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Constrained induced movement therapy for children with brachial plexus injury: Immediate and long term therapy specific and corticoplasticity related changes

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In the past we developed a modified constraint induced movement therapy (mCIMT) camp to address upper extremity deficits of children with hemiplegia (1). We found positive outcomes in upper extremity function and gait. The objectives of this study were to a) assess the effectiveness of a similar camp to treat upper extremity deficits of children with Brachial Plexus Injury (BPI), b) determine potential corticoplasticity related effects in lower extremity function, and c) determine retention of these effects.

This is a randomized control study including 17 children with BPI, 3-7 years of age, 9 of them randomly assigned in the experimental group. No participant had history of other neuromusculoskeletal injury or previous CIMT exposure. All subjects could use the affected arm as gross assist during play and self care tasks. Cognitively, they could follow two step commands. Treatment took place at Children's Memorial Hospital.

We delivered 30 hours of treatment (3 hours of treatment specific training over 10 days). Activities focused on gross, fine motor and self feeding skills. Control group participants had traditional occupational therapy. Outcomes were measured using the Shrinner Hospital Upper Extremity Evaluation (SHUEE), and the GAITRite to assess gait. Participants in the experimental group were tested pre and post mCIMT, and after six months also. Results were initially explored with discriminant analysis and then for simplicity and reporting with t-tests ($a<0.05$). This report focuses on the experimental group pre, post and 6 months post mCIMT.

Table 1 presents selected results based on the SHUEE and the GAITRite that showed showed significant changes between pre and post mCIMT.

This is, to our knowledge, the first randomized control study investigating the long term effects of mCIMT on the function of upper and lower extremities of children with BPI. The results demonstrate clear improvements in the upper extremity function and lower function, gait. Although gains are being retained after 6 months, it appears that lower extremity gains are better retained compared to the upper extremity gains.

Biography

Tasos Karakostas received his PhD in Biomedical Engineering through the College of Engineering at the Ohio State University and then a Master's in Physical Therapy at Texas Tech University. His work involves investigating different aspects of gait, either as an outcome function of different interventions or as a means to identify biomechanical parameters for intervention using neuromusculoskeletal modeling or experimental data collection. Over the past few years he has been investigating the effects of P-CIMT on walking gait under different conditions. Some of the results of this funded scientific inquiry, which is founded on the principles of corticoplasticity, are presented in this conference.

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