

Date: 27th October-2025

MOOD AND BEHAVIORAL CHANGES AFTER DEEP BRAIN STIMULATION IN A PATIENT WITH PARKINSON'S DISEASE: A CASE REPORT

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Abstract

Background: Deep Brain Stimulation (DBS) of the subthalamic nucleus (STN) is an effective therapy for advanced Parkinson's disease (PD), improving motor function in patients with inadequate response to medication. However, neuropsychiatric and behavioral complications may occur postoperatively.

Case presentation: We report a 62-year-old male with an 8-year history of PD who underwent bilateral STN-DBS due to severe motor fluctuations and dyskinesia. Postoperative stimulation settings were 7.8 V on the right and 8.3 V on the left side. Although motor symptoms improved remarkably, the patient developed mood elevation, irritability, and impulsive behavior. Neuropsychological assessment revealed hypomanic features without psychosis. Adjustment of stimulation parameters and reduction of dopaminergic medication led to gradual recovery of normal mood within four weeks.

Conclusion: STN-DBS can induce mood and behavioral disturbances, especially at higher stimulation voltages. Careful postoperative monitoring and individualized adjustment of stimulation parameters are crucial to prevent and manage such side effects.

Introduction

Deep Brain Stimulation (DBS) is a well-established treatment for advanced Parkinson's disease (PD), particularly in patients who develop motor complications resistant to pharmacological therapy. The subthalamic nucleus (STN) is the most common target for DBS, offering substantial improvement in motor performance and reduction of medication requirements.

Despite these benefits, several reports have described neuropsychiatric side effects, including mood swings, mania, depression, apathy, and behavioral disinhibition. These phenomena are often transient and reversible with proper management, but their occurrence underscores the need for careful neuropsychiatric monitoring after surgery.

Case Presentation

A 62-year-old male with an 8-year history of idiopathic Parkinson's disease presented with severe motor fluctuations and dyskinesias unresponsive to optimized dopaminergic therapy. Preoperative neuropsychological evaluation showed no depression, anxiety, or psychotic features. Cognitive testing was within normal limits for his age.

The patient underwent **bilateral subthalamic nucleus DBS implantation**. Postoperative MRI confirmed correct electrode placement. After programming, the stimulation settings were as follows:

- **Right STN:** 7.8 V, 130 Hz, 60 μ s
- **Left STN:** 8.3 V, 130 Hz, 60 μ s



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Within two weeks after stimulation onset, the patient's relatives noted increased talkativeness, irritability, impulsive decision-making, and decreased need for sleep. The patient displayed elevated mood and increased goal-directed activity, consistent with a hypomanic state. The **Young Mania Rating Scale (YMRS)** score was 22. No hallucinations or delusions were reported.

Stimulation amplitude was gradually reduced to 6.5 V bilaterally, and dopaminergic medication was decreased by 25%. Over the following month, mood and behavioral symptoms subsided. The patient maintained excellent motor control without recurrence of psychiatric symptoms during six months of follow-up.

Discussion

This case illustrates that **mood and behavioral changes can occur following STN-DBS**, particularly at higher stimulation voltages. The subthalamic nucleus is part of the cortico-striato-thalamo-cortical circuitry, linking motor, associative, and limbic loops. Excessive current spread to limbic territories of the STN or adjacent structures (such as the substantia nigra pars reticulata or the hypothalamus) may lead to **mood elevation and impulsivity**.

Previous studies have reported similar findings:

- Hypomanic or manic episodes after STN-DBS are frequently associated with **high voltage or medial electrode placement**.
- The combination of **STN stimulation and dopaminergic drugs** can potentiate behavioral disinhibition (Temel et al., 2006; Mallet et al., 2007).
- These effects are usually reversible after **parameter adjustment or medication modification**.

In this patient, mood stabilization occurred after lowering the stimulation amplitude, supporting the hypothesis that stimulation-induced activation of limbic circuits was the underlying mechanism.

Careful postoperative monitoring by a multidisciplinary team (neurologist, psychiatrist, neuropsychologist) is essential to identify early neuropsychiatric side effects and adjust therapy accordingly.

Conclusion

DBS remains one of the most effective interventions for advanced Parkinson's disease. However, **high-voltage stimulation** may lead to mood and behavioral disturbances. This case underscores the importance of optimal stimulation programming, close neuropsychiatric observation, and patient-family education to ensure both motor and mental well-being after DBS surgery.

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