Should Patients with Down Syndrome be Radiographically Screened for Developmental Hip Dysplasia before 5 years of age?

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INTRODUCTION:

Children with Trisomy 21 (Down Syndrome – DS) are known to be at increased risk of developmental dysplasia of the hip (DDH). These children have been noted to present with a spectrum of dysplasia, with different problems at different ages. Previously asymptomatic children may present "late" with acetabular dysplasia, superior subluxation, and early arthritis. The timing for development of DDH in DS however, is unclear. The purpose of this study was to analyze institutional data from patients with DS who were screened for DDH to better quantify who is at risk for acquiring DDH, and to assess the utility of current screening protocols.

METHODS:

After IRB approval, patients with DS referred to a single tertiary care center were reviewed. Inclusion criteria included a confirmed diagnosis of DS and at least 1 anterior-posterior pelvis x-ray (XR) between the ages of 6 months to 5 years old. All children underwent physical examination by a fellowship-trained pediatric orthopedic surgeon to assess for clinical signs of instability. Demographic data including diagnosis of DS, sex, age, and imaging were reviewed for all patients. XRs were utilized to measure the acetabular index (AI) and center-edge angle (CEA) of both hips. AI was classified as normal if less than 25°, borderline if between 25°-30°, abnormally small if below 20°, and dysplastic if greater than 30°. CEA greater than 25° was classified as normal, borderline between 20°-25°, abnormal if greater than 40,° and dysplastic if less than 20°. Mean and median values were calculated with corresponding standard deviation and inter-quartile ranges (IQR) for AI and CEA measurements.

RESULTS:

336 patients with DS were reviewed, of which 100 met inclusion criteria, resulting in 200 hips reviewed. Analysis of screening radiographs for AI and CEA (table 1) shows that of the 200 hips review, none (0.0%) were dysplastic by AI and 2 (1.0%) were dysplastic by CEA. Mean (table 2) and median values (table 3) of AI and CEA are also provided, of which all calculated averages are within established norms.

8 of the 100 children studied carried clinical diagnoses of hip dysplasia. All 8 patients had normal or low AI. For CEA, 6 of 8 patients had normal CEAs with the remaining 2 of 8 having borderline CEAs.

DISCUSSION AND CONCLUSION:

This study demonstrates a mean AI of <14° for all patients, which is significantly below the limit described in the literature as normal in the general population. No patients with clinically diagnosed DDH had dysplastic hips according to the criteria defined in this study. This data presents the novel finding that children with DS in our cohort were consistently found to have morphologically normal hips on XR imaged during routine screening, despite historic literature indicating a higher incidence of DDH, often presenting late, and with abnormal acetabular morphology. Paradoxically, our values indicate that on routine screening, children were noted to have unusually stable acetabular morphology, as indicated by relatively low AI's and high CEA's compared to norms in the general pediatric population.

These findings suggest that routine radiographic imaging may not be necessary in this population and that the morphologic changes associated with symptomatic DDH in patients with DS may occur after age 5. In our cohort, radiographic measurements of DS patients reveal morphologically stable hips, suggesting XR screening for DDH is not beneficial in the absence of clinical findings before 5 years of age.