Scoliosis

Oral presentation

Prediction of curve progression for AIS patients treated with a TLSO Brace

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Objective
The objective of this study was to develop a curve progression model for patients with AIS receiving brace treatment by considering compliance measures and in-brace correction factors.

Background
Bracing is the most commonly used non-surgical treatment for adolescent idiopathic scoliosis (AIS). Prediction of brace treatment outcomes has not been well documented.

Method
Twenty subjects (17 females, 3 males), aged 13.4 ± 1.8 years, were prescribed a full-time TLSO (22 hr/day) and were monitored and followed for 3 years. All subjects met the SRS Brace Study inclusion criteria. The brace usage in terms of quantity (percent of wear time relative to the prescribed wear) and quality (percent of wear tightness relative to the prescribed tightness level) was logged with a compliance monitoring system. The Peterson's risk of progression at the time when the brace was prescribed was calculated based on 4 variables: Risser sign, apex of the curve, age, and imbalance. In-brace curve correction (flexibility) was calculated using the following: (Initial Cobb - in-brace Cobb)/Initial Cobb. A predictive model for curve progression using regression was developed based on the Peterson's risk of progression, quantity, quality, and the percentage of in-brace correction. Data from six new subjects who used a monitoring system and were followed for 2 years after bracing was used to assess the validity of the model.

Results
The Cobb angles of the subjects pre-brace (n = 9), in-brace(n = 8) and 3 years after weaning(n = 23) were 32, 11, and 35 degrees, respectively. The individual parameters, including Peterson's risk of progression, flexibility, quality, quantity, and quality*quantity, contributed to the curve progression model were 8%, 19%, 15%, 8% and 14%, respectively. Combining all variables, 56% of the variance in curve progression can be predicted. The curve progression model was: curve Progression (in degrees) = 33 + 0.11*Peterson Risk (%) - 0.07 in-brace correction (%) - 0.45*Quality (%) - 0.48*Quantity (%) + 0.62*Quantity*Quality. The results from the 6 new subjects are in table I. The largest prediction error of the prediction model was 3 degrees.

Conclusion
It is possible to predict the curve progression for AIS patients who have brace treatment.