ABSTRACT

BACKGROUND: Robotics and related technologies are realizing their promise to improve the delivery of rehabilitation therapy but the mechanism by which they enhance recovery is still unknown. The electromechanical-driven gait orthosis Lokomat has demonstrated its utility for gait rehabilitation after stroke. Aim: To test the efficacy of Lokomat in gait retraining and to investigate the neurophysiological mechanisms underlying the recovery process. Design: Case series study. Setting: Unit of Neurorehabilitation of a University Hospital. Population: Fifteen patients with poststroke hemiparesis.

METHODS: Patients underwent a six weeks rehabilitative treatment provided by Lokomat. The outcome measures were: FuglMeyer Motor Scale (FMMS), Berg Balance Scale (BBS), 10 metres Walking Test (10mWT), Timed Up and Go test (TUG), 6 Minute Walking Test (6MWT). Strength and Motor Unit firing rate of Vastus Medialis (VM) were analyzed during isometric knee extension through an isokinetic dynamometer and surface EMG recording.

RESULTS: An increase of duration and covered distance, a decrease of body weight support and guidance force on the paretic side along the sessions were observed. The FMMS, the BBS, the TUG and the 6MWT demonstrated a significant improvement after the training. No increase of force was observed whereas a significant increase of firing rate of VM was recorded. Conclusions: The evidence that the improvement of walking ability observed in our study determines a significant increase of firing rate of VM not accompanied by an increase of force could suggest an effect of training on motoneuronal firing rate that thus contributes to improve motor control. Clinical Rehabilitation Impact. Given the current wide use of robotics in gait retraining after stroke, our approach can contribute to clarify the mechanisms underlying its rehabilitative impact so as to incorporate the findings of evidence-based practice into appropriate treatment plans for persons poststroke.

Free full text.