Oral Communication

OC-299

Effects of Intermittent Theta Burst Stimulation on Motor Function, Gait, and Pain in Patients With Incomplete Spinal Cord Injury: A Systematic Review and Meta-Analysis

Topic: Neurostimulation (rTMS, tDCS, etc.)

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BACKGROUND

Intermittent theta burst stimulation (iTBS) is an emerging treatment approach for spinal cord injury (SCI). Recent trials have shown that iTBS improves motor function, gait, and spasticity through nerve circuit reconstruction. However, the associations between iTBS and functional outcomes in patients with incomplete SCI (iSCI) remain unclear. This study aims to evaluate the effects of iTBS on motor, gait, sensory, and spasticity-related outcomes in individuals with iSCI compared to sham iTBS.

METHODS

A systematic search was conducted across PubMed, EMBASE, Cochrane Library, Web of Science, and ClinicalTrials.gov databases up to February 2025. Two investigators independently screened titles and abstracts, followed by full-text reviews to assess eligibility. The primary outcome was the Extremity Motor Score (EMS), including the Lower Extremity Motor Score (LEMS) and Upper Extremity Motor Score (UEMS). Secondary outcomes included gait parameters, motor evoked potential (MEP) amplitude and latency, pain level, the Extremity Sensory Score (ESS), the Spinal Cord Independence Measure (SCIM), and the Modified Ashworth Score (MAS). All outcomes were reported as continuous variables.

RESULTS

Six randomized control trials (RCTs) involving 116 patients with iSCI were identified. iTBS showed significantly greater improvements compared to sham iTBS in LEMS (mean difference [MD]: 7.13, 95% confidence interval [CI]: 0.71 to 13.56, $p = 0.03$), step length (MD: 7.81, 95% CI: 5.35 to 10.26, $p < 0.001$), MEP amplitude (MD: 24.47, 95% CI: 17.17 to 31.77, $p < 0.001$), pain level (standardized MD [SMD]: 2.77, 95% CI: 0.05 to 5.5, $p = 0.05$), SCIM (MD: 15.42, 95% CI: 6.72 to 24.13, $p < 0.001$), and MAS (MD: -2.89, 95% CI: -5.76 to -0.02, $p = 0.05$). However, no significant differences were observed in EMS (MD: 3.96, 95% CI: -4.2 to 12.12, $p = 0.34$), UEMS (MD: -5.83, 95% CI: -12.44 to 0.78, $p = 0.08$), walking speed (MD: 0.03, 95% CI: -0.0 to 0.07, $p = 0.08$), MEP latency (MD: -2.39, 95% CI: -5.27 to 0.49, $p = 0.1$), and ESS (SMD: 0.13, 95% CI: -0.43 to 0.7, $p = 0.64$).

CONCLUSION

Intermittent theta burst stimulation significantly improves lower limb motor function, step length, pain, independence, and spasticity compared to sham iTBS in patients with iSCI. It is a promising technique for enhancing neural transmission and muscle response, with the advantages of minimal adverse events and non-invasiveness. However, further RCTs with larger cohorts are needed.

Statement of Disclosures

None

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