Background

Severe spinal cord injury (SCI) leads to functional disconnection of ascending and descending spinal pathways.

Epidual electrical stimulation (EES) has previously facilitated volitional control of joint-specific muscles and independent standing after months of training in patients with SCI (Harkema 2011, Angeli 2014).

Here, we report a case of chronic traumatic paraplegia in which EES of the lumbosacral spinal cord enabled: 1) volitional control of task-specific muscle activity; 2) volitional control of rhythmic muscle activity to produce step-like movements while side-lying; 3) independent standing; 4) and while in a vertical position with body weight partially supported, voluntary control of step-like movements and rhythmic muscle activity.

This is the first time the application of EES enabled all of these tasks in the same subject within the first two weeks (eight stimulation sessions total) of EES therapy.

Methods

The participant was a 26-year-old male who sustained a traumatic T6 ASIA-A SCI three years prior. After 22 weeks of motor training, an EES system was applied over the lumbosacral spinal cord.

This is the first report of EES-facilitated independent standing after several months of training, in two ASIA-A and two ASIA-B subjects In addition, this is the first report of EES-facilitated volitional control of task-specific motor activity and control of rhythmic step-like movements within a single subject with clinically complete chronic SCI during the first two weeks of EES.

References


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