

Title: Balance Based Torso Weighting and Rhythmic Entrainment in a Patient Post Concussion/TBI

Background and Purpose:

The praxis system, the frontal-parietal-basal-ganglia and fronto-cerebellar networks, are thought to play a significant role in motor planning and motor learning.^{1,3} Studies with various populations have shown that auditory rhythms can be used to improve movement stability also known as auditory motor entrainment.^{4,6} This may be due to the dopamine response to rhythmic auditory stimulation in the basal ganglia.⁶ The aim of this case report is to present the benefits of training the praxis system through use of entrainment and by upweighting proprioception via Balance Based Torso Weighting (BBTW) to allow for improvement in sensorimotor function.⁷

Case Description: A 49-year-old female (LO) sustained a right frontal cranial TBI four years before our evaluation. Her primary deficits included discoordination, impaired balance, vestibular dysfunction, inability to perform dual tasks, and truncal/extremity ataxia. Her goals for treatment included developing strategies for sensory overload, decreasing fall risk, and improving her ability to converse. Significant success obtaining these goals were achieved with the use of an interactive metronome (IM) and the BBTW protocol utilizing a weighted torso vest.

Outcomes: LO demonstrated improvement using IM in both focus/attention through her Task Average (TA) and motor skill/precision and rhythm through her Variable Average (VA). On evaluation, she demonstrated severe deficits with her TA indicating poor attention/focus. This worsened with guide sounds indicative of sensory overload. With use of the BBTW vest, she demonstrated significant improvement with her TA and VA. By Discharge, she demonstrated further improvement with and without use of the BBTW vest and with and without guide sounds. On Sensory Organization Testing (SOT), she demonstrated significant improvement in her sensory analysis with use of the BBTW at evaluation and at discharge. There was significant change without use of the BBTW, however, review of her COG alignment showed decreased variability at discharge without use of the BBTW.

Discussion:

Use of the BBTW vest and utilization of entrainment via IM, were two of the most beneficial treatment strategies with collected pilot data that demonstrated improvement in sustained/divided attention, postural responses, timing, motor control and improved increased tolerance of visual and auditory stimulation with and without use of the BBTW. In conclusion, the combination of BBTW and IM were a useful treatment intervention for this patient with TBI. These modalities are low cost and risk and demonstrate great potential for treatment of patients with residual impairment beyond the expected recovery period after a TBI.

References:

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