

Oral presentation

Preliminary results of prediction of brace treatment outcomes by monitoring brace usage

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from 5th International Conference on Conservative Management of Spinal Deformities
Athens, Greece. 3–5 April 2008

Published: 15 January 2009

Scoliosis 2009, **4**(Suppl 1):O39 doi:10.1186/1748-7161-4-S1-O39

This abstract is available from: <http://www.scoliosisjournal.com/content/4/S1/O39>

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Objective

To determine whether brace treatment outcome can be predicted by brace usage in terms of wear time (quantity) and wear tightness (quality).

Study design

A brace compliance monitoring system consisting of a microcomputer and a force transducer was used to monitor how brace candidates used their braces during daily activities.

Twenty AIS subjects (13.4 ± 1.8 years) prescribed Boston braces with full time brace wear were monitored for 2 weeks and followed-up for 3 years. A prediction of curve progression model was developed. The prediction model was tested on a new full time brace wearer (9.2 years old, female, AIS, 39° Cobb angle, Apex T8).

Hypothesis

Brace treatment outcome may be predicted from brace usage.

Results

The curve size of the 20 subjects prior to bracing was $32 \pm 8^\circ$. While in the brace, the Cobb angle improved by $9 \pm 6^\circ$. At skeletal maturity, after bracing, the Cobb angle was $4 \pm 9^\circ$ higher than prior to bracing. The quantity and qual-

ity of brace usage was recorded. The curve progression model was:

$$\text{Curve Progression} = 33 + 0.12 * \text{Peterson Risk}(\%) - 0.48 * \text{Quality}(\%) - 0.52 * \text{Quantity}(\%) + 0.0066 * \text{Quantity} * \text{Quality}.$$

The new subject had a Peterson Risk 73%, Quantity 80% and Quality 70%. The in-brace Cobb angle was 29°. At the 4 month visit, the predicted curve progression was 2° and the out of brace curve was 40° (1° different).

Conclusion

The quality and quantity of brace usage plus the risk progression factor may be able to predict brace treatment outcome.

References

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