Preoperative Cognitive Profile Predictive of Cognitive Decline after Subthalamic Deep Brain Stimulation in Parkinson's Disease

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Abstract

Cognitive decline represents a severe non-motor symptom of Parkinson's disease (PD) that can significantly reduce benefits of subthalamic deep brain stimulation (STN DBS). Here, we aimed to identify pre-surgery cognitive profile associated with faster post-surgery cognitive decline in STN DBS treated PD patients to characterize patients who could benefit from more monitoring during treatment course. A retrospective observational study of 126 PD patients treated by STN DBS combined with oral dopaminergic therapy followed for 3.54 years on average (SD = 2.32) with repeated assessments of cognition was conducted. Pre-surgery cognitive profile was obtained via a comprehensive neuropsychological examination. Data were analyzed using exploratory factor analysis for pre-surgery cognitive profile extraction and Bayesian generalized linear mixed models for description of the longitudinal cognitive outcome. Overall, we observed a mild annual cognitive decline of 0.90 points from a total of 144 points in the Mattis Dementia Rating Scale (95% posterior probability interval (PPI) [-1.19, -0.62]). Pre-surgery executive deficit predicted the rate of post-surgery cognitive decline (b = -0.39, 95% PPI [-0.63, -0.15]). The predictive utility of pre-surgery executive deficit resulted from summing small effects of several single test scores. Patients with PD treated with STN DBS experience only mild annual post-surgery cognitive decline. According to our data and models patients with worse long-term cognitive prognosis can be identified via pre-surgery examination of executive functions. Aggregating results from multiple executive tests to estimate cognitive prognosis of PD patients treated with STN DBS is likely superior to examining single test scores.

Keywords: Parkinson's disease, deep brain stimulation, cognition, longitudinal, latent variable analysis

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