Comparison of Clinical and Sonographic Prevalence of Developmental Dysplasia of the Hip

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Abstract- Developmental dysplasia of the hip (DDH) is one of the most widely discussed abnormalities in neonates. The advantages of sonographic examination are well known, but its main disadvantage is that it might lead to over diagnosis, which might cause over treatment. Variations in the incidence of developmental dysplasia of the hip are well known. During six months study since September 2006 all 1300 neonates (2600 hips) were born in our hospital examined clinically and sonographically (587 hips) in the first 48 hours of life. Sonography was performed according to Graf's method, which considers mild hip sonographic abnormalities as type II a. Type IIb Graf were considered pathologic. Sonography screening of 587 hips detected 36 instances of deviation from normal indicating a sonographic DDH incidence of 12.5%. However, only 8 neonates remained abnormal and required treatment, indicating a true DDH incidence of 6 per 1000 live birth. Risk of diagnosis clinically and sonographicaly were 2.5 and 4.5 percent respectively and was significant (P<0.00001, x^2=1170). In order to avoid over diagnosis in first days examination, repeated clinical and sonographic examination is required.

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Introduction

Congenital Hip Dysplasia or developmental dysplasia of the hip is the preferred term to describe the condition in which the femoral head has an abnormal relationship to the acetabulum. Developmental dysplasia of the hip (DDH) includes frank dislocation (luxation), partial dislocation (subluxation) instability which in the femoral head comes in and out of the socket, and an array of radiographic abnormalities that reflect inadequate formation of the acetabulum. The literature on DDH incidence and the way it is diagnosed has changed over the years (1, 2).

At the beginning, before the introduction of routine screening programs for detecting DDH, incidence was estimated at 0% to 40%. Until the 1980s when routine screening for DDH was performed clinically incidence was 0.41% to 16.8%. Since the 1980s after the introduction of sonographic techniques for investigation of pediatric hip and neonatal screening incidence rose to 4.4% to 52%. This wide range of numbers is, because of varying definitions and diversity between inclusion and exclusion criteria in the protocols used by various authors (2-4). Experience with ultrasonopgraphy has documented its ability to detect abnormal position, instability, and dysplasia not evident on clinical examination. Ultrasonography during the first 4 weeks of life often reveals the presence of minor degrees of instability and acetabular immaturity (5).

Studies indicate that nearly all these mild early findings, which will not be apparent on physical examination, resolve spontaneously without treatment. Newborn screening with ultrasonography has required a high frequency of reexamination and results in a large number of hips being unnecessarily treated. This practice is yet to be validated by clinical trial. Consequently, the use of ultrasonography is recommended as an adjunct to the clinical evaluation. It is the technique of choice for clarifying a physical finding, assessing a high- risk infant, and monitoring DDH as it is observed or treated. Use in this selective capacity, it can guide treatment and may prevent over

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treatment. The aim of this study was to compare clinical and sonographic diagnosis of DDH.

Methods and Materials

Since September 2006 for six months, each neonate was born at our hospital routinely examined clinically and if their parents were agree sonographically for hip abnormality within the first 48 hours of life by neonatologists (clinically) and radiologist (sonographically) working independently.

Newborn with skeletal, neurological, muscular disorders, neural tube defects, and admission of NICU and disagreement of parents were excluded. We performed the clinical examination as instituted by ortolani and Barlow and the sonography investigation with Graf's method using a 7.5 MHz transducer. The sonographically abnormal hips were classified according to Graf's classification. Graf's method is based on an exact anatomic description of the infant hip using sonography and is divided into four major types (type I-IV). We considered Graf's type IIb as pathologic. Babies were reexamined clinically at 1, 2 and 4 weeks after birth.

Results

During the study 1300 newborn were examined clinically and 288 newborn sonographically. There were 54% female and 38.5% were born from primigravidas mothers. Sonographically, 36 neonates (12.5%) were suspected to have DDH. In 28 (9.7%) newborns, type IIa and in 8(2.7%) type IIb were detected. Neonates with type IIa were clinically normal in subsequent examination.

Fifteen of 288 neonates with sonographic examination were abnormal (5.2%) but were normal in clinical exams (false positive). Chi square test showed that sonographic diagnosis were more than clinical diagnosis. As only 8 neonates required treatment, risk of diagnosis clinically and sonographically were 2.5 and 4.5 percent, respectively and was significant ($P<0.00001$, $\chi^2=1170$).

Eight of 1300 clinically examined neonates had actual DDH (6 in 1000 live birth). The total neonatal incidence of DDH, including Graf Type IIa, and IIb was 9. 7 and 2.7 percent, respectively.

Discussion

This study was constructed to ascertain sonographic DDH incidence in 1300 neonates without considering the later development and treatment of these hips or epidemiologic, demographic or other factors. In this study incidence of sonographic DDH based on Graf's method was 12.5%. Although, most newborn screening studies suggest that some degree of hip instability can be detected in one in 100 to one in 250 babies, actual dislocated or dislocatable hips are much less frequent being found in 1- 1.5 of 1000 live births (6). The etiology of DDH is multifactorial, involving both genetic and intrauterine environmental factors. There is marked geographic and racial variation in the incidence of DDH. The reported incidence based on geography ranges from 1.7/1000 babies in Sweden to 75/1000in Yugoslavia to 188.5/1000 in a district in Manitoba, Canada. The incidence of DDH in Chinese and African newborns is almost 0%, where as it is 1% for hip dysplasia and 0.1% for hip dislocation in white newborns (6). On the other hand children in Native American and Eastern European cultures, which have a relatively high incidence of DDH, have historically been swaddled in confining clothes that bring their hips into adduction and extension. This position increases the tension of the psoas muscle-tendon unit and may predispose the physiologically flexed hips to displace and eventually dislocate laterally and superiorly (6). The American academy of pediatric reported the baseline estimate of DDH based on orthopedic screening was 11.5 /1000 infants. Estimates from pediatric screening were 8.6/1000 and from ultrasonography were 25/1000 (5), although the clinical examination remains the gold standard. It is now widely accepted ultrasonography is the most sensitive method to evaluate infant hips (7-9) and is sometimes even too sensitive. It is an excellent tool for evaluating acetabular development and for follow up during and after treatment. On the other hand, it is well known that sonographic screening of the neonatal hip, combined with clinical examination, can lead to over diagnosis followed by over treatment when not use properly. But it has been criticized because of substantial interobserver and intraobserver variations in the measurement of angels, particularly dynamic ultrasonography although can demonstrate what occurs during the ortolani or Barlow maneuvers, is excessively operator-dependant. An ideal use of ultrasonography is for guided reduction of a dislocated hip by a pavlik harness, prereduction traction and before closed reduction in operating room (8, 10-11). We assessed clinical–sonographic neonatal screening for DDH within the first 48 hours of life in 1300 neonates, without considering the development of those joints in the following years. Using Graf's method of sonography,

even minimal anatomic abnormalities can be detected, most of which will not affect the later development of the hip which will go on to become normal. Sonographic DDH incidence using Graf's method as reported in the literature varies between 4.44% and 51.8%. But overall sonographic incidence of DDH is as high as 5.51% (1). From these, only 0.5% abnormal hips with sonographic DDH did not progress to normal and needed treatment; these were defined as "true DDH". These data confirm Barlows statement, suggesting 88% of unstable hips will eventually become normal without treatment (2). Against Peled *et al.* study true DDH in this study was as high as 2.7 %. It means that in north-east of Iran"Mashhad a city located in this area of Iran" DDH is frequent. More severe sonographic hip abnormalities are recognized more easily, even by the less experienced investigators. Against to most study stated that sonographic incidence of DDH was 4.7% and type IIa was 3.31%, but in our study the incidence of sonographic DDH was 12.5% and type IIa was 9.7%. As we did Sonographic early during stay at hospital, therefore DDH diagnosis based on first days examination may cause over diagnosis. Although it is important to diagnose these conditions early to improve the results of treatment, decrease the risk of complications, and favorably alter the natural history. But also careful history taking and physical examination in conjunction with advances in imaging techniques, such as ultrasonography not only based on first days exam but repeat them will increased the proper ability to diagnose, management, and prevention in overdiagnosis of DDH. On the other hand, the disorder is not always present at birth (congenital) and an infant may have a normal neonatal hip screening examination and subsequently develop a dysplastic or dislocated hip.

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