

Effects of Locomotion Training With Assistance of a Robot-Driven Gait Orthosis in Hemiparetic Patients After Stroke: A Randomized Controlled Pilot Study

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Abstract

Background and Purpose: The success of gait rehabilitation after stroke depends on active walking exercises. However, the disabling after-effects of stroke often make such exercises impossible at the onset of therapy. To facilitate treadmill training of paraparetic patients, a robot-driven gait orthosis (Lokomat) was developed. We investigated the effects of the Lokomat when used with hemiparetic patients.

Methods: The authors conducted a randomized, controlled pilot study of 30 acute stroke survivors. The treatment group received 30 minutes of robotic training daily and the control group 30 minutes of conventional physiotherapy daily in addition to 30 minutes of conventional physiotherapy for each group. Outcome measures were independence of gait, gait speed, gait parameters, and body tissue composition.

Results: After 4 weeks of therapy, the walking ability of the Lokomat group and the control group expressed as the functional ambulation classification was significantly improved. The functional ambulation category (median±inter-quartile range) was at baseline 0±0 in control and 0±1 in the therapy group and increased after therapy to 1±3 in both groups significantly ($P=0.01$). There was no significant difference in gain of these parameters between the groups. The Lokomat group had a significantly longer single stance phase (sec; mean±SEM) on the paretic leg when walking on the floor. At baseline, it was 0.19±0.17 and after therapy 0.49±0.07 ($P=0.014$).

The control group had increased their body weight approximately 1.33±1.40 kg (mean±SEM; $P=0.046$), mostly as fat mass, whereas the Lokomat group had lost fat mass approximately -2.9±1.0 kg (mean±SEM; $P=0.016$) and increased their muscle mass approximately 3.36±1.4 kg (mean±SEM; $P=0.031$).

Conclusions: This pilot study indicates that Lokomat therapy is a promising intervention for gait rehabilitation. Although there was no difference between groups in gain of functional scores, the Lokomat group showed an advantage of robotic training over conventional physiotherapy in improvement of gait abnormality and body tissue composition.

Paper Reference:

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