A COMPARISON OF RESTRICTION OF RANGE OF MOTION OFFERED BY THREE SPINAL (TLSO) DESIGNS

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INTRODUCTION

Spinal orthosis are commonly used in post-operative and non-operative treatment of vertebral fractures (Li-Yang Dai, 2008). Restriction in gross range of motion has been used to compare orthoses (Cholewicki et al. 2003; van Leeuwen et al. 2000). In this study, a new Össur Miami TLSO design offering restriction of triplanar spinal motion was evaluated. This design was compared with two commercially available TLSOs (Aspen and Orthomerica) and a no brace condition. The goal of this study was to determine the effectiveness of the new design when compared to common devices in use or the no brace condition.

METHOD

Subjects: Ten healthy male adults were recruited to take part in the study. Subjects with previous back surgery, chronic back pain or current back pain were excluded.

Apparatus: Movement in the sagittal and coronal plane was measured using a twin axis electronic goniometer (SG150/B from Biometrics Ltd, Gwent, UK). This device was chosen as it could be placed on the subject and not interfere with the brace or movement. Data was gathered with a 4-channel processor (Myotrace 400, from Noraxon U.S.A., Inc., Scottsdale, AZ). Movement in the transverse plane was measured by placing markers over the AC joints of the shoulders and capturing motion with a video camera placed over head of the subject. The video data was analysed using motion analysis software (Kineview v3.2, Kine, Iceland).

Procedures: Orthoses application was provided by a single qualified CPO. All orthoses were sized and adjusted to manufacturer’s specifications. The goniometer recorded lumbar spine motion (S2 to T12). It was then moved to record thoracic spine (T12 and T4) motion.

Sagittal and coronal plane movements: The subject was asked to stand with arms at the sides and was instructed to minimize hip motion for all movements. The subject was then instructed to complete motions of maximal spinal flexion, extension, right and left lateral bending. This series of movements was completed three times. The goniometer captured angular movement for each trial, maximal values were obtained from this data for each trial.

Transverse plane movements: The subject was seated on a stool with arms crossed in front of them and feet flat on the floor. Marks were placed at the shoulders in the region of the AC joint. The subject was instructed to produce maximal transverse rotation of the spine in both directions, right and left. This series of movements was repeated three times. The maximal motion points were captured from the video and evaluated with Kine software.

Data Analysis: An analysis of variance was done on the maximum range of movement over three trials for each condition.

RESULTS

Figure 1: Example of mean sagittal plane range of motion for lumbar spines.

DISCUSSION

Sagittal plane motion in both lumbar and thoracic regions showed a significant reduction in motion by all braces over the non-braced condition.

CONCLUSION

Gross ROM restriction is confirmed in the new orthosis. Generally no significant differences are found in sagittal plane motion. Designs differed in coronal and transverse plane restriction.

REFERENCES

