Long term therapeutic and orthotic effects of a foot drop stimulator on walking performance in progressive and nonprogressive neurological disorders.

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Abstract

BACKGROUND: Stimulators applying functional electrical stimulation (FES) to the common peroneal nerve improve walking with a foot drop, which occurs in several disorders.

OBJECTIVE: To compare the orthotic and therapeutic effects of a foot drop stimulator on walking performance of subjects with chronic nonprogressive (eg, stroke) and progressive (eg, multiple sclerosis) disorders.

METHODS: Subjects with nonprogressive (41) and progressive (32) conditions used a foot drop stimulator for 3 to 12 months while walking in the community. Walking speed was measured with a 10-m test and a 4-minute figure-8 test; physiological cost index (PCI) and device usage were also measured. The subjects were tested with FES on and off (orthotic effect) before and after (therapeutic effect) stimulator use.

RESULTS: After 3 months of FES use, the nonprogressive and progressive groups had a similar, significant orthotic effect (5.0% and 5.7%, respectively, $P < .003$; percentage change in mean values) and therapeutic effect with FES off (17.8% and 9.1%, respectively, $P < .005$) on figure-8 walking speed. Overall, PCI showed a decreasing trend ($P = .031$). The therapeutic effect on figure-8 speed diverged later between both groups to 28.0% ($P < .001$) and 7.9% at 11 months. The combined therapeutic plus orthotic effect on figure-8 speed at 11 months was, respectively, 37.8% ($P < .001$) and 13.1% ($P = .012$); PCI decreased 18.2% ($P = .038$) and 6.5%, respectively.

CONCLUSIONS: Subjects with progressive and nonprogressive disorders had an orthotic benefit from FES up to 11 months. The therapeutic effect increased for 11 months in nonprogressive disorders but only for 3 months in progressive disorders. The combined effect remained significant and clinically relevant.