

Functional Electrical Stimulation slows disease progression in Hereditary Spastic Paraplegia –a randomized controlled trial

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Background: A progressive spastic gait disturbance is the main functional deficit in most HSP patients. Central dropped foot with decreased or belated dorsal flexion during the swing phase resulting in frequent toe catch, stumbling or falling is present in a high percentage of HSP patients. Functional electric stimulation (FES) of the peroneal nerve has been used as a treatment for central dropped foot due to stroke for at least two decades but has never been tested in a randomized controlled trial in HSP.

Methods: We performed a randomized-controlled trial to test the efficiency of FES of the peroneal nerve to correct dropped foot in HSP. Study participants were randomized in a treatment (n=25) and a control group (n=25). Subjects in the treatment group received FES treatment over a 6 month period. Outcome parameters included video gait analysis, 10m fast walk, 3 min endurance walk, Physical Cost Index (PCI) and the quality of life questionnaire EQ-5D.

Results: Video gait analysis demonstrated effective dropped foot correction with increase of foot dorsiflexion and an increased distance of the forefoot to the floor during the swing phase. However this did not result in a measurable orthotic effect on walking speed and effort as no significant differences in 10m fast walk speed, distance covered during the 3 minute endurance walk or PCI were observed when comparing stimulated versus unstimulated walks in the treatment group. However, FES stimulation showed positive long-term effects on mobility as well as quality of life. While all mobility measures and self-rated quality of life (EQ-5D) deteriorated in the control group over the 6 months of the study, demonstrating progression of the disease, mobility as well as quality of life remained stable in the FES treatment group.

Conclusions: No short-term orthotic effects of FES could be demonstrated in HSP patients. However, disease progression was significantly reduced in the treatment versus the control group. Whether this is a specific effect of FES or a consequence of a potentially increased daily activity in the treatment group due to FES remains to be shown.