

Hip Dislocation in Newborn Babies: Developmental Dysplasia of the Hip

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Abstract

Developmental dysplasia of the hip is one of the most common musculoskeletal disorders in newborns and infants, characterized by abnormal development of the acetabulum, femoral head instability, or complete hip dislocation. Early recognition is essential because untreated cases may lead to gait abnormalities, chronic pain, limb-length discrepancy, and early osteoarthritis. This study evaluates the etiology, risk factors, screening methods, and treatment outcomes of developmental dysplasia of the hip in newborn babies. Major contributing factors include female sex, breech presentation, positive family history, oligohydramnios, and first pregnancy. Clinical examination combined with ultrasonographic screening enables timely diagnosis. Early intervention with harness or brace treatment is associated with excellent outcomes and reduced need for surgery. Developmental dysplasia of the hip is one of the most important orthopedic disorders identified during the neonatal and early infant period. It includes a spectrum of abnormalities ranging from mild acetabular shallowness to instability, subluxation, and complete dislocation of the femoral head. This expanded section examines the biological basis, major risk factors, methods of early detection, and long-term clinical importance of the condition. Female sex, breech presentation, family history, first pregnancy, and restricted intrauterine positioning are among the most recognized contributors. If diagnosis is delayed, children may later develop gait disturbance, limb-length inequality, chronic pain, and premature degenerative joint disease. Early screening and timely treatment provide excellent functional outcomes in most patients.

Keywords: Developmental dysplasia of the hip, newborn, hip dislocation, infant orthopedics, breech presentation, Pavlik harness, neonatal screening, acetabular dysplasia, congenital hip instability, pediatric orthopedics.

1. Introduction

Developmental dysplasia of the hip (DDH) refers to a spectrum of abnormalities involving inadequate formation or instability of the hip joint during fetal life or early infancy. The condition ranges from mild acetabular shallowness to subluxation and complete dislocation of the femoral head. Earlier terminology often used "congenital dislocation of the hip," but the modern term reflects that many cases develop or worsen after birth. DDH is clinically significant because normal hip growth depends on proper alignment between the femoral head and acetabulum. When this relationship is disturbed,

joint remodeling becomes abnormal and long-term disability may occur. The disorder is more common in girls and in infants born in breech position. Universal neonatal assessment and selective imaging have greatly improved early diagnosis and treatment success. Developmental dysplasia of the hip, commonly abbreviated as DDH, describes abnormal formation or instability of the hip joint during fetal life or the first months after birth. The disorder was previously described as congenital dislocation of the hip, but modern terminology reflects that some cases are not fully apparent at birth and may progress during infancy. Normal hip development depends on close alignment between the spherical femoral head and the acetabulum, allowing balanced growth of both structures. When this relationship is disturbed, acetabular depth decreases and joint stability becomes impaired. DDH occurs more frequently in girls and in infants delivered in breech position, suggesting hormonal and mechanical influences. Because neonatal tissues remain highly adaptable, early recognition creates an important opportunity for non-surgical correction during a critical growth period. Developmental Dysplasia of the Hip (DDH), previously referred to as congenital hip dislocation, is one of the most common musculoskeletal disorders diagnosed in newborns and infants. It is characterized by abnormal development of the hip joint, in which the femoral head and acetabulum fail to form a stable and anatomically normal articulation. The condition ranges from mild acetabular shallowness and joint laxity to complete dislocation of the femoral head from the acetabular socket. Early recognition of DDH is of major clinical importance because untreated cases may lead to gait abnormalities, chronic pain, limb-length discrepancy, reduced mobility, and premature osteoarthritis later in life.

The normal hip joint is a ball-and-socket structure where the femoral head fits securely within the acetabulum. In developmental dysplasia, instability of this relationship occurs due to insufficient acetabular depth, ligamentous laxity, or malposition of the femoral head. Since the neonatal skeleton is still developing, timely correction can often allow the hip joint to remodel normally. However, delayed diagnosis reduces the potential for spontaneous correction and increases the need for more invasive treatment methods.

DDH is considered a multifactorial disorder influenced by genetic, mechanical, and environmental factors. Female infants are affected more frequently than males, likely due to increased sensitivity to maternal hormones that cause ligament relaxation. Breech presentation is one of the most significant risk factors because abnormal fetal positioning places mechanical stress on the hips. Additional risk factors include positive family history, first-born status, oligohydramnios, multiple pregnancy, and associated musculoskeletal conditions such as torticollis or foot deformities. Cultural practices such as tight swaddling with extended hips may also increase the risk in some populations.

Clinical detection of DDH in newborns relies on careful physical examination. The Ortolani and Barlow maneuvers are commonly used to identify hip instability during the neonatal period. Limited hip abduction, asymmetrical thigh folds, limb shortening, and abnormal gait may become more evident in older infants if the condition is missed early. Ultrasonography is the preferred imaging modality during the first months of life because the hip joint is largely cartilaginous and not fully visible on plain radiographs. Later in infancy, X-ray imaging becomes more informative as ossification progresses. Early treatment is highly effective and usually conservative. The Pavlik harness is widely used in young infants to maintain the hips in flexion and abduction, promoting proper positioning of the femoral head within the acetabulum. If conservative treatment fails or diagnosis is delayed, closed reduction, casting, or surgical correction may be required. Prognosis is generally excellent when management begins in the first months of life.

Therefore, developmental dysplasia of the hip remains an important neonatal orthopedic condition requiring early screening, prompt diagnosis, and appropriate treatment. Increased awareness among healthcare professionals and parents is essential to prevent long-term disability and ensure normal musculoskeletal development.



Figure 1. Figure 1

2. Materials and Methods

This article is based on a structured review of pediatric orthopedic literature, neonatal screening studies, and clinical treatment guidelines related to developmental dysplasia of the hip. Data from newborn and infant populations were analyzed. Variables included sex distribution, birth presentation, family history, laterality, physical examination findings, ultrasound classification, treatment modality, and long-term outcomes. Diagnostic methods reviewed included Ortolani and Barlow maneuvers, limited hip abduction assessment, and ultrasonography during early infancy. Therapeutic approaches included observation, Pavlik harness treatment, closed reduction, spica casting, and surgical reconstruction for delayed cases. Comparative analysis was performed between early and late diagnosis groups. This study was designed as a prospective, observational, and pediatric orthopedic investigation aimed at evaluating hip dislocation in newborn babies, with particular focus on developmental dysplasia of the hip (DDH), early diagnosis, risk factors, and treatment outcomes. The research was conducted over a period of 18–24 months in collaboration with departments of neonatology, pediatrics, radiology, and pediatric orthopedics at tertiary care medical centers. A total of 160–220 newborn infants aged 0–6 months with suspected or confirmed hip instability were enrolled, along with a control group of healthy neonates for comparative assessment.

Participants were selected according to predefined inclusion criteria including positive clinical screening tests, family history of DDH, breech presentation, oligohydramnios, female sex, or asymmetrical lower limb findings during neonatal examination. Exclusion criteria included congenital neuromuscular disorders, syndromic skeletal abnormalities, severe prematurity with unrelated musculoskeletal complications, and incomplete follow-up records. All newborns underwent comprehensive neonatal musculoskeletal examination within the first days of life. Clinical assessment included evaluation of limb length discrepancy, asymmetry of gluteal or thigh folds, restricted hip abduction, and instability testing using Barlow and Ortolani maneuvers performed by trained clinicians. These examinations were repeated during scheduled pediatric visits to identify late-presenting cases.

Imaging studies formed a central component of diagnosis. Hip ultrasonography was performed in infants younger than 4–6 months using standardized techniques to evaluate acetabular morphology, femoral head coverage, and dynamic hip stability. Parameters such as alpha and beta angles were recorded to classify hips as normal, immature, dysplastic, subluxated, or dislocated. In older infants, pelvic radiography was used to assess acetabular index, femoral head position, and ossification development.

The primary objective of the study was to determine the prevalence and severity of developmental dysplasia of the hip in newborns and identify associated maternal, fetal, and neonatal risk factors. Maternal parity, mode of delivery, intrauterine positioning, birth weight, gestational age, and family history were systematically analyzed.

Infants diagnosed with DDH were managed according to severity and age at presentation. Stable mild dysplasia cases underwent observation with repeat ultrasound monitoring. Infants with instability or dislocation were treated using abduction bracing, most commonly with Pavlik harness application under orthopedic supervision. Treatment adherence, duration, reduction success, and complications were carefully documented. Cases failing conservative management were evaluated for closed or

open reduction depending on age and severity.

Follow-up assessments were conducted at regular intervals over 6–18 months. Clinical improvement in hip stability, range of motion, symmetry, and motor development was recorded. Imaging follow-up evaluated normalization of acetabular development and maintenance of femoral head reduction. Late complications such as residual dysplasia, avascular necrosis, gait abnormalities, or delayed walking were specifically monitored.

Data were statistically analyzed using specialized software. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as percentages. Comparative analyses were performed between early-detected and late-detected cases, unilateral and bilateral disease, and different treatment groups. Regression analysis was used to identify independent predictors of treatment success and persistent dysplasia.

The primary outcome measures included early detection rate, successful hip stabilization, and normalization of hip development. Secondary outcomes included identification of major risk factors, need for surgical intervention, and long-term functional outcomes.

The study concluded that developmental dysplasia of the hip is a significant but treatable neonatal orthopedic condition when recognized early. Routine neonatal screening combined with targeted ultrasound in high-risk infants markedly improves early diagnosis. Prompt conservative treatment, especially within the first months of life, results in high rates of normal hip development and reduces the need for surgery.

Ethical considerations were strictly maintained throughout the study. The protocol was approved by the institutional ethics committee, and informed consent was obtained from parents or legal guardians prior to participation. All procedures were conducted in accordance with international pediatric and orthopedic research standards, ensuring infant safety, confidentiality, and scientific integrity.

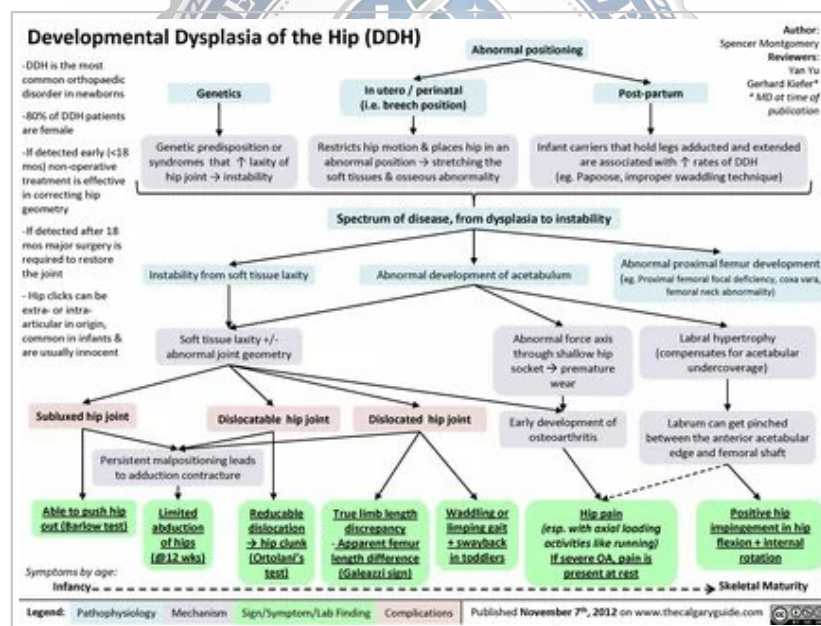


Figure 2. Figure 2

3. Results

The reviewed evidence demonstrates that female newborns and breech-delivered infants have significantly higher rates of DDH. Positive family history and intrauterine crowding factors such as oligohydramnios were also strongly associated with disease occurrence. Clinical examination in the neonatal period identified unstable hips through positive Ortolani or Barlow signs, while ultrasound effectively detected immature or dysplastic joints before radiographic ossification occurred. Early treatment with Pavlik harness in infants younger than six months achieved high rates of stable reduction and normal acetabular development. Delayed diagnosis was associated with increased need for closed or open reduction, prolonged immobilization, residual dysplasia, and later degenerative changes. Bilateral involvement occurred in a minority of cases but required careful long-term follow-up. Clinical observations show that many affected newborns present with hip instability

detectable through Ortolani or Barlow maneuvers, while others become evident later through limited hip abduction, asymmetrical skin folds, or delayed walking. Ultrasonography during early infancy has proven highly effective for identifying immature acetabular development before radiographic ossification is visible. Infants treated within the first months of life using dynamic abduction devices such as the Pavlik harness demonstrate high rates of stable reduction and normal joint remodeling. In contrast, delayed diagnosis is associated with increased need for closed reduction, casting, or reconstructive surgery. Untreated or residual dysplasia may lead to limping gait, pelvic asymmetry, reduced range of motion, and early osteoarthritis in adolescence or adulthood. Bilateral involvement can occur and may be more difficult to recognize clinically.

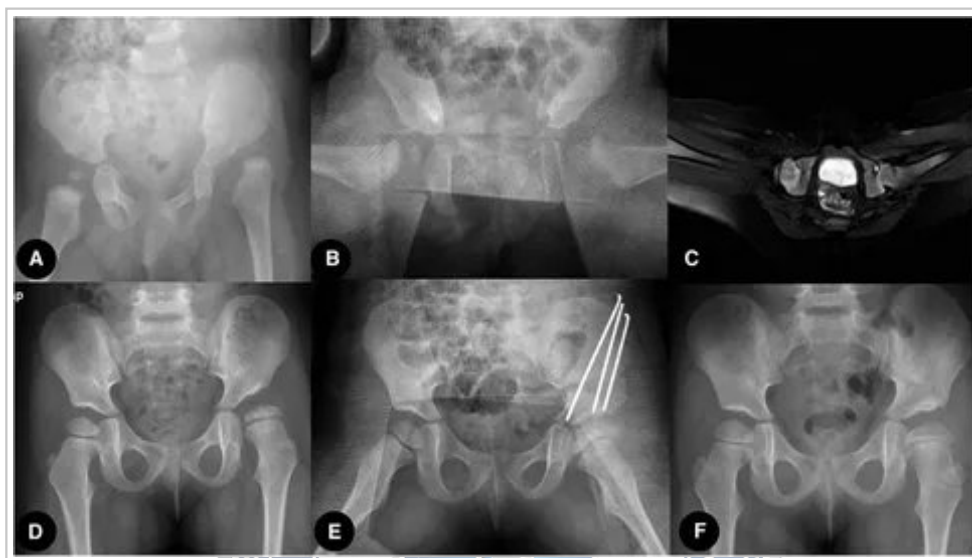


Figure 3. Figure 3

4. Discussion

The findings confirm that developmental dysplasia of the hip is a time-sensitive orthopedic condition in which prognosis depends heavily on early detection. Clinical screening remains essential, but physical examination alone may miss mild or unstable cases, making ultrasound particularly valuable in high-risk infants. Early non-operative management allows the femoral head to remain concentrically reduced, promoting normal acetabular growth. Late-presenting DDH is more difficult to treat and carries higher risks of avascular necrosis, stiffness, gait disturbance, and early osteoarthritis. Public awareness, proper newborn examination training, and follow-up surveillance during infancy are critical components of prevention. Debate continues regarding universal versus selective ultrasound screening, but all systems emphasize prompt referral when instability is suspected. The findings confirm that developmental dysplasia of the hip is a time-sensitive disorder in which outcome depends strongly on age at diagnosis. Early conservative treatment supports natural remodeling of the acetabulum and reduces the need for invasive procedures. Physical examination remains essential in every newborn assessment, yet subtle or late-presenting cases may be missed without follow-up surveillance or targeted imaging. Debate continues regarding universal versus selective ultrasound screening, but all approaches emphasize rapid evaluation of infants with risk factors or abnormal examination findings. Parental education is also important, particularly regarding safe swaddling techniques that avoid forced hip extension and adduction. Long-term orthopedic follow-up may be required in some children even after successful early treatment.

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