Ultrasonographic Screening for Developmental Dysplasia of the Hip in Infants

By

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Thesis

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Abstract

Developmental dysplasia of the hip (DDH) is an important problem in infancy, 100 infant randomly collected 75 infants had risk factors for DDH 27 infants had more than one risk factor and they were 57 boys and 43 girls below 1 year to detect the incidence of DDH.

Clinical examination by **Ortolani and Barlow testes** was normal in all newborn infants but the other clinical tests showed leg length discrepancies and asymmetrical skin creases in 2 cases.

Ultrasound examination of the hips using ***Graf's technique*** revealed that 2 cases had DDH.

First case had bilateral DDH and **second case** had DDH on right side and small femoral head (1 cm), on left side absent femoral head, short femur and the acetabuler hypoplasia.

The two cases that had DDH were females and had more than one risk factor for DDH:

First case: Female with positive family history (her uncle had hip dislocation on left side) and oligohydramnios.

Second case: Female, first pregnancy and congenital anomalies including small kidneys, small spleen and short deformed lower limbs.

The results of sonographic examination revealed that all infants who hadn't risk factors for DDH (25 infants) had normal hip ultrasound (0%) and 2 out of 75 infants (2.6%) who had risk factors showed DDH, these 2 cases represent (2%) of all examined cases.

Routine ultrasonographic screening of all infants who demonstrate abnormal clinical signs or who are at an increased risk for developmental dysplasia of the hip led to a high rate of detection of DDH.

Diagnosis of DDH was made by clinical examination and ultrasound of the hips.

In conclusion early diagnosis and treatment of DDH, leading to the exclusion of surgery as a method of treatment, shorter, less invasive course of treatment with more favorable results and fewer complications.

Keywords: DDH, Ultrasonographic, Graf's technique, Clinical examination.

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CFE	Capital femoral epiphysis
Cm	Centimeter
CS	Cesarean section
DDH	Developmental dysplasia of the hip
NVD	Normal vaginal delivery
MHz	Millimeter hertz
US	Ultrasound
α angle	Alpha angle
β angle	Beta angle
+ve	Positive
-ve	Negative
%	Percentage
°	Degree

Introduction

Developmental dysplasia of the hip (DDH) is the preferred term to describe the condition in which the femoral head has an abnormal relationship to the acetabulum. DDH includes frank dislocation, partial dislocation (sublaxation), instability where the femoral head comes in and out of the socket ***(Abtullah, et al., 2004)*.**

This condition was previously called congenital dislocation of the hip, but the hip is not always dislocated, it was renamed to reflect the wider range of possible problems and their occurrence after birth as well as being present at birth ***(Karen, 2006)***.

Developmental dysplasia of the hip (DDH) is a major health problem leading in untreated babies to permanent disability. Costs for treatment, surgery and rehabilitation of these cases are much higher than for relatively simple prevention. A relatively simple ultrasound screening method has permitted an early diagnosis and treatment of DDH. Early diagnosis means a shorter, less invasive course of treatment with more favorable results and fewer complications ***(Magda, et al., 1998)***.

Prevalence of the clinical condition has been reported to vary from 0.8 to 1.6 per 1000 births in populations not screened neonatally, but with high rates of 10 to 100 per 1000 births among ethnic communities, where infants are traditionally

cradled or clothed with their hips extended and adducted; in screened populations, rates of 2.5 to 20 per 1000 births have been reported, but reach 40-90 per 1000 births in some communities, Differences in reported prevalence may be due to genetic differences and differences in clinical skills and methods used in detection as well as definition of the condition ***(Nenad and Sinisa, 2004).***

Ultrasound is an excellent method for imaging the cartilaginous and soft tissue components of the infant hip. Both clinically and radiographically undetected abnormalities are demonstrable by US examination; the value of ultrasonography diminishes as development of the ossification center occurs. Usually by 1 year of age the center is sufficiently developed to prevent good visualization of the acetabulum with ultrasound ***(Wientroub and Grill, 2000).***

Examination by ultrasound is indicated in infants with abnormal clinical examination or who are at increased risk for DDH, whether all infants should be examined in a screening program because ultrasound can demonstrate abnormalities not found on clinical examination ***(Jose and Stuart, 2002).***

Currently the two widely accepted methods of ultrasound examination are the static method of ***Graf*** and the dynamic method of ***Harcke***. The static method stresses morphological characteristics, relying on the measurement of angles on a single coronal view to provide quantitative assessment of femoral head

coverage based on landmarks on the acetabulum. In contrast the dynamic method places emphasis on the position and stability of the femoral head within the acetabulum. Rather than a single static coronal view, ***Harcke's*** method is both multiplanar and dynamic, assessing the hip in the positions produced by the ***Ortolani*** and ***Barlow*** manoeuvres ***(Bar-On, et al., 1998)***.

Aim of work

The aim of this study is early identification of developmental dysplasia of the hip in infants by ultrasonography and to detect the incidence of developmental dysplasia of the hip in infants.

Developmental dysplasia of the hip

Developmental dysplasia of the hip (DDH) refers to an abnormal relation between the femoral head and the acetabulum. At birth the femoral head and the acetabulum are mainly cartilaginous and normal adult hip joint depends on their correct development. During the newborn period unstable hips are common, but most of these develop normally if sublaxation or dislocation persists, anatomic changes develop and eventually the correct positioning of the femoral head within the acetabulum (reduction) can be achieved only with surgery ***(Nenad and Sinisa, 2004; Nerys, et al., 2005)***.

Hip dysplasia refers to an abnormality in the size, shape, orientation, or organization of the femoral head, acetabulum, or both. Acetabular dysplasia is characterized by an immature, shallow acetabulum and can result in sublaxation or dislocation of the femoral head. In a sublaxated hip, the femoral head is displaced from its normal position but still makes contact with a portion of the acetabulum. With a dislocated hip, there is no contact between the articular surface of the femoral head and the acetabulum. An unstable hip is one that is reduced in the acetabulum but can be provoked to sublaxate or dislocate ***(Stephen and David, 2006).***

The term developmental is now preferred to be congenital because it is more encompassing as it is taken in the literal sense of organ growth and differentiation, which includes fetal,

neonatal, and infantile periods. This terminology includes all cases that are clearly teratological and those that are developmental, and it incorporates dysplasia of the hip, sublaxation and dislocation ***(Jose and Stuart, 2002)***. It more accurately reflects the full spectrum of abnormalities that affect the immature hip ***(Stephen and David, 2006)***.

Chaarani, et al., (2002): Reported that the term "Developmental Dysplasia of the Hip (DDH)" has replaced the term “Congenital Dislocation of the Hip” because a hip put under unfavorable conditions can deteriorate. That is why communities that practice swaddling have a higher rate of DDH as swaddling may prevent the acetabulum from correct development. If there is muscle imbalance leading to persistent hip adduction of an otherwise normal hip can change gradually into a sublaxated and dislocated hip, as is very common in neuromuscular disorders such as cerebral palsy in neonates the majority of dysplastic and dislocated hips can improve to normal under favorable conditions (flexion and abduction) such as the position in a Pavlik harness most hips that have minor acetabular dysplasia during the neonatal period recover spontaneously within a few weeks.