

A Click Is Not a Clunk

Developmental Dysplasia of the Hip in a Newborn

A common cause of hip dysfunction in adulthood, developmental dysplasia of the hip affects up to 76 newborns per 1,000 live births. Here's expert, guideline-based advice on how to screen for prompt diagnosis and treat for positive outcome.

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Developmental dysplasia of the hip (DDH), previously known as *congenital dislocation of the hip*, follows a spectrum of irregular anatomic hip development spanning from acetabular dysplasia to irreducible dislocation at birth. Early detection is critical to improve the overall prognosis. Prompt diagnosis requires understanding of potential risk factors, proficiency in physical examination techniques, and implementation of appropriate screening tools when indicated. Although current guidelines direct timing for physical exam screenings, imaging, and treatment, it is ultimately up to the provider to determine the best course of action on a case-by-case basis. This article provides a review of these topics and more.

CURRENT GUIDELINES

In 2000, the American Academy of Pediatrics (AAP) developed guidelines for detection of hip dysplasia, including recommendation of relevant physical exam screenings for all newborns.¹ In 2007, the Pediatric Orthopaedic Society of North America (POSNA) encouraged providers to follow the AAP guidelines with a continued recommendation to perform newborn screening for hip instability and routine follow-up evaluations until the child achieves walking.²

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The American Academy of Orthopaedic Surgeons (AAOS) also established clinical guidelines in 2014 that are endorsed by both AAP and POSNA.³ These guidelines support routine clinical screening; research evaluated infants up to 6 months old, however, limiting the recommendations to that age-group.

Failure to treat DDH early has been associated with serious negative sequelae that include chronic pain, degenerative arthritis, postural scoliosis, and early gait disturbances.⁴ Primary care providers are expected to perform thorough newborn hip exams with associated specialized tests (ie, Ortolani and Barlow, which are discussed in "Physical exam," facing page) at each routine follow-up. Heightened clinical suspicion and risk factor awareness are key for primary care providers to promptly identify patients requiring orthopedic referral. With early diagnosis, a removable soft abduction brace can be applied as the initial treatment. When treatment is delayed, however, closed reduction under anesthesia or complex surgical intervention may be required.

EPIDEMIOLOGY

The etiology for DDH remains unknown. Hip dysplasia typically presents unilaterally but can also occur bilaterally. DDH is more likely to affect the left hip than the right.⁵

Reported incidence varies, ranging from 0.06 to 76.1 per 1,000 live births, and is largely affected by race and geographic location.⁵ Incidence is higher in countries where routine screening is required, by either physical examination or ultrasound (1.6 to 28.5 and 34.0 to 60.3 per 1,000, respectively), compared with countries not requiring routine screening (1.3 per 1,000). This may suggest that the majority of hip dysplasia cases are transient and resolve spontaneously without treatment.^{6,7}

RISK FACTORS AND PATIENT HISTORY

Known risk factors for DDH include breech presentation (see Figure 1), positive family history, and female gender.^{5,8-10} Female infants are eight times more likely than males to develop DDH.¹⁰ Firstborn status is also recognized as an associated risk factor, which may be attributable to space constraints in utero. This hypothesis is further supported by the relative DDH-protective effect of prematurity and low birth weight. Other potential risk factors include advanced maternal age, birth weight that is high for gestational age, decreased hip abduction, and joint laxity. However, the majority of patients with hip dysplasia have no identifiable risk factors.^{3,5,9,11,12}

Swaddling, which often maintains the hips in an adducted and/or extended position, has also been strongly associated with hip dysplasia.^{5,13} Multiple organizations, including the AAOS, AAP, POSNA, and the International Hip Dysplasia Institute, have developed or endorsed hip-healthy swaddling recommendations to minimize the risk for DDH in swaddled infants.¹³⁻¹⁵ Such practices allow the infant's legs to bend up and out at the hips, promoting free hip movement, flexion, and abduction.^{13,15} Swaddling has demonstrated multiple benefits (including improved sleep and relief of excessive crying¹³) and continues to be recommended by many US providers; however, those caring for infants at risk for DDH should avoid traditional swaddling and/or practice hip-healthy swaddling techniques.^{10,13,14}

Early diagnosis starts with the clinician's knowledge of DDH risk factors and the recommended screening protocols. The presence of multiple risk factors will increase the likelihood of this condition and should lower the clinician's threshold for ordering additional screening, regardless of hip exam findings.

PHYSICAL EXAM

Both AAP and AAOS guidelines recommend clinical screening for DDH with physical exam in all new-

FIGURE 1
Breech Presentation



Photo courtesy of Trent Tipton, PA-C.

borns.^{1,3} A head-to-toe musculoskeletal exam is warranted during the initial evaluation of every newborn in order to assess for any known DDH-associated conditions, which may include neuromuscular disorders, torticollis, and metatarsus adductus.⁵

Initial evaluation of an infant with DDH may reveal nonspecific findings, including asymmetric skin folds and limb-length inequality. The Galeazzi sign should be sought by aligning flexed knees with the child in the supine position and assessing for uneven knee heights (see Figure 2, page 28). Unilateral posterior hip dislocation or femoral shortening represents a positive Galeazzi sign.¹⁶ Joint laxity and limited hip abduction have also been associated with DDH.^{1,10}

Barlow and Ortolani exams are more specific to DDH and should be completed at newborn screening and each subsequent well-baby exam.¹ The Barlow maneuver is a provocative test with flexion, adduction, and posterior pressure through the infant's hip (Figure 3, page 28). A palpable *clunk* during the Barlow maneuver indicates positive instability with posterior displacement. The Ortolani test is a reductive maneuver requiring abduction with posterior pressure to lift the greater trochanter (Figure 4, page

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FIGURE 2
Positive Galeazzi Sign

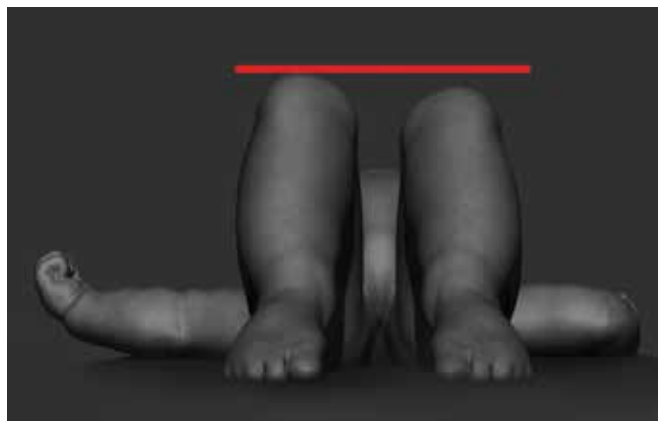


Illustration by Walt Shumway.

FIGURE 3
The Barlow Maneuver



Illustration by Walt Shumway.

32). A clunk sensation with this test is positive for reduction of the hip.

The infant's diaper should be removed during the hip evaluation. These exams are more reliable when each hip is evaluated separately with the pelvis stabilized.¹⁰ All physical exam findings must be carefully documented at each encounter.^{1,17}

It is critical for the examiner to understand the appropriate technique and potential results when conducting each of these specialized hip exams. A true positive finding is the clunking sensation that occurs with the dislocation or relocation of the affected hip; this finding is better felt than heard. In contrast,

a benign hip click with these maneuvers is a more subtle sensation—typically, a soft-tissue snapping or catching—and is not diagnostic of DDH. A click is not a clunk and is not indicative of DDH.^{1,3}

DDH may present later in infancy or early childhood; therefore, DDH should remain within the differential diagnosis for gait asymmetry, unequal hip motion, or limb-length discrepancy. It may be beneficial to continue to evaluate for these developments during routine exams as part of a thorough pediatric musculoskeletal assessment, particularly in patients with documented risk factors for DDH.^{1,3,4} Delay in diagnosis of DDH, it should be noted, is a relatively common complaint in pediatric medical malpractice lawsuits; until the early 2000s, this condition represented about 75% of claims in one medical malpractice database. The decrease in claims has been attributed to better awareness and earlier diagnosis of DDH.¹⁷

DIAGNOSIS

A positive Ortolani or Barlow sign is diagnostic and warrants prompt orthopedic referral (Figure 5, page 33). If physical examination results are equivocal or inconclusive, follow-up at two weeks is recommended, with continued routine follow-up until walking is achieved. Patients with persistent equivocal findings at the two-week follow-up warrant ultrasound at age 3 to 4 weeks or orthopedic referral. Infants with significant risk factors, particularly breech presentation at birth, should also undergo imaging.¹⁸ AAP recommends ultrasound at age 6 weeks or radiograph after 4 months of age.^{1,18} AAOS recommends performing an

imaging study before age 6 months when at least one of the following risk factors is present: breech presentation, positive family history of DDH, or previous clinical instability (moderate level of evidence).³

IMAGING

Ultrasound is the diagnostic test of choice for infants because radiographs have limited value until the femoral heads begin to ossify at age 4 to 6 months.¹⁸ Ultrasonography allows for visualization of the cartilaginous portion of the acetabulum and femoral head.¹ Dynamic stressing is performed during ultrasound to

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FIGURE 4

The Ortolani Maneuver

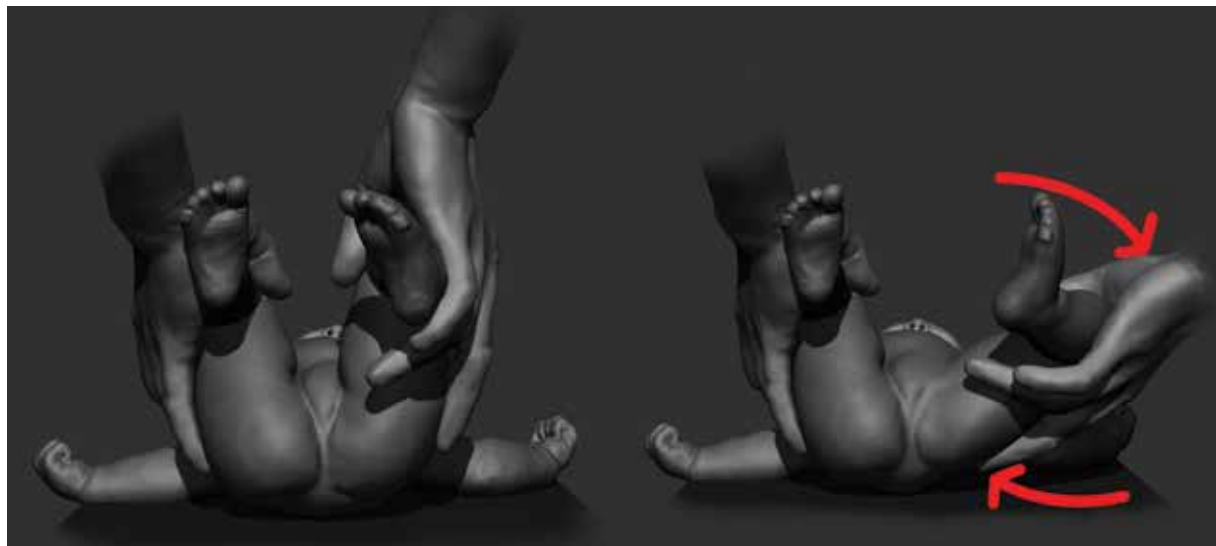


Illustration by Walt Shumway.

assess the level of hip stability. A provider trained in ultrasound will measure the depth of the acetabulum and identify any potential laxity or instability of the hip joint. Accuracy of these findings is largely dependent on the experience and skill of the examiner.

Ultrasound evaluation is not recommended until after age 3 to 4 weeks. Earlier findings may include mild laxity and immature morphology of the acetabulum, which often resolve spontaneously.^{1,18} Use of ultrasound is currently recommended only to confirm diagnostic suspicion, based on clinical findings, or for infants with significant risk factors.¹⁸ Universal ultrasound screening in newborns is not recommended and would incur unnecessary costs.^{1,3,9} Plain radiographs are used after age 4 months to confirm a diagnosis of DDH or to assess for residual dysplasia.^{3,18}

MANAGEMENT

Once hip dysplasia is suggested by physical exam or imaging study, the child's subsequent care should be provided by an orthopedic specialist with experience in treating this condition. Treatment is preferably initiated before age 6 weeks.¹² The specifics of treatment are largely based on age at diagnosis and the severity of dysplasia.

The goal of treatment is to maintain the hips in a stable position with the femoral head well covered by the acetabulum. This will improve anatomic de-

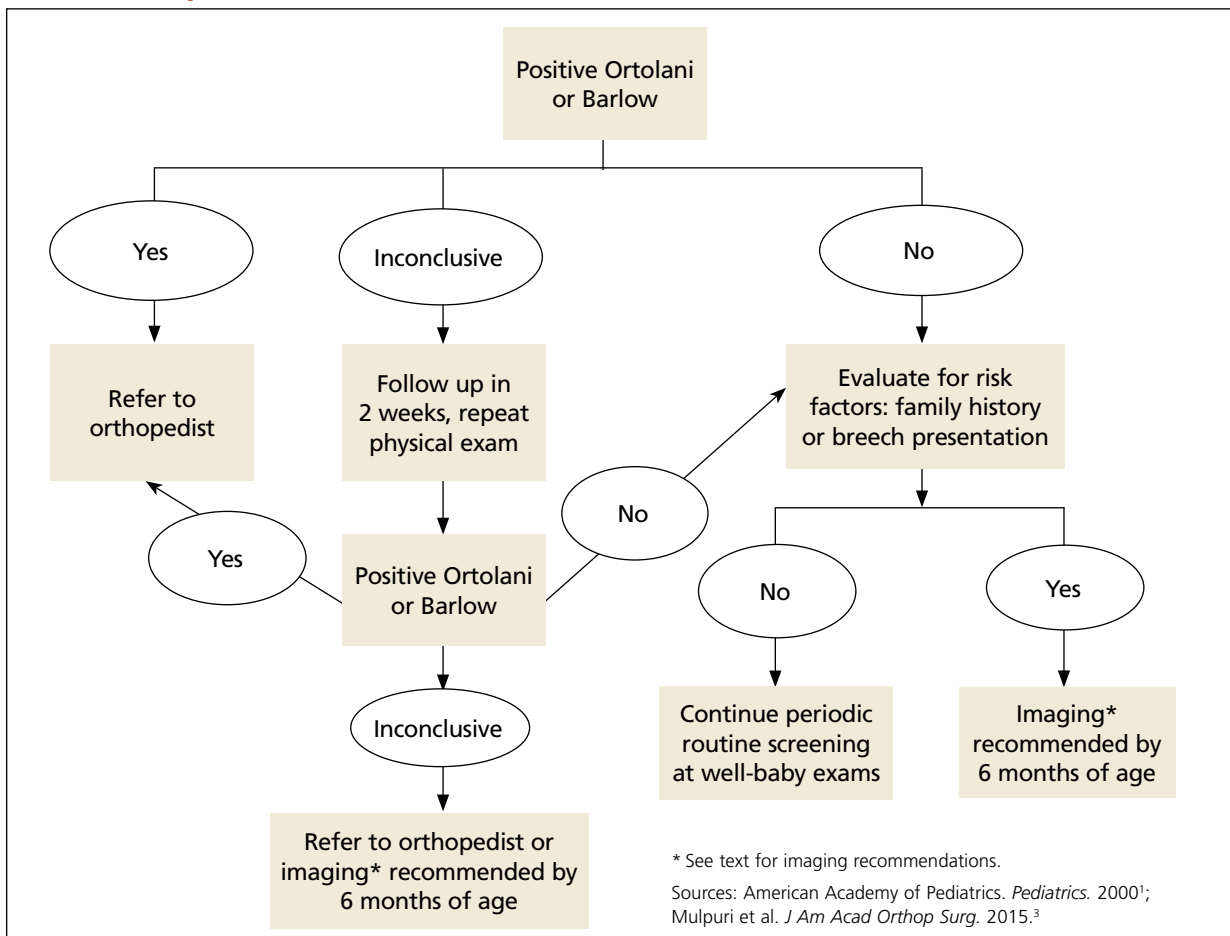
velopment and function. Early clinical diagnosis is often sufficient to justify initiating conservative treatment; additionally, early detection of DDH can considerably reduce the need for surgical intervention.¹² Although the potential for spontaneous resolution is high, the consequences associated with delay in care can be significant.

Preferred initial management, which can be initiated before confirmation of DDH by ultrasound, involves implementation of soft abduction support.¹⁹ The Pavlik harness is the support design of choice (Figure 6, page 34).¹² This harness maintains hip flexion and abduction, creating concentric reduction of the femoral head. The brace is highly successful when its use is initiated early. Treatment in a Pavlik harness requires nearly full-time wear and close monitoring by a clinician. Unlikely potential risks associated with this treatment include avascular necrosis and femoral nerve palsy.⁴

Ultrasonography is used to further monitor treatment and to determine length of wear. Long-term results suggest a success rate exceeding 90%.^{20,21} However, this rate may be falsely elevated due to the number of hips that likely would have improved spontaneously without treatment.^{6,19}

The Pavlik harness becomes less effective with increasing age, and a more rigid abduction brace may be considered in infants older than 6 months.²⁰ Overall outcomes improve once the femoral head is

FIGURE 5
Newborn Hip Evaluation



consistently maintained in the acetabulum. Delay in treatment is associated with an increase in the long-term complications associated with residual hip dysplasia.²²

Once an infant is undergoing treatment for DDH in a Pavlik harness, there is no need for primary care providers to continue to perform provocative testing, such as the Ortolani or Barlow test, at routine well-baby checks. Unnecessary stress to the hips is not beneficial, and any new results will not change the treatment being provided by the orthopedic specialist. Adjustments to the fit of the harness should be made only by the orthopedist, unless femoral nerve palsy is noted on exam. This development warrants immediate discontinuation of harness use until symptoms resolve.²¹

Abduction bracing may not be suitable for all cases of hip dysplasia. Newborns with irreducible

hips, more advanced dysplasia, or associated neuromuscular or syndromic disorder may require closed versus open reduction and casting. More invasive surgical options may also be considered in advanced dysplasia in order to reshape the joint and improve function.^{20,22}

PATIENT EDUCATION

Parents should be fully educated on the options for managing hip dysplasia. Once DDH is diagnosed, prompt referral to an orthopedic specialist is critical in order to weigh the treatment options and to develop the appropriate individualized plan for each child. Once treatment is initiated, parental compliance is essential; frequent meetings between parents and the specialist are important.

Parents of infants with known risk factors for and/or suspicion of hip dysplasia should also be

FIGURE 6
The Pavlik Harness



Photo courtesy of Trent Tipton, PA-C.

educated on hip-healthy swaddling to allow for free motion of the hips and knees.^{10,13} Advise them that some commercial baby carriers and slings may maintain the hips in an undesirable extended position. In both swaddling and with baby carriers, care should be taken to allow for hip abduction and flexion. Caution should also be taken during diaper changes to avoid lifting the legs and thereby causing unnecessary stress to the hips.

CONCLUSION

Developmental dysplasia of the hip can be a disabling pediatric condition. Early diagnosis improves the likelihood of successful treatment during infancy and can prevent serious complications. If untreated, DDH can lead to joint degeneration and premature arthritis. Recognition and treatment within the first six weeks of life is crucial to the overall outcome.

The role of a primary care provider is to identify hip dysplasia risk factors and recognize associated physical exam findings in order to refer to an orthopedic specialist in a timely manner. Guidelines from

the AAP, POSNA, and AAOS help direct this process in order to effectively identify infants at risk and in need of treatment. **CR**

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