

Predicting impulse control disorder evolution after deep brain stimulation in Parkinson's disease patients

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Introduction: Parkinson's disease (PD) is a dopaminergic neurodegenerative disorder characterized by motor and cognitive impairment. Between 14 and 40% of PD patients also exhibit typical impulse control disorder (ICD) behavioral symptoms. Subthalamic deep brain stimulation (DBS) is a validated therapy for PD motor symptoms, but its effects on ICD are still unclear.

Objective: The aim of this study is to develop an algorithm able to predict the improvement of ICD after DBS implant, based on the pre-surgery assessment of the patient's profile. Considered features include demographic, clinical, cognitive profile and drug therapy.

Methods: We investigated population-level disparities between the improved and persistent ICD groups, which were based on the results of their first-year evaluation after DBS across 24 patients. Multiple statistical analyses were employed, and clustering techniques were utilized to check the separation of these two preoperative clinical profiles.

Results: We identified several features in clinical and demographic profiles of patients differing between improved and stagnant ICD group. A simple algorithm based on these features correctly classified the one-year outcome based only on pre-operative data.

Conclusions: Despite the complex nature of the pathophysiology of PD with ICD, our preliminary study on a small dataset suggests that a preoperative assessment of the clinical and demographic characteristics of ICD patients can effectively predict the enhancement of ICD symptoms following a DBS surgery targeting the subthalamic nucleus.