Does Combining Body Weight Support Treadmill Training with Thera-Band® Improve Hemiparetic Gait?

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Abstract

Introduction: The purpose of this case report was to explore the use of Thera-Band® Elastic Band in combination with body weight support treadmill training during locomotor training of a person with chronic stroke.

Methods: Inclusion and exclusion criteria were established and Institutional Review Board approvals were obtained. During treadmill training, the Thera-Band® was configured around the participant's hemiparetic leg in a figure-8 fashion and attached to the harness of the body weight support. The purpose of the Thera-Band® was to assist with hip and knee flexion and ankle dorsiflexion during swing and proper foot placement during stance, avoiding excessive inversion. The locomotor training protocol consisted of thirty minutes of training at ten-minute intervals with five-minute rest periods in between, three times per week for a total of ten weeks. Outcome measures included fast gait speed, spatiotemporal gait variables of gait, endurance and strength of ankle eversion. Data collection occurred at baseline, during weeks five and ten of the training protocol and at six weeks follow-up (week sixteen).

Results: All 90 training trials were completed. Mean gait speed increased from .625m/s at baseline to 1.10m/s at week sixteen. Gait distance increased from 131m at baseline to 367m at week 16. ankle eversion strength increased from 4.67 ± 0.45 to 5.90 ± 0.59 force/kg. GAITRite data demonstrated a more symmetrical gait pattern, with a more equal step length and stance time when comparing the left and right limbs, and an increased stride length bilaterally. Discussion: The results of this case report with one participant demonstrated significant improvement in the fast walking speed, gait endurance, gait symmetry and spatiotemporal gait variables and ankle eversion strength. Several limitations and suggestions for further research were identified.

Introduction

Body weight support treadmill training (BWSTT) is a treatment modality used for gait recovery of persons with stroke [1,2]. Patients with hemiparesis are able to walk with more normal gait kinematics, EMG timing and improved symmetry during BWSTT [3,4]. Manual assistance during BWSTT is sometimes necessary to properly align the trunk and advance and guide the lower extremity (LE) through a more normal gait trajectory, and provide stability during stance, particularly for those with severe weakness or spasticity [5,6]. The need for manual assistance can be problematic; it can require more than one individual to administer [7,8]. It is difficult to consistently and adequately control the joint to produce kinematically correct steps [8-10]. It can be exhausting and can place the physical therapist (PT) assisting the LE in a non-ergonomic position [7,9,]. The author hypothesized that the elastic properties of Thera-Band® Elastic Band (Thera-Band®) might lend well to assisting a hemiparetic LE through the gait cycle during BWSTT. Different colors of Thera-Band® were trialed to determine which band color offered the appropriate amount of resistance; enough to adequately assist the limb without interfering with either phase of gait. The middle of a piece of green Thera-Band®, approximately 78 inches in length (197cm), was placed under the sole of the participant's forefoot, crossed in front of the ankle and behind the knee in a figure-8 configuration. The two ends of the Thera-Band® were tied to a metal ring on the harness of the BWS near the participant's upper anterior thigh area (Figure 1). The purpose of the Thera-Band® was to assist with hip and knee flexion and ankle dorsiflexion during swing and proper foot placement during stance. Since the overhead harness is fixed and the Thera-Band®

Figure 1: Student demonstrating Thera-Band Elastic Band Configuration with BWSTT.