Effects of end-effector-controlled gait training on walking ability in non-ambulatory patients with left-sided neglect

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Background: Visuospatial neglect (VSN) often coincides with other debilitating symptoms, e.g., tilted perceived verticality, altered posture and insufficient balance negatively affecting treatment and motor recovery. Although evidenced based guidelines recommend an end-effector assisted gait training in non-ambulatory patients at early stages, in practice a hierarchical approach is often used in which balance and standing exercises precede gait therapy. In fact, in studies on the effectiveness of gait training neglect patient are often underrepresented (Peurala et al., 2009) or have been even excluded from participation (Morone et al. 2012,2018). The aim of this study was to test, if subacute non-ambulatory stroke patients with VSN and vertical misperception benefit from an early end-effector-controlled gait training in comparison to a standing training measured in terms of functional ambulation categories (FAC). Secondary goals include the exploration of treatment effects on trunk function, postural control, balance, neglect symptoms and subjective visual vertical perception.
Method: In a single-blinded study 34 subacute neglect patients with significant gait deficit (FAC<3) and tilted vertical perception (subjective visual vertical (SVV) > 2°) were randomly assigned to an end-effector-guided gait training (GT) or static standing training (ST). Groups were balanced according to trunk impairment. Over three weeks patients received a maximum of 30 minutes training three times per week additional to standard rehabilitation treatment. Before and shortly after the end of training FAC-score (primary outcome), trunk stability (TIS), balance (BBS, mFRT), several neglect symptoms, and SVV (secondary outcomes) were measured.
Results: Although, patients completed on average fewer minutes of GT than ST preliminary results suggest that the chance of improving walking ability measured in terms of FAC is 4,6 times higher after GT compared to ST (Odds Ratio=4,6, 95% CI: 1,06-20,04). Importantly, initially low trunk stability did not correlate with training time or subjective perceived strain in the GT condition and both, patients with low and higher (median split TIS) trunk stability, showed improvements in FAC (Wilcoxon Tests: both p<.03) after training. With regard to the secondary outcomes, patients of both training conditions showed on average an increase in motor scores, a reduction in vertical misperception and VNS symptoms over time. However, a stronger increase in trunk stability (TIS) and balance (BBS) was observed after GT compared to ST.
Discussion/Conclusion: Despite of several limitations this study demonstrated feasibility and beneficial effects of an early GT in subacute neglect patients even in patients with initial very low trunk stability. The results may contribute to reduce uncertainty about effectiveness and scepticism of using GT in initially severely

affected patients with neglect symptoms. Further knowledge about the relationship are important to guide early therapeutic strategies to counteract possible activation limitations during the sensitive phase of high plasticity.