

Results of a 24 month prospective cohort study investigating the influence of home-based therapy on cerebral palsy patients on intra-abdominal pressure and spinal stability

Mark Driscoll, P.Eng., Ph.D.^{a,b} and Leonid Blyum^a

^aAdvanced Bio-Mechanical Rehabilitation Ltd., Montreal, Canada, ^bBiomedical Research Group, Montreal, Canada

BACKGROUND: Severely affected cerebral palsy (CP) patients (GMFCS 4 and 5) have, perhaps due to a lack of ambulation, very poor intra-abdominal structural integrity or compressional strength. That is, the active and passive enveloping fascial structures contributing to compressional strength are likely weakened due to disuse. Furthermore, poor seated spinal stability is also documented to which the authors believe is linked. The purpose of this study was to evaluate the feasibility of a high frequency home-based therapy tailored to GMFCS type 4 and 5 patients seeking to augment the intra-abdominal integrity and improve seated spinal stability.

METHODS: Non randomized prospective cohort treatment study of 100 cerebral palsy type 4 and 5 patients participated. Inclusion criteria limited to patients over 5 years old, not having undergone surgery, and having at least a 24 month follow up. At baseline and every 6 months, parents of patients were provided a 3 day lesson teaching a home-based manual therapy with focus to provide cyclic motion strain to the weakened abdominal region of their child. Stimulation guidelines (pressure magnitude and frequency) were instructed and monitored for consistency using a custom force gauge integrated into the therapy. Therapy was encouraged for at least 30 minutes 5 times a week. Measures of intra-abdominal pressure (force of 1 compressive inch) and seated spinal stability (minimal support for 10 seconds of independent sitting) were taken initially and bi-annually for 24 months. Study directives were approved by independent ethical committees in conformance with the declaration of Helsinki. Non-parametric Wilcoxon tests were utilized to perform data analyses.

RESULTS: Measures of intra-abdominal pressure improved from 3.23 to 4.46 lbs/inch of compression and, correspondingly, seated spinal stability improved from 2.3 to 3.1 after 36 months ($p < 0.05$).

CONCLUSIONS: Results suggest a high frequency home based therapy for CP patients to be a feasible platform for the improved mid-section compressional strength and, correspondingly, seated spinal stability, of severely affected cerebral palsy patients GMFCS types 4 and 5.

