Effects of intensive therapy intervention on walking in a child with Cerebral Palsy

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BACKGROUND

- Cerebral palsy (CP) is a nonprogressive disorder caused mainly by a lack of oxygen to the brain which results in irreparable damage to the brain and nervous system. Children with CP may exhibit difficulty with ambulation.
- The corticospinal tract (CST) carries information about movements required for ambulation from the brain to the spinal cord. The concept of neuronal plasticity suggests that the central nervous system can recover from brain injuries by reorganizing neuronal networks in response to environmental stimulation and this reorganization can occur throughout the entire lifespan.
- Various researchers have looked at the effects of strengthening treatments, static and dynamic walking types, equipment positioning, body weight supported treadmill training, programmed repetition, and neurodevelopmental training, on improving the ambulation ability of children with cerebral palsy. 1,2,3,4,5,6,7
- There is little meaningful evidence to promote one method over another. In an article comparing trials of different therapies meant to stimulate the development and use of alternative brain pathways to control muscle coordination and movement better, it seems patient motivation and the intensity and the duration of therapy appear to be the more important factors. 8
- A combination of high intensity independent isolated movements and walking may facilitate neuroplastic effects on stepping patterns and gait. These effects may translate to the child demonstrating increased step length and speed of walking with overall better quality of walking with a walking device. Ideally, improvement in or development of functional gain would result in improvement in multiple domains.

PURPOSE

- The purpose of this case study is to evaluate the potential applicability of high intensity independent isolated movements and walking in a walking aid for improving walking performance measures in non-ambulatory children with Cerebral Palsy.

SUBJECT

- Non-ambulatory 4 year old female with spastic quadriplegic cerebral palsy
- Diagnosed with shaken baby syndrome at 8 months old
- Presents with increased tone, difficulty self-initiating stepping, and has decreased breath support during ambulation
- Child has been attending Pediatric Services of America since she was 10 months old and has been receiving PT since then.
- Supported Walker Ambulation Performance Scale (SWAPS) score- 21.667

METHODS

- The study protocol included independent isolated movements described as 2 sets of 10 of active hip flexion with knee flexion bilaterally while supine on a mat.
- This was followed by 2 sets of 10 of reciprocal bicycling motion while supine on a mat.
- Following mat activities, the child was placed in a Rifton Pacer Walker where she ambulated for two trials of a 30.4 meter distance.
- Heart rate and oxygen saturation data were recorded at baseline and after mat and walking activities.
- The child participated in the protocol five times a week for seven weeks with a total of 32 treatment days.
- Outcome measures were: percent of time the patient was able to self-initiate a step, max consecutive steps without a tactile cue, HR and oxygen saturation, average step length, the amount of time taken to complete the set distance, and total average amount of steps taken.

REFERENCES


RESULTS

- There was a significant positive change in the percent the child can initiate stepping over time (effect size 20.92).
- There was also a significantly positive change in the average max consecutive steps without tactile cue over time (effect size 8.62).

DISCUSSION/CONCLUSIONS

- A high intensity of combined independent isolated movements and overland walking five days a week may help children suffering from spastic CP initiate stepping independent of tactile cues from the therapist and have a higher average of consecutive steps without tactile cues.
- Randomized control trials should be conducted for stronger supportive evidence.
- Future studies are warranted in order to determine the duration of such programs and the effectiveness of an overland walking program isolated from a mat exercise program.