

RESEARCH ARTICLE

DDH Epidemiology Revisited: Do We Need New Strategies?

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Abstract

Background: Although the developmental dysplasia of the hip (DDH) is well known to pediatric orthopedists, its etiology has still remained unknown and despite dedication of a vast majority of research, the results are still inadequate and confusing. The exact incidence of DDH and its relationship with known risk factors in Iran is still unknown. Here we represent the results of one year study on the incidence and related conditions of DDH.

Methods: Sonography was performed on the hip joints of 1073 full term healthy newborns at Imam Khomeini Hospital from March 2013 to March 2014. The results were classified according to Graf's classification. Pathologic hips were cross checked by the known risk factors for DDH.

Results: A significant correlation was found between DDH and breech presentation ($P=0.000$), torticollis ($P=0.004$), metatarsus adductus ($P=0.024$).

Conclusion: The incidence of DDH is significantly high in the studied group of neonates, suggesting reevaluation of current approach to DDH. The screening protocols need to be improved with the help of trained pediatricians and other health professions.

Keywords: CHD, Congenital hip dysplasia, DDH, Developmental dysplasia of the hip, Epidemiology, Sonography

Introduction

Developmental dysplasia of the hip (DDH), 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 been 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 turns 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 as well. This information is vital for health policy makers to make long term plans for prevention and early diagnosis.

Graf method is one of the preferred sonographic clinical classifications. The hip joints is classified into 4 basic types and 9 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 repeated sonograms. The diagnosis of type 2b hips can be made only after 3 months of age. Any hip with type 2c and up is considered as having DDH.

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Materials and Methods

All full term and healthy newborns from the obstetric ward at Imam Khomeini Hospital were referred for sonographic hip study from March 2013 to March 2014. Newborns less than 38 week age and those with associated musculoskeletal anomalies (i.e. teratologic hip dysplasia) were excluded from the study. Pregnancy related data and recordings were reviewed and completed before discharge. The clearance to conduct this study was provided by the Deputy of Education and Research of Tehran University Orthopedic Department (No: 112-A/1391-5-23). All parents agreed with the procedure. All sonographies were done by an experienced person with Graf method. The results were classified according to the Graf's classification for neonatal DDH and cross checked by the known risk factors. The statistical analyses were performed using XLSTAT version 19.4.45342. Z-test for two proportions / Two-tailed test was used to determine the correlation between the risk factors and DDH.

Results

Among 1073 (414 male and 659 female) qualified neonate candidates for hip sonographic study, 50 (72 hips) had abnormal reports (47/1000 live births), including 36 female and 14 male patients (female ratio: 72%). Bilateral hip anomalies were seen in 44% of the candidates.

Breech presentation was identified in 40 neonates. Of whom, 13 (33%) were confirmed to have DDH. The rate of bilaterality in this group was higher than the main group (54% vs 44%) ($P=0.000$). Both DDH occurrence and its bilaterality were significantly related to breech presentation (CI: 95% - $P=0.000$).

Positive family history, defined as the past diagnosis of DDH in one of the first degree family members, was confirmed in 86 (8%) neonates. In DDH group, only 12 patients (24%) reported a positive family history ($P=0.165$).

Torticollis is another known difficult to evaluate risk factor for DDH in newborns. Any unilateral restricted neck rotation was considered as an 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 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. The deformity was ruled out when the long axis of the hindfoot was in line with the forefoot. It was important to evaluate the newborns as early as possible after birth as some milder forms of the deformity were resumed quickly afterwards. The evaluation showed a 60% incidence of DDH in patients with metatarsus adductus deformity (3 DDH out of a whole 5 metatarsus adductus, $P=0.024$).

Discussion

The lowest and highest incidences of DDH have been reported from sub-Saharan Africa (0.06/1000 live births) and American Native Indians (76.1/1000 live births), respectively. This shows a great geographical diversity in DDH distribution (4). Whether this difference is due to

genetic causes or the way of caring the child is uncertain (3). Swaddling is the most related factor in developing DDH after birth. Turning the traditional swaddling into a safe method has been shown to reduce the incidence 6 times in Native Americans, Japan and Turkey (5, 6). The incidence of 47/1000 in our patient population has to be considered relatively high; while considering the geographical distribution, our situation seems more complicated. A complete epidemiologic profile of DDH should consider the diversity in our country with at least 14 different ethnic groups and geographical distribution. 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 as ours. Although the current screening program 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 meta-analysis studies of DDH-related risk factors, the breech presentation was reported as the most statistically significant risk factor (7, 8). They concluded that every neonate with one or more risk factors should be considered as a candidate for sonographic screening evaluation. These findings have also been confirmed by a number of other studies (4, 9-12).

Male to female ratio in our study also showed similar results compared to other studies. Actually female predominance for DDH has been invariably confirmed regardless of the geographical and other differences in the population. While this fact has its own value for screening, however there is another concern in traditional Middle Eastern societies. 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.

We found other previously known risk factors like torticollis and metatarsus adductus in our patients. The only main difference in our study was the higher incidence of bilaterality comparing to other studies (44% vs 20%). However, 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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