Validation of parameters recommended for secondary screening for developmental dysplasia of the hip in Japan

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INTRODUCTION:

Based on the Japanese Pediatric Orthopaedic Association's guidelines, secondary screening and imaging including ultrasonography and radiography, are recommended in infants with limited hip abduction (<70°) or in those with multiple risk factors including the following: asymmetrical skin creases, a family history of developmental dysplasia of the hip, female sex, and pelvic position at delivery. However, there is still little information regarding the usefulness of this guideline. The objective of this study was to investigate the association between the risk factors and developmental dysplasia of the hip diagnosed using ultrasound and radiography.

METHODS:

A total of 356 infants (67 boys and 289 girls) underwent secondary ultrasonographic and radiological screening for developmental dysplasia of the hip in our hospital. Risk factors were documented from their medical records. The recommended item score, which we defined as an integrated value of the recommended item, was calculated for each patient. The limitation of hip abduction alone was a criterion for secondary screening; therefore, we defined the scores as follows: the limitation of hip abduction scored 2 points and other recommended scores were assigned 1 point. If the recommended item score was 2 points or more, we classified the infants as high-risk.

RESULTS:

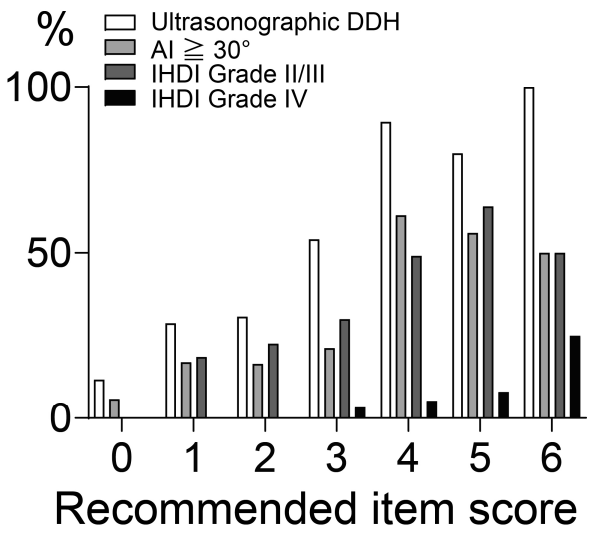
A total of 280 of 356 infants were included in the high-risk group, which showed a higher ratio of cases with abnormal imaging findings than the low-risk group. The high-risk group showed a higher ratio of ultrasonographic DDH ($P < 0.001$), AI of ≥30° ($P = 0.005$), and IHDI Grade II/III ($P = 0.001$) than the low-risk group. There were eight cases with IHDI Grade IV in the high-risk group and no dislocation cases in the low-risk group. Among the high-risk group, 60 infants were treated with a Pavlik harness, and five infants received closed reduction.

Over half the infants whose recommended item scores were 3 or more showed ultrasonographic DDH (Fig. 1). Over half the infants whose recommended item scores were 4 or more showed AI of ≥30° and IHDI Grade II/III. There was no dislocation among infants whose recommended item scores were 2 or less. In the high-risk group, 12 of 85 (14.1 %) infants with AI of ≥30° and 23 of 93 (24.8 %) with IHDI Grade II/III did not show ultrasonographic DDH. Conversely, there were some patients who showed ultrasonographic or radiographic abnormalities even if their recommended item score was 0 or 1. More specifically, in the low-risk group (recommended item score 0 or 1 point), 19, 11, and 11 infants showed ultrasonographic DDH, an AI of ≥30°, and IHDI Grade II/III, respectively. Additionally, 1 of 11 infants with AI of ≥ 30°and 2 of 11 infants with IHDI Grade II/III in the low-risk group did not show ultrasonographic DDH.

In the multivariate logistic regression analyses among the recommended items, being female, skin asymmetry, and limb limitation were identified as independent risk factors for ultrasonographic DDH, AI of ≥ 30°, IHDI Grade II/III, and requirement for a Pavlik harness. Breech position was also identified as an independent risk factor for IHDI Grade II/III. In the multivariate logistic regression analyses among the recommended items and ultrasonographic DDH, skin asymmetry, limb limitation and ultrasonographic DDH were identified as independent risk factors for AI of ≥30°, IHDI Grade II/III, and the requirement for a Pavlik harness.

DISCUSSION AND CONCLUSION:

The recommended items for secondary screening based on the JPOA guidelines could be useful for screening infants in need of treatment for DDH. This study showed that the analysis of radiographic DDH exhibited significant improvement when ultrasonographic DDH was added to the recommended items, suggesting that ultrasonographic evaluation is useful and necessary for infants at high risk of radiographically predicted DDH. On the other hand, 10–20 % of infants showed DDH even in the low-risk group. Treatment philosophies regarding the recognition and treatment of DDH vary among institutions; therefore, the value of the recommended items might depend on the threshold of the treating orthopedic surgeon.


%
Ultrasonographic DDH
AI ≧ 30°
IHDI Grade II/III
IHDI Grade IV
100
50
0
0
1
2
3
4
5
6
Recommended item score