DDH Epidemiology Revisited, Do We Need New Strategies?

Abstract

Introduction: Developmental Dysplasia of the Hip (DDH), is well known to pediatric orthopedists but its etiology has still remained unknown. Although a vast majority of research are dedicated to this, but the results are confusing and inadequate.

Material and method: 1073 neonates' hips were examined by sonography and the results were classified according to Graf's classification. Pathologic hips were cross checked by known risk factors for DDH.

Result: There is a significant correlation between DDH occurrence and breech presentation, torticollis, positive family history, metatarsus adductus and oligohydramnious.

Conclusion: Incidence of DDH is significantly high in this group of neonates. This make us reevaluate our current approach to this condition. We need to improve our screening protocols with the help of trained pediatricians and other health professions.

Keywords: Congenital hip dysplasia, Medical sonography, Incidence study.

Introduction

Developmental Dysplasia of the Hip formerly known as congenital dislocation of the hip is a spectrum of hip anomalies from subtle hip dysplasia to complete hip dislocation. Although most believe it is a congenital malformation, but late onset disease has clearly identified and studied (1,2). From the epidemiologic stand of view, many risk factors are considered to be associated with DDH, but no single responsible main cause has been identified yet. Whatever the cause is, we certainly know that the untreated DDH will progress to more advanced disease to the point that in some patients it needs complex operations and in some others it turned into an untreatable condition. The good point, however, is that DDH can almost always be diagnosed in early stages.

Like any other congenital anomaly, early diagnosis of the disease needs at least two main prerequisites: the identifiable risk factors and a nationwide screening program. An interesting fact about DDH is its geographically diverse distribution (3). This should be considered as a priority for us to know its incidence and risk factors in our country. This information is vital for health policy makers to make long term plans for prevention and early diagnosis.

Method

During one year (from March 2013 to March 2014), all full term and healthy newborns from Imam Khomeini Hospital obstetric ward were referred for sonographic hip study. If the newborn's age was less than 38 weeks or there was associated musculoskeletal anomalies, the newborn was excluded from the study. In this way we excluded the cases of teratologic hip dysplasia. Pregnancy related data and recordings were reviewed and completed before discharge. All parents agreed with the procedure. Sonographic studies were done by one person with past experience of work with Dr. Graf. The results were classified according to the Graf's classification for neonatal DDH. They also were cross checked by known risk factors and statistical analysis (XLSTAT) was used to determine the correlation between them.

Neonatal hip sonographic classification of Dr. Graf is our preferred classification in clinical use. According to it, hip joints can be classified into four basic types and nine subtypes. Type1 is normal hip configuration. Type 2 has four subtypes including 2a+, 2a-, 2b and 2c. 2a types are considered as physiologically premature and need to be followed up by repeat sonograms. The

diagnosis of type 2b hips can be made only after 3 months of age. Any hip with type 2c and up, was considered as having DDH.

Results

A total of 1073 neonates were qualified as candidates for sonographic hip study. These included 414 male and 659 female neonates. 50 patients (72 hips) had abnormal reports (47/1000 live births). These included 36 female and 14 male patients with a female ratio of 72%. 44% of hip anomalies were bilateral.

Breech presentation was identified in 40 neonates. Of these, 13 were confirmed to have DDH (33%). The rate of bilaterality in this group was higher than the main group (54% vs 44%). With a confidence interval of 95% through XLSTAT software, both DDH occurrence and its bilaterality were significantly related to breech presentation (Table 1).

Positive sonographic study for DDH	**50 (4.7%)**
Total number of breech presentations	**40 (3.7%)**
Positive sonograms with breech presentation	**13 (26%)**

Table 1: correlation between breech presentation and DDH.

Positive family history, defined as the past diagnosis of DDH in one of the first degree family members, was confirmed in 86 neonates. This accounted for 8% of cases. In DDH group, this happened in 12 patients (24%, P value <0.01) (Table 2).

Positive family history for DDH in all neonates	**86 (8%)**
Positive family history in positive sonograms	**12 (24%)**

Table 2: Positive family history in all neonates compared to the ones with DDH.

Torticollis is another known risk factor which is difficult to evaluate in newborns. We supposed any unilateral restricted neck rotation as early sign of torticollis. The classic sign of a mass in

sternocleidomastoid muscle was not found in any of our patients. Torticollis was seen in 4 neonates, 3 of them identified as having DDH (75%).

All the newborns were checked for the presence of metatarsus adductus in the first days after birth. The examination was based on the inspection of the plantar surface of the foot. If the long axis of the hindfoot was in line with the long axis of forefoot, the deformity was ruled out. That was important to evaluate the newborns as early as possible after birth because some milder forms of the deformity were resumed quickly afterward. The evaluation showed a 60% incidence of DDH in patients with metatarsus adductus deformity (3 DDH out of a whole 5 metatarsus addactus, P value <0.01).

Oligohydramnios complicated 59 pregnancies in our case population. This condition was diagnosed by routine pregnancy sonographic studies. Of these, nine patients had DDH (15%, P value <0.01).

Discussion

The lowest incidence of DDH has been reported from sub-Saharan Africa (0.06/1000 live births). The highest incidence belongs to American Native Indians (76.1/1000 live births). This shows a great difference in DDH distribution between different geographical regions (4). Whether this difference is due to genetic causes or the way of caring the child is uncertain (3). The most related factor in developing DDH after the birth is swaddling. Turning the traditional swaddling into a safe method could reduce the incidence 6 times in Native Americans (5). Similar results have been reported from Japan and Turkey (6). We found a 47/1000 incidence in our patient population. This has to be considered a relatively high incidence. But it seems we have a more complicated situation regarding our geographical distribution. In fact, we have at least 14 different ethnic groups in our country with different geographical distribution. A complete epidemiologic profile of DDH should consider this differences. Additionally, this high incidence of the disorder is a warning sign for health policy makers. Screening programs have been approved to decrease the late diagnosis in many countries and should be considered seriously in high occurring societies like ours. Although we have a current screening program that makes the examination of all neonates obligatory by pediatricians, the number of late diagnosed or missed cases should provoke the health system for better planning and goal oriented research programs.

Among the many accompanying conditions, breech presentation showed the strongest correlation with DDH in our study. In a meta-analysis of DDH related risk factors, Ortiz-Neira et.al reported in the breech presentation as the most statistically significant risk factor for DDH (7). They concluded that every neonate with one or more than one risk factors should be considered as a candidate for sonographic screening evaluation. Hundt et.al in another meta-analysis for major risk factors of developmental dysplasia of the hip found the breech presentation as the most related risk factor (8). A number of other studies also confirmed these findings (4, 9,10,11,12).

Male to female ratio also showed similar result comparing to other studies. Actually female predominance for DDH has been invariably confirmed regardless of the geographical and other differences in the population. This fact has its own value for screening but there is another concern in traditional societies of middle east. The psychosocial negative impact of severe limping and disability in the life of a young woman is a lot more devastating than a young man in our society to the limits that actually can ruin a life forever. This is a fact that should be in our mind as a person responsible for well-being of his or her community.

We found other previously known risk factors like torticollis, metatarsus adductus and oligohydramnios as risk factors in our patients. The only main difference that we found was the higher incidence of bilaterality comparing to other studies (44% vs 20%). For now, we have no explanation for this difference.

This study has its own limitations. We did not consider the ethnicity of the patients and other risk factors as multiple pregnancy or first born children. We also failed to have a follow up for our patients. But we hope this study could be a beginning for more sophisticated researches.

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