

# THE EFFECTS OF LUMBAR ORTHOSES ON THE RANGE OF MOTION OF THE LUMBAR SPINE DURING FIFTEEN ACTIVITIES OF DAILY LIVING

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Poster presented at NASS 24th Annual meeting

Published in The Spine Journal 9 (2009) 200S

**BACKGROUND CONTEXT:** Lumbar braces are frequently considered for patients suffering from acute and chronic low back pain, postoperatively, and in other situations. There are a variety of options for lumbar braces ranging from generic, soft corsets to rigid, custom fit orthoses. Previous studies have demonstrated that the range of motion (ROM) reduction from lumbar braces varies greatly from subject to subject based on body habitus and type of brace. They also have shown that the overall reduction in full, active motion is often quite modest. However, there has been little data to date exploring how lumbar braces affect the ROM used during activities of daily living (ADLs). **PURPOSE:** The purpose of this study was to evaluate the relative efficacies of a soft corset, a semi-rigid off the shelf LSO, and a rigid, custom molded LSO for restricting both the full, active and functional ranges of motion (ROM) of the lumbar spine during 15 activities of daily living (ADLs). **STUDY DESIGN/SETTING:** Prospective cohort study. **PATIENT SAMPLE:** 10 subjects with no history of lumbar spine pathology and no current back pain or disability. **OUTCOME MEASURES:** Full, active and functional ROM of the lumbar spine. **METHODS:** In this investigation, a previously validated electrogoniometer device was employed to quantify both the full, active ROM of 10 subjects as well as the functional ROM during a series of 15 ADLs in the sagittal and coronal planes. For each individual, these ROM measurements were repeated without a brace (No Brace) and after the application of a soft corset (Corset), a semi-rigid off the shelf brace (Semi-rigid), a custom LSO brace (Custom). **RESULTS:** The Corset, Semi-rigid and Custom braces restricted mean ( $\pm 95\%$  CI) full, active motion in the sagittal plane by  $24.1 \pm 7.9\%$ ,  $46.8 \pm 7.1\%$ , and  $64.7 \pm 8\%$  compared to No Brace ( $p < 0.008$  for each), respectively. In the lateral plane, they restricted full, active motion by  $33.9 \pm 8.8\%$ ,  $51 \pm 9.4\%$  and  $49.1 \pm 11.8\%$  compared to No Brace ( $p < 0.008$  for each), respectively. There was no difference in ROM between No Brace and any of the braces for 7 of the ADLs in the sagittal plane and 9 of the ADLs in the lateral plane. In the sagittal plane, there was a greater restriction of full, active motion with the Custom compared to the Semirigid brace ( $p < 0.01$ ). However, there was no difference between these two braces for the ROM used during any of the ADLs ( $p = 0.325$  for all activities). There were 4 ADLs for the Custom brace and 1 ADL for the Semi-rigid brace for which the respective brace provided better sagittal motion restriction than the soft Corset ( $p < 0.021$  for all). In the lateral plane, there were no differences observed in motion restriction between any of the braces ( $p = 0.116$  for all). **CONCLUSIONS:** We found that all of the braces provided some restriction of full, active ROM. The Custom brace provided the most restriction followed by the Semi-rigid brace and then the Corset. For functional ROM, we found that the Custom and Semirigid braces provided significantly better restriction during some of the ADLs compared to the Corset. However, there were no differences between these two braces for ROM during any of the ADLs. Thus, depending on the clinical goal of bracing, this study suggests that the Custom LSO may not always be superior to less expensive generic models, which may suffice for providing restriction during many daily activities.

## SELECTED QUOTATIONS

### Summary: Functional ROM

[There was] no difference in functional ROM for Semi-Rigid LSO (Contour™ by Aspen) and Custom LSO braces for any ADLs in any plane.

### Clinical Significance

For Trauma, the Semi Rigid LSO (Contour™ by Aspen) and Custom braces provide excellent reductions in full, active and functional ROM.