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Deep brain stimulation in Parkinson's disease: cognitive outcomes one year after surgery

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Introduction: Deep Brain Stimulation (DBS) is a valid treatment for motor symptoms in patients with Parkinson's disease (PD). However, a recent meta-analysis [1] has shown that this can have adverse effects on cognition, but most of the included studies do not have level II cognitive assessments and lack a control group.

Objective: The study aims to evaluate the effects of DBS on the subthalamic nucleus (STN) one year after surgery by comparing DBS and non-DBS patients in level II cognitive assessment.

Methods: Eight PD patients undergoing STN-DBS and eight pharmacologically treated patients (MED) were administered a neurological exam and an extensive battery of neuropsychological tests. Both groups were evaluated at baseline (T0) and after one year (T1), a time long enough to avoid effects due to surgical micro-injuries and short enough to avoid measuring possible cognitive decline.

Results: At baseline, the two groups differ in levodopa taken per day (LEDD) but not in other demographic, cognitive, and motor variables. Considering T0 and T1 of each group, the DBS shows a worsening in Attentive Matrices, Semantic Verbal Fluency, and Stroop Test. Even MED worsen Attention Matrices but improve Semantic Verbal Fluency. Furthermore, only MEDs increase depressive symptoms. Using the simple discrepancy score (SDS), the comparison between DBS and MED shows that the two groups no longer differ in LEDD, but there is a difference in the Semantic Verbal Fluency about one year after the intervention, in which DBS scores significantly lower than MEDs.

Conclusions: Preliminary results indicate that, after about a year, STN-DBS patients compared to MEDs presented a reduction of LEDD and stability in most cognitive tests while worsening in Semantic Verbal Fluency. This finding needs further neuroimaging and behavioral investigations and emphasizes the need to integrate cognitive assessment into the pre- and post-operative routine of DBS patients.

References:

[1] Bucur M., Papagno C. (2022). Deep Brain Stimulation in Parkinson's Disease: A Meta-analysis of the Long-term Neuropsychological Outcomes. Neuropsychological Review. DOI: 10.1007/s11065-022-09540-9.