Paper #40: Defining Pre-operative Age and Deformity Magnitude Cut-offs for the Initiation of Surgical Treatment with Dual Growing Rods

Vidyadhar V. Upasani, MD; Kevin C. Parvaresh, MD; Jeff Pawelek; Patricia E. Miller, MS; George H. Thompson, MD; David L. Skaggs, MD, MMM; John B. Emans, MD; Michael P. Glotzbecker, MD; Growing Spine Study Group


Introduction: Objective guidelines for the initiation of growing rod (GR) surgery for the treatment of progressive early onset scoliosis (EOS) have not been clearly defined. Balancing the potential of spontaneous fusion associated with the law of diminishing returns against progressive spine and chest deformity is challenging. The purpose of this study was to determine the optimal age and deformity magnitude for initiation of GR surgical intervention.

Methods: A multicenter EOS database was used to analyze a cohort of 126 patients who completed dual GR treatment. Complication rates were determined for medical and implant-related complications. Classification and regression tree (CART) analysis was used to determine optimal cut-offs for pre-operative age and major curve size to minimize the incidence of complications. The American Society of Anesthesiologists (ASA) Physical Status Classification was used to assess patient health status relative to complication rates.

Results: 126 patients (53 boys, 73 girls) with a mean age at initial surgical intervention of 6.9 ±2.4 years (range: 1.3 to 12.0 years) were studied. 95 out of 126 patients (75%) experienced at least one medical or implant-related complication. Multivariable analysis determined that both age at implantation and pre-op major curve size were significant independent predictors of complication. For each year increase in
age, the odds of complication decreased by 21% (OR=0.79; p=0.02). For each one degree increase in major curve size, the odds of complication increased by 3% (OR=1.03; p=0.02). CART analysis determined that the optimal cutoff for age was 8 years and for pre-op major curve size was 82 degrees. Based on these cutoffs, multivariable regression determined that patients less than 8 years at implantation had more than 4 times the odds of complication compared to older subjects (OR=4.4; p<0.001); and subjects who had a pre-op major curve size greater than 82 degrees had more than 6 times the odds of complication (OR=6.6; p=0.02). The incidence of medical complications was significantly correlated to ASA level (p=0.02), while the incidence of implant complications was not (p=0.33).

Conclusions: These data provide objective cut-offs to help guide the initiation of dual GR treatment and provide valuable information for patients and their families regarding the incidence of complications. ASA level may be used as a surrogate marker to pre-operatively identify patients at increased risk for medical complications.