitive nor specific for DDH.

IMAGING

To prevent unnecessary costs and incorrect diagnoses for families, universal screening imaging for all newborns is not recommended, given its high false positive rate. Imaging for DDH should be reserved for infants with instability on physical examination or specific risk factors such as a positive family history of DDH or breech positioning during the third trimester. These patients have an elevated absolute risk of DDH in comparison with the general population. Because of this increased risk, clinicians may consider referring these infants for hip ultrasonography at 6 weeks of age. Ultrasonography interpretation of newborn hips before 6 weeks of age can be difficult and variable. Because femoral head ossification occurs at around 4 to 6 months, radiographs become the most reliable form of imaging after 6 months of age. If a hip examination reveals laxity or frank dislocation, treatment can be started even without imaging.

TREATMENT AND MANAGEMENT

Treatment of DDH is dependent on examinations; patients with unstable hip examinations should undergo treatment, whereas patients with stable examinations but abnormal hip ultrasounds can be closely monitored by a confident examiner to determine need for treatment vs self-resolution. Treatment also depends on age. Infants up to 6 months can be treated with a Pavlik harness; those 6 to 12 months will receive a rigid abduction brace. Children over 12 months of age may need surgery and spica casting. This highlights the importance of early detection in hopes of preventing the need for surgical interventions. The Pavlik harness holds the hip in a position of flexion and abduction to center the femoral head on the acetabulum. Patients with positive Barlow maneuvers usually have favorable outcomes with the Pavlik harness alone, whereas patients with positive Ortolani maneuvers have a higher rate of failure with the harness. Risks of brace treatment include avascular necrosis of the hip, femoral nerve palsy, and inferior hip dislocation. Duration of treatment typically ranges from 6 to 12 weeks. For patients with successful treatment of DDH with the Pavlik harness, studies have shown that normal radiographs 2 years following treatment are sufficient for surveillance of recurrence.

PEDIATRICIAN PRACTICES AND GUIDELINES

All newborns’ hips should be examined before discharge from the hospital and at every health maintenance visit up to and including the 12-month visit by a trained professional. Frequent examination is crucial because hips continue to dislocate throughout the first year of life, and not every dislocated hip is detectable at birth. A positive Ortolani and Barlow warrants direct referral to an orthopedist. Equivocal findings, such as clicks, during the newborn examination should resolve by the 2-week follow up visit, and if not, are considered equivocal and may benefit from ultrasonography to better characterize the finding. Positive Ortolani and Barlow maneuvers will still be detectable at 2 weeks if DDH is present, but these examination findings typically resolve by 8 to 12 weeks of life regardless. Ultrasonography at 6 weeks is recommended for infants with equivocal physical examination findings or risk factors. Families should be counseled on avoiding restrictive swaddling techniques that restrict hip motion. Although treatment of neonatal DDH is not an emergency, it is important to develop local criteria for screening and treatment of DDH because early identification is crucial to optimize nonoperative treatment and even prevent the need for surgical intervention.

Simulation based education has also emerged as an effective strategy to improve pediatric trainees' ability to detect DDH. A recent study by Joshi et al demonstrated that hands-on practice with both normal and abnormal infant hip mannequins improved the accuracy and confidence of interns performing Ortolani and Barlow maneuvers. Learners valued the opportunity to practice rare findings, receive feedback, and refine their technique, underscoring the importance of experiential learning in pediatric residency training.

CONCLUSION

DDH requires careful screening, evaluation with longitudinal examinations, and management to prevent long-term complications. Pediatricians play a crucial role in early detection and should be proficient at performing the proper hip maneuvers to detect unstable hips. Standardized guidelines and more deliberate training in the infant hip examination can improve the accuracy of diagnosing DDH.

Comment: I still remember during my early pediatric training when the terminology changed from congenital hip dysplasia to DDH. When it was initially thought that all hip dysplasia would be present at birth, I remember reading about lawsuits of "missed diagnoses." I have such gratitude for continued longitudinal research on primary care topics such as hip dysplasia, which has given us more accurate information and prevented the unnecessary worry and disruption of trust that occurred with earlier

recommendations. I recently attended a regional pediatric meeting where one of the authors, JL, presented findings from a simulation study he and colleagues performed. These results (summarized in Joshi et al) evaluated a simulation provided to pediatric interns in which they learned about hip maneuvers and then practiced the hip examination on 2 infant mannequins: one with a normal examination and the other with an abnormal examination consistent with hip dysplasia. The study demonstrated improvement by interns in performing the Ortolani and Barlow maneuvers. Their qualitative comments detailed the benefit of the simulation experience in exposure to both normal and abnormal findings and the benefit of being observed while doing the examination and receiving feedback. He brought the 2 mannequins to the meeting, and many experienced clinicians practiced on them and commented that they were never "really sure" of their hip examination expertise but that practicing with the mannequins was beneficial. This demonstrates the power of simulation as an educational tool but also the importance of the lifelong educational journey of pediatric clinicians.

Janet R. Serwint, MD
Editor Emeritus, In Brief

Acknowledgments

We wish to thank Nicholas P. Lopreiato MD, Division of Pediatric Orthopedics, Walter Reed National Military Medical Center for his critical review.