Timing of Epiphysiodesis to Correct Leg Length Discrepancy: A Comparison of Prediction Methods

John G. Birch, MD, FRCS(C), Marina R. Makarov, MD, Connor Smith, BA, Taylor Jackson, BA

Texas Scottish Rite Hospital for Children
Department of Orthopedics
2222 Welborn Street
Dallas, TX 75219
john.birch@tsrh.org, 214–559–7558

What is the question? Several methods exist to determine leg length discrepancy at maturity and appropriate timing of its management by long–leg epiphysiodesis. The purpose of this study was to compare the accuracy of different methods used to predict ultimate leg lengths and discrepancy in a group of patients treated at our institution.

What is your answer? Seventy–seven patients with three pre–operative scanograms at least 6 months apart, no postoperative complications, and followed to skeletal maturity comprised the study group. We compared outcomes using the Green–Anderson Growth–Remaining formulae, Moseley Straight Line Graph predicted lengths of the long (after epiphysiodesis) leg, short leg, and residual discrepancy to actual (Rotterdam modification), the White–Menelaus method, and the Paley Multiplier Method using both skeletal age as determined from the Greulich and Pyle atlas, and chronological age.

What are your results? The Moseley straight line graph (Rotterdam version) and Green–Anderson growth–remaining formulae using skeletal age (as recommended by the originators) were significantly better ($p=0.01$) than the White–Menelaus and Paley multiplier methods using chronological age in predicting the length of the short leg and long leg (after epiphysiodesis). The multiplier method was the least accurate in predicting the lengths of both legs, which may lead to inaccurate calculation of epiphysiodesis timing in some cases. If skeletal age was used for each method, the prediction results were not statistically different. Skeletal age varied more than one year from chronological age in 61/231 observations (3 observations per patient) and only 37 patients (48%) had skeletal age recorded as within one year of chronological age in all three observations. Skeletal age averaged more than one year different from chronological in 13 (17%), and skeletal and chronological ages differed by more than one year all three observations in 6 (8%).

What is your conclusion? When used as described by the originators, the Moseley Straight Line Graph (Rotterdam version) and the Green–Anderson Growth Remaining method were the most accurate methods of estimating leg lengths and inequality at maturity, and appropriate timing of epiphysiodesis. All methods were comparable when skeletal ages and growth inhibition were taken into account. Determination of skeletal age and growth inhibition of the shorter leg are clinically relevant in patients being considered for epiphysiodesis to manage leg length inequality.