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Deep Brain Stimulation and Motor Cortex Stimulation for Post-Stroke Pain: A Systematic Review and Meta-Analysis

Authors : Siddarth Kannan

Abstract : Objectives: Deep Brain Stimulation (DBS) and Motor Cortex stimulation (MCS) are innovative interventions in order to treat various neuropathic pain disorders such as post-stroke pain. While each treatment has a varying degree of success in managing pain, comparative analysis has not yet been performed, and the success rates of these techniques using validated, objective pain scores have not been synthesised. The aim of this study was to compare the effect of pain relief offered by MCS and DBS on patients with post-stroke pain and to assess if either of these procedures offered better results. Methods: A systematic review and meta-analysis were conducted in accordance with PRISMA guidelines (PROSPEROID CRD42021277542). Three databases were searched, and articles published from 2000 to June 2023 were included (last search date 25 June 2023). Meta-analysis was performed using random effects models. We evaluated the performance of DBS or MCS by assessing studies that reported pain relief using the Visual Analogue Scale (VAS). Data analysis of descriptive statistics was performed using SPSS (Version 27; IBM; Armonk; NY; USA). R statistics (Rstudio Version 4.0.1) was used to perform meta-analysis. Results: Of the 478 articles identified, 27 were included in the analysis (232 patients- 117 DBS & 115 MCS). The pooled number of patients who improved after DBS was 0.68 (95% CI, 0.57-0.77, I2=36%). The pooled number of patients who improved after MCS was 0.72 (95% CI, 0.62-0.80, I2=59%). Further sensitivity analysis was done to include only studies with a minimum of 5 patients in order to assess if there was any impact on the overall results. Nine studies each for DBS and MCS met these criteria. There seemed to be no significant difference in results. Conclusions: The use of surgical interventions such as DBS and MCS is an upcoming field for the treatment of post-stroke pain, with limited studies exploring and comparing these two techniques. While our study shows that MCS might be a slightly better treatment option, further research would need to be done in order to determine the appropriate surgical intervention for post-stroke pain.

Keywords : post-stroke pain, deep brain stimulation, motor cortex stimulation, pain relief
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