APPENDICE
Segmental Muscle Vibration Improves Walking in Chronic Stroke Patients With Foot Drop: A Randomized Controlled Trial.

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ABSTRACT

BACKGROUND: Studies have described the effects of segmental muscle vibration (SMV) on brain plasticity and corticomotor excitability. Information on the treatment-induced effects of SMV in stroke patients is, however, still limited. OBJECTIVES: To assess whether the application of SMV to ankle dorsiflexor muscles of chronic stroke patients can improve walking. METHODS: Forty-four patients were randomly assigned to either an experimental group (EG) or a control group (CG) and underwent 12 sessions over 4 weeks of general physical therapy. Patients in the EG also received SMV at 120 Hz over the peroneus longus and tibialis anterior for 30 minutes at the end of each session. All the participants underwent pretreatment and posttreatment gait analysis assessments. Time-distance, kinematic, and surface electromyography (EMG) data were used as outcome measures. RESULTS: A moderate improvement in mean gait speed, normal-side swing velocity, bilateral stride length, and normal-side toe-off percentage was observed only in the EG. A significant increase in bilateral ankle dorsiflexion angle at heel contact was associated with increased maximum ankle dorsiflexion and plantarflexion degrees during the swing phase on the paretic side after treatment in EG. Surface EMG during the swing phase revealed a significant increase in the activation of the tibialis anterior muscle on the paretic side in the posttreatment assessment in the EG. CONCLUSIONS: SMV added to general physical therapy may improve gait performance in patients with foot drop secondary to chronic stroke. The authors hypothesize that this may be due to the mechanical vibration stimulation, probably as a consequence of effective brain reorganization.

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Comparison between kinematic and kinetic methods for computing the vertical displacement of the center of mass during human hopping at different frequencies.

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ABSTRACT

Kinematic and kinetic methods (sacral marker, reconstructed pelvis, segmental analysis, and force platform methods) have been used to calculate the vertical excursion of the center of mass (COM) during movement. In this study we compared the measurement of vertical COM displacement yielded by different methods during able-bodied subjects' hopping at different frequencies (varying between 1.2 and 3.2 Hz). ANOVA revealed a significant interaction between hopping frequency and method (p < 0.001), showing that increasing hopping frequency reduced the differences between methods. A post hoc analysis revealed a significant difference between all methods at the lowest hopping frequency and between the force platform and both the sacral marker and reconstructed pelvis methods at the intermediate hopping frequencies, with differences ranging from 16 to 67 millimeters (all p < 0.05). Results are discussed in view of each methods' limits. We conclude that the segmental analysis and force platform methods can be considered to provide the most accurate results for COM vertical excursion during human hopping in a large range of hopping frequency.

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Modulation of spinal inhibitory reflex responses to cutaneous nociceptive stimuli during upper limb movement.


ABSTRACT

In the present study we investigated the probability, latency and duration of the inhibitory component of the withdrawal reflex elicited by painful electrical stimulation of the index finger in humans. The stimulus consisted of a train of high-intensity pulses. The investigation was carried out in several upper limb muscles during isometric contractions of different strengths and during a motor sequence consisting of reaching, picking up and transporting an object. We used a new algorithm to detect and characterize the inhibitory reflex. The reflex was found in all muscles except the brachioradialis at all the isometric contraction strengths, and showed a distal-to-proximal gradient of latency and duration. Conversely, during movement the reflex probability was high (> 80%) in the anterior deltoid and triceps muscles during reaching, in the extensor carpi radialis muscle during transporting of the object, and in the first interosseous muscle during both picking up and transporting of the object. This modulation of inhibitory reflex transmission in the upper limb muscles suggests that the motor response is organized in such a way as to inhibit the overall ongoing motor task by interrupting motion during reaching and by releasing the object during transporting. This pattern of modulation appears to differ markedly from that previously reported for the excitatory component of the withdrawal reflex. Study of the nociceptive inhibitory reflexes during movement offers new and more profound insights into the functional anatomical organization of the spinal interneuronal network mediating sensory-motor integration.

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Foot drop and plantar flexion failure determine different gait strategies in Charcot-Marie-Tooth patients.


ABSTRACT

OBJECTIVE: To describe the temporal, kinetic, kinematic, electromyographic and energetic aspects of gait in Charcot-Marie-Tooth patients with foot drop and plantar flexion failure. METHODS: A sample of 21 patients fulfilling clinical, electrodiagnostic and genetic criteria for Charcot-Marie-Tooth disease were evaluated by computerized gait analysis system and compared to a group of matched healthy subjects. Patients were classified as having isolate foot drop (group 1) and association of foot drop and plantar flexion failure (group 2). RESULTS: While it was impossible to detect a reliable gait pattern when the group of patients was considered as a whole and compared to healthy subjects, we observed two distinctive gait patterns when patients were subdivided as group 1 or 2. Group 1 showed a gait pattern with some characteristics of the "steppage pattern". The complex motor strategy adopted by this group leads to reduce the swing velocity and to preserve the step length in spite of a high energy consumption. Group 2 displayed a "clumsy pattern" characterized by very slow gait with reduced step length, a broader support area and great reduction in the cadence. This group of patients is characterized by a low energy consumption and greater energy recovery, due above all to the primary deficit and the various compensatory mechanisms. CONCLUSIONS: Such between-group differences in gait pattern can be related to both primary motor deficits and secondary compensatory mechanisms. Foot drop and plantar flexion failure affect the overall gait strategy in Charcot-Marie-Tooth patients.

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