

Abstract Preview - Step 3/4

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Title: CHANGES IN LOCOMOTORY FUNCTIONING AFTER REPETITIVE LOCOMOTOR TRAINING IN PATIENTS AFFECTED BY CEREBRAL PALSY

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Text: **Purpose:** The primary aim of the present randomized controlled trial was to evaluate whether repetitive locomotor training with the Gait Trainer (GT I) can improve walking speed and endurance in ambulatory children with Cerebral Palsy (CP). The secondary aim was to assess whether training can also have a positive impact on kinematic and spatiotemporal gait parameters and on daily-life disability.

Relevance: The reduced gait performance in children affected by CP leads to low levels of social relationships and life quality. Recent gait rehabilitation methods in patients with neurological impairment rely on technological devices which drive the patient's gait in a body-weight support condition and emphasize the beneficial role of repetitive practice in gait rehabilitation. The rationale for these approaches derives from animal studies which have shown that repetition of gait movements may enhance spinal and supraspinal locomotor circuits. Early studies on their use in the rehabilitation of CP with patients were carried out with partial body-weight support treadmill training and robotic-assisted treadmill therapy. Several studies on a new electromechanical gait trainer (GTI) in adult patients who have experienced a stroke, have shown that training with the device may significantly improve gait performance. Despite the clinical impact of this new rehabilitative procedure, no studies have been conducted to date on its use in children with CP.

Description: Eighteen patients with CP were recruited from the Developmental Age Unit, "C. Santi", Polyfunctional Centre Don Calabria, Verona, Italy, from January to October 2009. Inclusion criteria were: bilateral lower limb (diplegic or tetraplegic) CP, age 10 to 18 years, GMFCS levels II to IV, ability to walk by themselves for at least 10 meters, keep a sitting position without assistance. Exclusion criteria were: lower limb spasticity >2 on the Modified Ashworth Scale, severe lower limb contractures. Before the start of the study, the patients were randomly assigned to an experimental (EC) or a control group (CG). The EC received 30 minutes of repetitive locomotor training with the GTI, plus 10 minutes of passive joint mobilization and stretching exercises. The CG received 40 minutes of conventional physiotherapy. Each subject underwent a total of 10 treatment sessions over a 2-week period.

Evaluation: Before and after treatment and then at 1-month follow-up assessment, the patients were evaluated by the same examiner who was unaware of treatment allocation. The assessment procedures, consisting of clinical (10-meter walking test, 6-minute walking test, WEE-FIM) scale and instrumental (gait analysis) evaluations.

Conclusions: Our results show that repetitive locomotor gait training with an electromechanical body-weight support machine can significantly improve gait velocity and endurance in ambulatory children with diplegic and tetraplegic CP and that the improvements can be maintained for at least 1 month post-treatment. Improvements were also seen in proximal lower limb gait kinematics and in spatiotemporal parameters (gait speed and step length).

Implications: The GTI device could be a feasible instrument that can be integrated into routinely rehabilitative programs. A repetitive locomotor training program performed with this device could improve gait performance, cinematic and spatiotemporal gait parameters in children with CP.

Key-Words: 1. Cerebral Palsy
2. Robotics
3. Rehabilitation

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Ethics approval: The Committee of the Department of Neurological and Vision Sciences, University of Verona, approved the study protocol.

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