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**NATALIA GUISOLPHI**

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# Thermocoagulation treatment of a patient with obsessive compulsive disorder and substance use disorder: case report

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Short report

# Thermocoagulation treatment of a patient with obsessive compulsive disorder and substance use disorder: case report

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## ABSTRACT

**Introduction** Substance use disorder (SUD) is a set of physical, psychological, behavioral, and cognitive phenomena related to the use of one or more chemical substances as a priority in a person's life that compromises quality of life. A possible cause associated with SUD is obsessive compulsive disorder (OCD). Since they can share the same neuronal network, this serves as a basis for neurosurgical procedures in cases refractory to conventional therapies.

**Case Report** A 31-year-old male patient, with a history of SUD and OCD refractory to conventional therapies, underwent bilateral ablative stereotactic neurosurgery of the anterior limb of the internal capsule, subgenual cingulate region, nucleus accumbens, and cingulate gyrus.

**Results** Up to 30 months of the procedure, the patient showed an absolute improvement in OCD and SUD and reported lack of withdrawal signs or symptoms and/or need to use drugs.

**Discussion** In recent years, ablative neurosurgery has proven to be an alternative to OCD refractoriness, with long-term benefits.

**Conclusion** In the case analyzed, ablative stereotactic neurosurgery was effective in controlling both the signs and symptoms triggered by OCD, as well as those of anxiety and stress.


**Keywords:** Stereotaxic surgery. Neurosurgery. Psychiatry. Quality of life. Behavioral disorder.

## INTRODUCTION

Substance use disorder (SUD) is a complex condition that involves a set of physical, psychological, behavioral, and cognitive phenomena related to the use of one or more chemical substances as a priority in a person's life that compromises quality of life. The most severe form of SUD is often called addiction, when the users have difficulty keeping away from the substance even knowing that it will cause harm, affecting their quality of life, functionality, and interpersonal relationships.[1] Over a quarter of the world population uses drugs and, of these, about 35 million people have a SUD. Alcohol, tobacco, cannabis, opioids, amphetamines, ecstasy, and cocaine are the most used substances worldwide.[2] Drug use is still strongly associated with psychiatric comorbidities such as depression, anxiety, and obsessive compulsive disorder (OCD), mainly because they share some neuronal systems and similar risk factors.[2]

Obsessive behaviors are characterized by intrusive thoughts that may or may not be associated with actions that alleviate the sensation of discomfort generated by them.[3] Individuals affected by OCD experience reduced ability to voluntarily control or inhibit their own behavior and tend to act repeatedly. Compulsiveness has been shown to be one of the mechanisms capable of explaining the addiction to chemical substances, via negative reinforcement in the limbic system, cognitive and behavioral inflexibility, decreased prefrontal serotonergic control, and imbalanced frontostriatal and ventral habitual responses.[4] Therefore a dysfunction in the brain circuit may overlap the therapeutic targets of OCD and addiction.

The pharmacological therapy associated with psychotherapy is the first choice to treat psychiatric conditions. However, 30% to 40% of the individuals diagnosed with OCD are refractory to this treatment, and SUD also has a high refractoriness rate.[5 6] Among the interventionist options, ablative stereotactic neurosurgery is a consolidated method in the treatment of psychiatric diseases. It is indicated for the treatment of those patients refractory to conventional drug therapy and psychotherapy, for whom the benefits proposed are worth the risks of an invasive procedure.[7] This type of surgical procedure has been proven to be effective in up to half of the cases. Additionally, the improvements last long after the surgery, giving hope to people affected by these disorders to have a better quality of life.[8]

## CASE REPORT

*Patient history*

A single 31-year-old male agricultor sought care at our neurology service. He reported a history of drug addiction, anxiety, and OCD refractory to pharmacotherapy. He informed that SUD started when he was 15 years old, with alcohol consumption, and progressed to tobacco use at 17, cocaine at 18, cannabis at 21, followed by crack abuse, including some episodes of overdose. As a result of drug abuse, he was voluntarily admitted in two different rehabilitation centers, staying there for 6 and 3 months, respectively. Withdrawal symptoms included irritability, anxiety, nervousness, aggression, insomnia, agitation, and hallucinations. The neuropsychological evaluation prior to the procedure revealed severe anxiety and near-exhaustion stress, and confirmed OCD refractory to treatment (Table 1).

**Table 1** Neuropsychological assessment

| **PRIOR TO THE PROCEDURE** | | | |
|---|---|---|---|
| **Symptom** | **Scale** | **Score** | **Interpretation** |
| Depression | Beck Depression Inventory | 10 | Not depressed |
| Anxiety | Beck Anxiety Inventory | 50 | Severe anxiety |
| Stress | Lipp's Stress Symptoms Inventory for Adults | Phase 3 | Near-exhaustion |
| Obsessive compulsive disorder | Yale-Brown Obsessive-Compulsive Scale | 36 | Refractory OCD |
| **AFTER THE PROCEDURE** | | | |
| **Symptom** | **Scale** | **Score** | **Interpretation** |
| Depression | Beck Depression Inventory | 1 | Not depressed |
| Anxiety | Beck Anxiety Inventory | 4 | Minimal level of anxiety |
| Stress | Lipp's Stress Symptoms Inventory for Adults | Did not reach minimum score | Not stressed |
| Obsessive compulsive disorder | Yale-Brown Obsessive-Compulsive Scale | 1 | Responded to surgical treatment (score improvement ≥ 35%) |

*Surgical procedure*

The patient underwent stereotactic neurosurgery in August 2018. Thermocoagulation was performed percutaneously using a 244-mm long probe, with exposed tip 4 mm in length and 1.5 mm in diameter, at 70°C for 70 seconds. Fluoroscopic technique was used to guide the radiofrequency coagulation probe to the following surgical targets: anterior limb of the internal capsule, subgenual cingulate region, nucleus accumbens, and cingulate gyrus, bilaterally. In the postoperative period, the patient was feverish until the fourth day, but had no signs of meningeal involvement. On the fifth day, he was discharged from hospital with a mild degree of mental confusion but no sensory deficits.

## RESULTS

After 30 months of the surgical procedure, the patient reported continuous use of tobacco, but denied consumption of alcohol, cocaine, cannabis, and crack. He also affirmed that during this period he had no relapses or withdrawal signs or symptoms, and that his interpersonal relationships showed improvement, especially with his family. Currently, in addition to psychotherapy, he makes daily use of topiramate 25 mg, carbamazepine 200 mg, and chlorpromazine 25 mg. Postoperatively, the neuropsychological assessment indicated significant improvement in anxiety, stress, and OCD (Table 1), showing that the proposed procedure resulted in a good response.

## DISCUSSION

In recent years, neuroablation has emerged as an alternative in cases of OCD refractory to conventional therapy (Yale-Brown Obsessive-Compulsive Scale, Y-BOCS > 30). In 2015, a literature review that included 108 patients with refractory OCD who underwent anterior capsulotomy showed an average 51% decrease in Y-BOCS score.[9] In a 2019 meta-analysis, 367 individuals diagnosed with treatment-resistant OCD that underwent neuroablation and 314 that underwent deep brain stimulation (DBS) were assessed. The first group had a decrease in Y-BOCS score by 50.4%, whereas the second group had a 40.9% reduction postoperatively.[10]

A meta-analysis performed in 2020 analyzed the outcomes of 457 patients with severe and refractory OCD who underwent neuroablation and concluded that 55% of them achieved a ≥ 35% reduction in Y-BOCS. These results show that ablative neurosurgeries are safe and effective for a large number of people with OCD refractory to conventional drug therapy and psychotherapy.[6] In addition, comparing neuroablation to DBS, the literature suggests the former is superior in individuals with refractory OCD, since it results in a higher decrease in Y-BOCS score.[9]

On the one hand, in a literature review the authors concluded that patients who underwent anterior capsulotomy were 9% more likely to go into remission than those treated with DBS, with no difference in the rates of adverse events between the two procedures.[9] On the other hand, a meta-analytic study revealed that adverse events were higher in patients treated with DBS, with an incidence of 64.6% compared to 43.6% using neuroablation.[10]

The main advantages of neuroablation over DBS are its lower cost and absence of complications for maintenance such as programming and battery change. Furthermore, it is possible to access multiple anatomical targets in the same procedure. In the present case, neuroablation resulted in greater accessibility and comfort to the patient, given that he underwent a single surgical procedure with multiple targets. However, it has the disadvantage of generating irreversible injuries, which can result in long-term adverse events, unlike DBS, which allows changes in stimulation parameters and even turning the device off.[8 9]

In the reported case, the patient had a 97.3% reduction in Y-BOCS score, an instrument used to assess the severity of OCD and its response to the proposed treatment. Patients who decrease their score by ≥ 35% are considered responsive to treatment.[11 12] Thus, neuroablation was effective to control our patient's signs and symptoms triggered by OCD, as well as those of anxiety and stress, in agreement with the literature consulted. [8–10] Regarding SUD, after the neurosurgery the patient stopped using all the drugs, except for tobacco. He has remained abstinent throughout the follow-up period of 30 months. It is worth mentioning that ablative surgeries to control SUD have an average remission rate of 58% five years after the procedure.[13]

The targets used in the present case play roles in the pathophysiology of both OCD and SUD, justifying the effective outcome for both. The main surgical targets with promising results in neurosurgery for the treatment of SUD are nucleus accumbens, anterior limb of the internal capsule, and bed nucleus of the stria terminalis.[13–16] The anterior cingulate cortex, cingulate fibers, anterior limb of the internal capsule, ventral cortico-striatal tracts at the head of caudate nucleus, and frontotalamic fibers are the major targets to control OCD.[8 6]

Only mild, transient, and controllable adverse events were observed in the present case. In a systematic review of 23 studies that included 487 patients who underwent neuroablation, most adverse events (88.4%) were also classified as mild and transient. The most common adverse events were postoperative headache (14.9%), cognitive deficits (9.1%), and behavior problems (8.1%). Serious or permanent adverse events, not observed in our case, had and average incidence of 0.5%, and the most common ones were personality changes (2.3%), cerebral cysts or cerebral edema (1.5%), behavioral disorders (1.3%), and weight change (1.0%).[6]

## CONCLUSIONS

In line with the literature, the present results point to the benefits of neuroablation to our patient, given the significant improvement in OCD, SUD, anxiety, and stress scores. It is important to emphasize that the procedure did not cause significant adverse effects to the patient and did not prevent him from performing his usual daily activities. This demonstrates the possibility of improving the quality of life of individuals with similar conditions.

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**Contributors** LJS performed the neurosurgery. NG, IGB, and LJS planned the study. NG and IGB wrote the pre-project and LS carried out the correction. NG and IGB submitted the study plan to the ethics committees and performed data collection.

NG and IGB wrote the draft of the case report and LS revised it. All authors did critical revision of the manuscript for important intellectual content and provided creative input to its final version.

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**Competing interests** None declared.

**Patient consent for publication** Not required.

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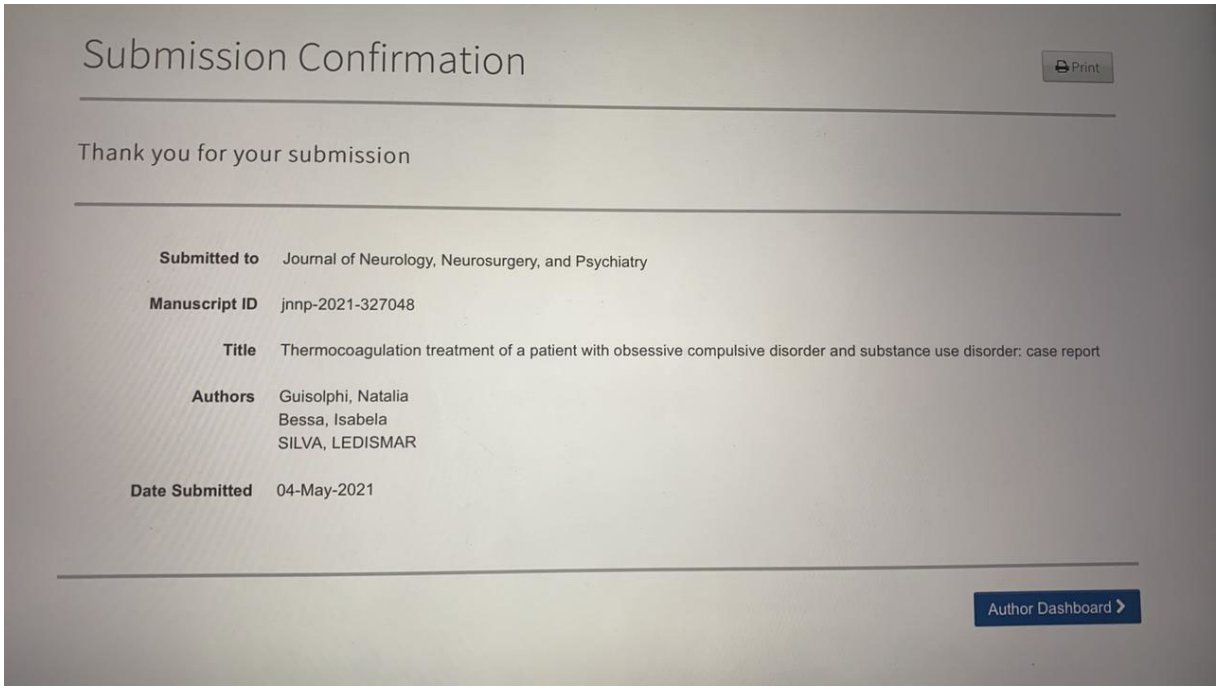

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