

Improvements in Gait Performance and Balance Following Use of a Scoliosis Support Orthosis for Patients with Adult Spinal Deformity

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INTRODUCTION

Adult Spinal Deformity (ASD) is defined as a coronal curvature in the spine where the alignment is outside of defined normal limits [1]. Symptoms and clinical presentation vary as there are multiple etiologies such as progressive deformity, axial back pain, and/or neurologic symptoms [1]. Scoliosis Support Orthosis braces (SSOs) provide lumbar support orthosis with a scoliosis-supporting component which induces medial support between the hip and rib cage (Figure 1). This study evaluated the use of SSO in short-term and long-term improvements in activities of daily living such as gait performance and balance in patients with ASD as well as measuring pain levels.



Figure 1. Scoliosis-Support Orthosis

METHODS

The study design was a prospective, nonrandomized concurrent cohort comprised of 30 patients with symptomatic ASD. Gait analysis, pain level, and dynamic balance were used to measure the outcomes of patients after use of scoliosis bracing. Each patient was evaluated at three time points: before wearing the brace (Pre), after an initial period of wearing the brace for 45min (Post45m), and eight weeks after wearing the brace for a minimum of 4hrs a day (Post8w). Patients completed five, 10m over-ground walking trials at a self-selected speed. Kinematic and kinetic measures were collected using three-dimensional motion tracking and force plates. More specifically, range of motion (ROM) of lower-extremity, pelvic, and trunk were calculated. The patients then completed a 6-minute walking (6MW) distance test, timed-up-and-go

(TUG) chair test, and a dynamic balance test of sixty seconds standing with eyes open. Additionally, subjects completed patient-reported outcome measures including visual analog scales (VAS) for low-back and leg pain, Oswestry Disability Index (ODI), and SRS22r.

RESULTS AND DISCUSSION

With the use of the SSO, ASD patients were able to complete the TUG significantly faster (Pre: 12.2 vs. Post45m: 10.9 vs. Post8w: 10.2s, $p=0.001$) and covered significantly longer distances in the 6-minute walking test (Pre: 283.9 vs. Post45m: 324.6 vs. Post8w: 337.3m, $p<0.001$) while using the SSO. Significant short-term (Pre-Post45m) improvements included walking speed (Pre: 0.90 vs. Post45m: 0.94 m/s, $p=0.001$), step time (Pre: 0.59 vs. Post45m: 0.56 s, $p=0.001$), stance time (Pre: 0.75 vs. Post45m: 0.72 s, $p=0.001$), and swing time (Pre: 0.41 vs. Post45m: 0.39 s, $p=0.001$). Moreover, ASD patients reported a significantly lower score in VAS low back (Pre: 5.4 vs. Post45m: 3.3, $p<0.001$) and leg (Pre: 2.9 vs. Post45m: 1.6, $p=0.002$), ODI (Pre: 38.7 vs. Post45m: 35.0 vs. Post8w: 27.4, $p<0.038$), SRS22r (Pre: 2.8 vs. Post45m: 3.0 vs. Post8w: 2.2, $p<0.016$), and TSK (Pre: 30.2 vs. Post45m: 30.1 vs. Post8w: 23.4, $p<0.019$). Minimal changes were found in the dynamic balance test and gait GRF.

CONCLUSIONS

Following 8 weeks of wearing an SSO, ASD patients showed significant improvements in gait. Key findings were a reduction in VAS back and leg and improvement in trunk stability. These findings suggest that the SSO may provide additional trunk support which in turn reduces pain and allows for more natural and symmetric gait. These patients were also able to function better following both short-term and long-term use of the SSO. The results of this study suggest that the SSO may be an option for spine care providers to still be able to improve quality of life for patients with ASD, when surgical intervention is not possible.

REFERENCES

[1] Good, C. R., et al. *Curr Rev Musculoskelet Med.* 2011 Dec; 4(4): 159–167.

DISCLOSURE STATEMENT

This study was partially supported by Aspen Medical Products.