뇌신경재활

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Exoskeletal overground robot-assisted gait training for patients with stroke

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Objective

The purpose of this study was to determine repetitive locomotor treatment using the robot-assisted gait training (RAGT) device (Exowalk®, HMH Co. Ltd, Korea) on the functional improvement of patients with stroke.

Methods

This is a blinded prospective, randomized, controlled study from September, 2018 to July, 2019. The inclusion criteria were as follows: (1) ischemic or hemorrhagic stroke confirmed by brain imaging study; (2) good cognition function (Mini-Mental Status Examination above 10); (3) mild to moderate spasticity (Modified Ashworth Scale Grade below 2); (4) able to stand with assist. The exclusion criteria were as follows: (1) poor cognition (unable to obey command or Mini-Mental Status Examination less than 10); (2) ataxia; (3) severe spasticity (Modified Ashworth Scale Grade 3 and 4); (4) difficulty to walk due to severe leg osteoarthritis or joint swelling; (5) status unable to undergo gait training. Participants were randomized into 2 groups as follows. The Experimental Group (EG) underwent a rehabilitation program of robot assisted gait training for 30 minutes, 5 times a week for 4 weeks, whereas the Control Group (CG) received a conventional gait training in same intensity. The outcome measures were recorded by Functional Ambulation Category (FAC), Rivermead Mobility Index (RMI), 10 Meter Walk Test (10MWT), 6 Minute Walk Test (6MWT), Motricity Index (MI), Berg Balance Scale (BBS), Korean version Modified Barthel Index (K-MBI), Step Counting (SC) and Borg Scale (BS). In addition, using gait analysis system (Human Track), Swing Time Asymmetry (STA) and Step Length Asymmetry (SLA) were recorded. The assessments were performed at the beginning (T0), at the end of the treatment (T1) and after 4 weeks of the end of the treatment (T2).

Results

The assessments were completed in 14 patients (8 patients in EG, 6 patients in CG). Most patients were enrolled in acute and subacute phase. Both groups showed functional improvement, especially in FAC, RMI, 10MWT, 6MWT, MI, BBS, K-MBI and STA. Compared with the CG, the EG showed a larger improvement in FAC, RMI, and BBS.

Conclusions

RAGT can be applied to individuals with stroke disease to facilitate gait recovery. The results showed that locomotor treatment using Exowalk is as efficient as conventional gait training. However, larger sample size is needed to investigate the effectiveness and efficacy of Exowalk as single gait training.

Figure 1. A patient on a Exowalk