Predictive Factors in Children with Hip Dysplasia at Bone Maturity: A Longitudinal Study with an Average Follow-up of 12 Years

Yoichi Murata, Tomoyuki Nakamura, AKIFUSA WADA, Haruhisa Yanagida, Chinatsu Ishikawa, Soshi Uchida

INTRODUCTION:
Acetabular dysplasia (AD) significantly increases the risk of developing osteoarthritis of the hip. Salter-innominate osteotomy (SIO) is commonly performed as a preventive surgical intervention. Standard indications for SIO around age 5 include an acetabular index (AI) of ≥ 30° or a centeredge (CE) angle of < 5°. However, we sometimes encounter cases in which AD persists despite not meeting these criteria. The purpose of this study was to identify risk factors for AD at skeletal maturity and establish cutoff values of relevant radiographic parameters assessed at age 5.
METHODS:
Patients diagnosed with developmental dysplasia of the hip (DDH) who underwent closed reduction since 1995 and were followed without corrective surgery until skeletal maturity were analyzed. AD at maturity was defined as having a CE < 20° or an acetabular roof obliquity (ARO) >15°. The factors evaluated included age at initial consultation, sex, affected side, family history, and radiographic parameters (CE angle, AI, modified lateralization distance (LD), and the presence of Os acetabuli). Differences between patients with DDH and control were assessed using t tests, and logistic regression analysis were conducted to identify risk factors.
RESULTS:
A total of 250 hips were included. Of these, 51 hips (20%) had residual AD at skeletal maturity. Significant risk factors for residual AD were left side involvement, absence of Os acetabuli, lower CE angle, and increased modified LD. Optimal cutoff values at age 5 were a CE angle ≤ 8.0° and a modified LD ≥ 7.4 mm. Combining the parameters (CE ≤ 8° and modified LD ≥ 7.4 mm) yielded the highest positive predictive value (PPV), of 65.5%. In contrast, the PPV using traditional surgical indications at age 5 (CE ≤ 5° or AI ≥ 30°) was only 36.3%.
DISCUSSION AND CONCLUSION:
Risk factors for AD after skeletal maturity included left-sided, absence of Os acetabuli, a lower CE angle (≤ 8.0°), and a high modified LD (≥ 7.4 mm). Given the limited predictive value of radiographic measurements, surgical decision should be made cautiously. Magnetic resonance imaging may enhance decision making regarding interventions, such as Salter osteotomy.