



## **Sub-acute Body Weight Supported Treadmill Training Case Report**

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The following is a case report of the effects of rehabilitation, including the use of Lite Gait (LG) body-weight-supported (BWS) gait training, on a 55-year-old status-post right hemisphere CVA in a sub-acute setting. The name of the patient and the exact dates of treatment have been changed to ensure patient anonymity. The following will highlight the physical therapy (PT) protocol administered by Michael Gores, MSPT and A. Kelly Myers, SPT at South Hills Rehabilitation Center and the outcomes achieved.

On Christmas Day, Lori suffered a CVA that left her in the hospital with complete left-sided paralysis. After one week at Sacred Heart Medical Center, Lori was transferred to South Hills Rehabilitation Center (SHRC), a skilled nursing facility with a pediatric unit and an attached long-term care facility.

Lori came into SHRC with orders for physical therapy (PT), as well as speech and occupational therapy (ST and OT). At the time of our PT evaluation, the patient was alert, aware, and agreeable to treatment. Lori's speech production, comprehension, and ability to follow single-step-commands were evident since her admittance to SHRC. She did, however, continue to be mildly compulsive and did have some motor planning deficits. Multiple-step- commands resulted in decreased safety and skipped steps.

Upon evaluation, Lori had flaccid paralysis of her entire left upper extremity (LUE), left-sided facial droop, and complaints of "cramping" and "uncontrolled movement" of her left lower extremity (LLE). Nervous system screening showed a positive light touch response for C-4 through C-8 and L-4 through S-1 dermatomes. Manual muscle testing was performed and manual control of left extremities was not yet possible in the left upper extremity (LUE) and 1/5 grossly in the left lower extremity (LLE) with no active dorsiflexion or hip flexion.

After several days of PROM for both left extremities, Lori's LLE began developing an extensor pattern synergy that was promoted using D1 manual resisted LLE extension. Lori was able to manually engage and shut off the extensor tone in supine by the beginning of week two at South Hills Rehabilitation Center (SHRC) (three weeks post CVA). Michael Gores, MSPT and A. Kelly Myers, SPT instituted standing balance and gait training in the parallel bars, at this time. The team employed the following techniques: standard Neuro-Developmental Technique (NDT) hand holds, verbal cueing to "push down with your left leg", and physical and verbal cueing to bring her left hip over her base of support (BOS) during LLE stance times. Lori's best functional performance at initiation of this protocol was maximum assist of two to ambulate four steps in the parallel bars.

Lori was able to ambulate sixteen feet in parallel bars and still required a two-person maximum assist for gait training at the end of week two.

As the end of the second week approached, the appropriateness for utilization of the Lite Gait (LG) body-weight support (BWS) system became apparent. Recent studies have demonstrated measurable functional gains from utilizing the LG with stroke patients. According to a single subject study by Miller<sup>1</sup> in 2001, BWSTT significantly improved left and right step length, step length ratio, Berg Balance Scale, ten-meter walk, and six-minute walk assessment scores, and these improvements persisted at a one month follow-up. Additional research by Barbeau and Visintin<sup>4</sup> has recently been completed that supports the use of BWS for the rehabilitation of patients status post CVA.

Initiation of BWS treatment was confounded by Lori's development of a gastrointestinal tract infection during week three, postponing use of the Lite Gait system until twenty-eight days post-stroke. The patient subsequently was sensitive to abdominal pressure. Pressure about the proximal, medial thigh and also the abdomen was problematic early, but the adjustability and multipoint control of the harness system allowed us to relieve the tension while maintaining the effectiveness of the system.

During weeks four and five we utilized the Lite Gait system ten times over fourteen days. The amount of body weight supported by the Lite Gait varied depending upon patient report, ease of advancement of the LLE, and performance (stride length, pacing, alternating gait pattern). Speed of the treadmill was placed at 0.4 miles per hour on day one, increasing to 1.0 miles per hour by the end of week four and 1.4 miles per hour by the end of week five. A treadmill speed of 1.1-1.5 has been found in research to be the required functional speed for successful community ambulation<sup>2</sup> and higher treadmill speeds have been shown to improve functional outcomes<sup>3</sup>. Lori also stated that 1.0 mph was a "comfortable walking speed, though a little bit slower than I used to walk." We alternated treadmill and over-ground Lite Gait ambulation during week five as Miller found results that "support the immediate effectiveness of combined BWS treadmill and overground training."<sup>1</sup>

In week six, we discontinued use of the Lite Gait for five consecutive days to work on functional tasks, hemi-walker gait training, wheelchair mobility training, and to re-assess unsupported ambulation. At the end of week six, Lori ambulated 75 feet four times with contact guard assistance with a right hemi-walker. She did have a narrow base of support, a left circumducting gait pattern, decreased left-side stance time, and uneven stride length. Lori was able to increase left stance time and stride length with verbal cueing during treatment. She was independent with her bed mobility and her supine-to-sit transfers, and required contact guard assistance for sit-to-stand and stand-pivot transfers.

During weeks seven and eight (eight and nine weeks post CVA), treatment consisted of alternating over-ground and treadmill body-weight supported gait training. We focused on pacing, stride length, and equal stance time on each leg during ambulation. Treadmill walking in the Lite Gait progressed from 1000 feet

at 1.0 miles per hour to 0.75 miles at 1.3 miles per hour and over-ground Lite Gait ambulation resulted in a best performance of 600 feet on two separate days.

At the end of the eighth week of therapy (nine weeks post CVA), Lori scored a 19/24 on the Tinetti, including a 12/16 on the balance portion. A Tinetti score of 21/24 represents the ability to be a community ambulatory and Lori is almost there. She was independent with all bed mobility, supine to sit transfers, and can now don/doff the AFO and shoe on the left. Lori transferred sit to stand independently, ambulated 2x 20 ft with a right hemi-walker with stand-by assist, and was independent with her wheelchair mobility.

South Hills Rehabilitation Center, like most of the top rehabilitation facilities in the nation, uses a Lite Gait partial weight bearing gait therapy device. This system has been shown to improve functional outcomes of patients with a wide range of gait deficits and has proven at this facility to be very complimentary to established treatment techniques such as NDT and PNF. Barbeau and Visintin<sup>4</sup>, Pohl et al.<sup>2</sup>, Hesse et al.<sup>5</sup>, and many more have documented the functional benefits of the Lite Gait body weight supported system. Continued research and clinical application has only increased it's uses and values. We hope Lori's case helps illustrate some of the benefits and possible outcomes of using BWS in the rehabilitation of a patient with CVA.

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<sup>1</sup>Miller EW. Body weight supported treadmill and overground training in a patient post cerebrovascular accident. *Neurorehabilitation* 16(2001) 155-163.

<sup>2</sup> Pohl M, Mehrolz J, Ritschel C, Ruckriem S. Speed-dependent treadmill training in ambulatory hemiparetic stroke patients. *Stroke* 33(2002) 553-558.

<sup>3</sup> Sullivan KJ, Knowlton BJ, Dobkin BH. Step training with body weight support: Effect of treadmill speed and practice paradigms on poststroke locomotor recovery. *Arch Phys Med Rehab* 83(2002) 683-691.

<sup>4</sup> Barbeau H, Visintin M. Optimal outcomes obtained with body-weight support combined with treadmill training in stroke subjects. *Arch Phys Med Rehab* 84(2003) 1458-1465.

<sup>5</sup> Hesse S, Bertelt C, Jahnke MT, Schaffrin A, Baake P, Malezic M, Mauritz KH. Treadmill training w/ partial body weight support (PWS) compared with physiotherapy in nonambulatory hemiparetic patients. *Stroke* 26:6(1995) 976-981.