Paper #21: Serial Measures of Lung and Inspiratory Muscle Function in Children with Early Onset Scoliosis

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Previous reports of serial lung function in children with EOS used passive maneuvers to test lung function in the operating room that did not require use of respiratory muscles. We previously reported that respiratory muscle function in these children is impaired and that passive lung functions may underestimate loss of lung function over time. We hypothesized that active lung function measures (Forced Vital Capacity, FVC) while awake would demonstrate greater decline in FVC over time than previously reported. We also serially measured Maximum Inspiratory Pressures (MIP) in children with EOS to determine if respiratory muscle function was impaired chronically. In Group 1, we measured FVC in 38 patients over an average of 6 years (27-98 months) with EOS with and without fused ribs without known neuromuscular disease from Seattle and San Antonio. In Group 2, we measured both FVC and MIP in 15 children over >1 year. The age of group 1 children at first FVC measurement was 7.9+/−1.6 years (5.23-14.5 yrs). Thirteen had PFTs before initial implantation; 35/38 had multiple expansions (x=7.8, range 1-16) and rod revisions (x=1.6, range 0-7) during the follow-up period. Four had spine fusion during follow-up. Initial FVC values were 48+−18% in Seattle and 58.9+−24% in San Antonio and final FVC values were 37.5%+−16% and 43.6% predicted respectively using arm span, and a similar and significant loss of 16+−23% over 6 years. (p<.05 paired t-test) There was no difference in time interval of follow-up nor initial age at first PFT between the two centers. In Group 2, 12 children with EOS, age 8.9+/−2.6 years at first test, who had serial measures of with both FVC and MIP over 18 months (7-41 mo) showed persistently reduced but unchanged FVC 2nd MIP (47.8%+−14.6% vs 47.0%+−22.3%). We conclude that declines in lung function in older awake children with EOS over a mean of six years are twice the declines previously reported over shorter time intervals with passive assessment techniques and that respiratory muscle weakness is sustained in children with EOS.