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Deep Brain Stimulation for Treatment of Central Post-stroke Pain: A Systematic Review of Case Reports

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Introduction
Central Post-Stroke Pain (CPSP) is a rare condition of chronic neuropathic pain that affects approximately 1.5% of patients after a stroke potentially involving damage to areas in the central nervous system responsible for pain processing in the cortical part of the spinothalamic pathway. The pain pattern is characterized by sensations of burning, stabbing, tingling, or electric shock, usually in the limbs on the side opposite to the stroke, in a hemicorporal pattern, and there may also be hemicranial headache (LORENZ et al., 1998).
There is currently no consensus on the best treatment for CPSP. Recently, neurosurgical interventions such as Deep Brain Stimulation (DBS), have shown promise for the treatment of CPSP. However, there is limited research on the effectiveness of DBS in treating CPSP, highlighting the need for studies to assess the effectiveness of this technique in rehabilitating this condition.
Objective
The objective of the study is to assess Deep Brain Stimulation as a potential treatment for CPSP.
Methods
The present study is a systematic review of case reports that utilized the Pubmed/MEDLINE and EMBASE databases. The search employed the terms 'Deep Brain Stimulation' and 'Central Post- stroke Pain' connected by the boolean operator 'AND'.
Unfiltered search yielded a total of 83 results (Pubmed = 26, EMBASE = 57). 16 results were excluded as duplicates. 48 articles were excluded by title and abstract. Only case reports and articles with full-text availability in English were included. After full-text analysis of 18 articles, 9 of them were ultimately included in the review.
Results
There are reports of patients experiencing a cessation of their painful symptoms after a second stroke in one case and after traumatic brain injury in another case (HELMCHEN et al., 2002). This demonstrates that invasive approaches could potentially be performed to treat CPSP. Therefore, neuromodulation emerges as a less invasive alternative for managing these cases.
The standard technique of neuromodulation through DBS has become a recurring practice for cases where pain control through medication alone is insufficient, leading to an expansion of knowledge in the techniques involved in this treatment. In all the cases included in this review, the patients targeted for surgery met the criteria for CPSP.
In all the procedures included in the study, the treatment involved neuromodulation of the cortical motor center, using one or two electrodes. One of the cases utilized Bayesian optimization, but the procedure did not differ significantly from the others in terms of technique. In all cases, whether ischemic or hemorrhagic, there was involvement of the thalamus in the stroke.
All patients in the study underwent post-surgery pain assessments, which resulted in either complete or partial pain reduction. In terms of the evaluated factor of quality of life, all patients reported an improvement in this aspect.
Despite not having long-term follow-up for all cases, the effects were long-lasting, requiring adjustments as it was identified that the electrodes change their behavior over time, necessitating reevaluation. Only in one case, the patient could not continue follow-up due to death from small cell lung cancer.
Conclusion
DBS is an effective procedure for various neurological conditions, and its application for CPSP is supported by the literature. While there is a possibility of technical implant failure or infections due to manipulation, the procedure is safe and allows patients to achieve significant pain relief. Nevertheless, continuous assessment is necessary, and the replacement of the device should always be considered in cases of treatment ineffectiveness.
Among the study's limitations are the scarcity of case reports in the literature, primarily due to CPSP being a rare condition, as well as diagnostic challenges. Therefore, further in-depth investigations into this condition and its potential treatments are warranted.

Palavras-chave: Central Post-Stroke Pain; Deep Brain Stimulation; Stroke.