Screening for developmental dysplasia of the hip in Hong Kong

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ABSTRACT

Purpose. To review records of children referred to our hospital for developmental dysplasia of the hip (DDH) and evaluate the effectiveness of hip screening in Hong Kong.

Methods. Records of children suspected of DDH and referred to our hospital between 1 January 2005 and 31 March 2010 were reviewed. The diagnosis was based on static and dynamic ultrasonography of the hips and/or radiographic features of hip subluxation, dislocation, and pelvic dysplasia. The age of the children at presentation was recorded. Late diagnoses were those presenting after the age of 6 months. Late presentations were those presenting after the walking age.

Results. Of 213 referred children, 33 were diagnosed to have DDH. Their mean age at presentation was 90.8 (range, 9–559) days. The female-to-male ratio was 2.9:1, and the mean follow-up duration was 25.1 (range, 4.2–50.3) months. 30 of the DDH infants were diagnosed before the age of 6 months, one at 8 months, and 2 were late presenters. Hence, the failure rate of the hip screening was 0.09 per 1000 live births. The remaining 180 were confirmed to be normal and followed up until the walking age. The point prevalence of DDH on Hong Kong Island was 0.87/1000 live births.

Conclusion. In light of the low point prevalence of DDH in Hong Kong born children, the protocol of universal clinical assessment and selective ultrasonographic screening of suspected cases is justified.

Key words: Asian continental ancestry group; hip dislocation, congenital; mass screening

INTRODUCTION

Developmental dysplasia of the hip (DDH) includes various hip disorders: instability, subluxation, dislocation, and poorly developed acetabulum with inadequate coverage of the femoral head. The natural history of hip instability remains unclear.1,2 Persistent and untreated hip dysplasia may lead to early
arthritis and joint degeneration and eventually a hip replacement. Hip screening with ultrasonography for early diagnosis has been implemented in many countries; whether to adopt universal screening or selective screening (for those with a clinical suspicion) is debatable. In Hong Kong, selective screening is adopted.

In 1981, the point prevalence of DDH in Hong Kong was 0.1/1000 live birth, which was lower than that of 1.5 to 20/1000 in developed countries. We reviewed records of children referred to our hospital for DDH and evaluated the effectiveness of hip screening in Hong Kong.

MATERIALS AND METHODS

Records of children suspected of DDH and referred to our hospital between 1 January 2005 and 31 March 2010 were reviewed; those born on Hong Kong Island were referred to our tertiary specialist hospital. Referral was based on clinical signs of hip instability (using the Ortolani and Barlow tests), limitation of hip abduction, apparent leg-length inequality, asymmetrical skin creases, and hip click. Patients with hip dysplasia secondary to a teratological cause, severe congenital and neonatal disorders were excluded.

The diagnosis of DDH was based on static and dynamic ultrasonography of the hips and/or radiographic features of hip subluxation, dislocation, and pelvic dysplasia. The age of the children at presentation was recorded, as were associated conditions such as torticollis and metatarsus adductus. Late diagnoses were those presenting after the age of 6 months. Late presentations were those presenting after the walking age.

RESULTS

Of 213 suspected cases referred to our hospital, 33 were diagnosed to have DDH. Their mean age at presentation was 90.8 (range, 9–559) days. The female-to-male ratio was 2.9:1, and the mean follow-up duration was 25.1 (range, 4.2–50.3) months. 30 of the DDH infants were diagnosed before the age of 6 months, one at 8 months, and 2 were late presenters. Hence, the failure rate of the hip screening was 0.09 per 1000 live births. The remaining 180 were confirmed to be normal and followed up until the walking age.

For the 30 patients diagnosed before the age of 6 months, 26 had reducible hips and were treated with the Pavlik harness. Eight of them underwent further treatment after failing the Pavlik harness treatment. Regarding the 4 patients not treated with the Pavlik harness, 3 underwent closed reduction, and a hip spica was applied. The remaining patient had a Graf II hip without instability; no treatment was needed and subsequent reassessment showed normal hip development. All 3 patients with delayed diagnosis and presentation underwent open reduction.

Between 1 January 2005 and 31 December 2008, 36,831 newborns were born on Hong Kong Island; 33,148 (90%) of them were screened in the Maternal Child Health Centres. Of the 31,005 born at public hospitals, 27 were diagnosed to have DDH. Therefore, the point prevalence of DDH on Hong Kong Island was 0.87/1000 live births.

DISCUSSION

The effect of DDH screening in reducing surgical intervention remains debatable. Clinical examination using the Ortolani and Barlow tests has been the mainstay screening tool, but it is not definitive. In our study, 2 patients with DDH were not identified until they reached their walking age. A normal hip early in life could develop DDH later. Late diagnosis/presentation may be attributed to the unreliability of the clinical examination, especially in inexperienced hands. It may also be due to clinically occult anatomical abnormalities such as a shallow acetabulum that only progresses to dislocation when weight bearing starts and therefore affects the hip at a later age. This may explain why DDH is commonly not clinically evident before 3 months of age. Late diagnosis increases the risk of more invasive interventions and worse long-term sequelae. Attention should be paid during the extended follow-up period until the walking age.

Universal screening with ultrasonography has higher sensitivity in detecting DDH than clinical examination alone or selective screening of high-risk infants. A possible 6- to 10-fold reduction in surgery for late DDH may be achieved. In Germany, universal screening with ultrasonography reduced the rate of surgical intervention for DDH by 80%. However, some ultrasonographically abnormal hips may become normal with age. The increased false positive rates associated with universal screening increase the risk of potential iatrogenic injury (such as avascular necrosis of the femoral head and neck) from unnecessary interventions. The DDH detection rate based exclusively on clinical screening performed by experienced examiners was similar to that of
universal screening with ultrasonography; the costs of universal screening may also be prohibitive; 1000 to 2000 ultrasonographs are needed to pick up a case of late DDH. Neither the United States nor Canada adopt routine ultrasonographic screening for DDH.

Selective screening reduces false-positives and unnecessary treatment, but has a higher risk of missing cases. Its effectiveness depends on the ability to identify positive clinical signs or risk factors, but neither is specific for DDH. Risk factors associated with DDH include breech delivery, female gender, and positive family history, but 60% of cases do not have associated risk factors. Selective screening with ultrasonography does not significantly lower the point prevalence of late diagnosis or late presentation. Failure rates of the screening system vary because of different outcome measures. In our study, it was 0.09 per 1000, which is considerably lower than that in other studies.

The point prevalence of DDH worldwide ranges from 1.5 to 20 per 1000 live births. This discrepancy can be due to the variability in the disease definition, the evaluation modality, the population studied, and the skill levels of examiners. In Taiwan, it was 1.2 per 1000 live births when including dislocated hips at birth and late diagnoses; it increased to 2.9 per 1000 live births when including any case with dislocatable hip at birth. In Singapore, the rate was 4.7 per 1000 live births. In Japan, the rate used to be 4.7 per 1000 live births after a national campaign. The high rate may have been related to the postnatal care of the newborn using ‘swathing diapers’ and forcibly maintaining the legs in an extended position prior to 1965. Prolonged tension on the hamstrings and iliopsoas can result in hip dislocation. DDH is highly associated with the traditional use of swaddling for newborns. In Hong Kong, it was 0.1 per 1000 live births in 1981 and increased to 0.87 per 1000 live births in our study. This increase is probably due to the more comprehensive postnatal care in the Maternal Child Health Centres and the use of ultrasonography. It may also be related to the reduced popularity of the traditional way of carrying baby on the back, with hips in wide abduction and flexion (resembling use of the Pavlik harness). This can relax the hamstrings and iliopsoas. Clinically undetected DDH might thus have been treated.

This study was limited by its retrospective nature, and only referrals to our hospital were included. There is a possibility that some newborns born with dislocatable hips whose diagnoses were missed at birth but spontaneously resolved subsequently would have been excluded from the database. Therefore if DDH is defined as any hips that can be dislocated (including those that resolve spontaneously), the true frequency might have been underestimated. In light of the low point prevalence of DDH among children born in Hong Kong, the protocol of universal clinical assessment and selective ultrasonographic screening of suspected DDH is justified.

REFERENCES

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