Long-term improvement in obsessions and compulsions with subthalamic stimulation

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LONG-TERM IMPROVEMENT IN OBSESSIONS AND COMPULSIONS WITH SUBTHALAMIC STIMULATION

Obsessive-compulsive disorder (OCD) may be conceptualized as a disorder of self-control and behavioral inhibition. Recent studies suggested interest in deep brain stimulation (DBS) of different subcortical brain targets such as the nucleus accumbens, anterior internal capsule/ventral striatum, and subthalamic nucleus (STN) in severe, resistant OCD. STN is a critical node of the indirect and hyperdirect basal ganglia–thalamocortical circuit. STN-DBS may release its function as a brake on behavioral programs, disinhibiting habitual responses and enabling more flexible goal-directed behavior control in OCD. Little is known about long-term outcome of STN-DBS in OCD. Based on experience in Parkinson disease, STN-DBS can induce a change from apathetic to disinhibited behavior. This target has also a potential impact on addictions.

The study is listed on clinicaltrials.gov (NCT00169377).

Case report. A 49-year-old man had chronic, severe OCD starting at age 21 preceded by hyperactivity in childhood and multiple simple and complex motor tics and vocal tics starting as late as age 20 years after being enrolled into military service. Tics and OCD worsened in parallel and the patient was initially diagnosed with Tourette syndrome. Over time, the simple motor tics virtually disappeared, while OCD eventually dominated the clinical picture. Some of the rituals followed a complex evolution: while at the early phases of the illness they appeared as simple involuntary motor tics, they evolved into complex tics and then, over time, were integrated into deliberate rituals and executed in a compulsive manner, in response to obsessions, such as the licking ritual shown on the video at Neurology.org.

Obsessions were centered on imminent catastrophe, with fatal accidents occurring to his wife and children. Compulsions consisted primarily of neutralizing mental operations by mental superimposition of scenarios of accidents with positive images of situations of well-being of his family members. "Just right" compulsions included repetitive throat clearing and touching or licking objects, based on the initial simple tics. His medical history revealed traumatic biographical events, influencing his OCD theme: his mother’s death from a car accident when he was 10 years old, witnessing a terrorist bomb explosion at age 20 years, and, finally, seeing his beloved grandmother’s dead body the day before his marriage, which eventually triggered the onset of his OCD, without constituting a real posttraumatic stress disorder.

Despite adequate therapeutic trials of psychotherapy (dynamic psychotherapy, cognitive behavioral therapy) and pharmacotherapy (4 selective serotonin reuptake inhibitors, 1 serotonin and norepinephrine reuptake inhibitor, clomipramine, 2 antipsychotics; clonidine, in different combinations), OCD induced major disability, with socioprofessional withdrawal. Alcohol intake, used as a daily sedative after 33 years of age, contributed to emotional lability and several impulsive suicide attempts (benzodiazepines). Clinical assessment eliminated cluster A or B personality disorders.

By age 39 years, considering this disabling chronic and treatment-resistant OCD, the patient underwent neurosurgery for DBS of the associative-limbic part of the STN, as the first Grenoble participant in a French national multicenter study.

STN-DBS rapidly led to major improvement in OCD (see video) at low voltage (1.3 V/60 μs/130 Hz monopolar stimulation bilaterally), paralleled by acute mild hypomania on discharge, which progressively worsened up to full-blown mania at 1.5 V bilaterally. This state improved within less than 30 minutes after a reduction of 0.2 V bilaterally, not requiring hospitalization. The therapeutic window of DBS between OCD improvement and hypomania remained narrow over years. As a satisfying compromise, some residual OCD were accepted to avoid behavioral disorder. Chronic stimulation with these parameters led to marked improvement in OCD [Yale-Brown Obsessive Compulsive Disorder Scale (Y-BOCS)] decrease from 37 to 9/40 within 3 months), anxiety, and mood. The patient’s social and family lives markedly improved and professional reininsertion became possible. He has been able to reduce his use of alcohol and had major improvement in suicidal ideas; despite 2 suicidal attempts committed in a context of short, partial relapses following self-decided medication discontinuation during the first postoperative years. His overall state has been relatively stable over...
recent years, requiring only small DBS adjustments. Currently, after 10 years of follow-up, the Y-BOCS is improved by 43% (current treatment: fluvoxamine 200 mg/d; lorazepam 4 mg/d; 2 V/60 μs/130 Hz). The patient subjectively estimates his improvement at 80%, paralleled by a quality of life better than ever achieved on conventional treatment.

**Discussion.** We highlight this case as it illustrates rapid onset of improvement and long-term efficacy of STN-DBS in OCD. Initial limbic side effects were transient. The small therapeutic window required cautious DBS management for optimizing outcome. Future studies will have to confirm the long-term efficacy of STN-DBS in OCD illustrated in this single case report, compare different DBS targets, and identify responder profiles.

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**Author contributions:** M.P. and P.K. contributed to drafting of the manuscript. M.P., P.K., A.L.B., C.A., P.P., S.C., and T.B. were involved in the multidisciplinary management (evaluation, surgical intervention, postoperative adaptation of DBS and medications, as well as 10-year follow-up of this historical first patient treated by STN-DBS for OCD in the multidisciplinary team). These authors all critically read and revised the manuscript.

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