

Subthalamic Nucleus Stimulation after Cingulotomy for Refractory Obsessive-Compulsive Disorder

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Federico Salle, Sebastian Lema, Aurana Erman, Silena Correa, Germay Rodriguez, Nicolas Legorburu, Humberto Prinzo. Hospital De Clínicas. Uruguay.

Corresponding author: Federico Salle

email: federico.salle@gmail.com

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Abstract

Introduction: Obsessive compulsive disorder (OCD) is characterized by recurrent intrusive thoughts and repetitive behaviors performed to relieve distress related to obsessions. It is a prevalent psychiatric condition that affects 2-3% of the population and almost 30% of the patients can be refractory to first-line pharmacotherapy and psychotherapy. In these cases, neurosurgical procedures such as stereotactic lesioning and deep brain stimulation (DBS) are an option. Combining these treatments is relatively uncommon. The aim of this study is to report our experience with subthalamic nucleus (STN) stimulation in a patient that had previously undergone bilateral cingulotomy and relapsed. To our knowledge, this therapeutic approach has not been published in the literature before.

Clinical description: 36 year-old male. OCD diagnosed more than twenty years ago with sexual and intra-psycho aggressive obsessions associated to compulsions dominated by mental rituals and repetitive hand movements. He required four hospital admissions, one of them after a major depressive episode with suicide attempt. Electro-convulsive therapy was carried out at that time. He received cognitive-behavioral therapy and complete pharmacological treatment. The patient had a severe OCD with 34 points in Yale-Brown Obsessive-Compulsive Scale (YBOCS). SPECT imaging showed bilateral prefrontal cortex hypoperfusion and right caudate nucleus hyperactivity. Ultimately, bilateral stereotactic cingulotomy was performed in 2011. The surgery resulted in dramatic improvement of his OCD and mood disorder. 1 year postoperatively YBOCS was reduced by 20 points (59% improvement) and depression remitted. However, 10 years later he showed progressive worsening of the OCD symptoms and mild depression. After several sessions of repetitive trans-cranial magnetic stimulation (rTMS) that had transient effect, the patient was still very disabled (YBOCS= 24). We proposed anteromedial subthalamic nucleus stimulation (amSTN DBS). He was implanted in December 2023 and

the stimulator was turned on after one month with a conventional monopolar configuration at 130Hz and 60µs. Middle contacts were chosen according to the postoperative images and electrophysiological data. Interestingly, we found an unusual high power local field potential (LFP) in the theta band (7.81Hz) that was clearly reduced by increasing stimulation (Fig 1). During follow up we had to activate more dorsal contacts using a bipolar configuration due to a dysphoric-anxious reaction immediately elicited by ventral STN stimulation with amplitudes above 2.0mA. Micturition disturbances and subtle right upper limb dyskinesia were also observed. The former resolved with anticholinergic medication and the latter is not troublesome. The patient has now been followed for 20 months and reached YBOCS scores indicating mild OCD (12 points) with 50% improvement. There are no signs of depression. He is now able to work, live alone and take care of his daughter using low doses of medication.

Discussion: Different targets, either for lesioning or DBS, have been proposed to treat refractory OCD. Most of them within the same neurobiological circuit involved in OCD

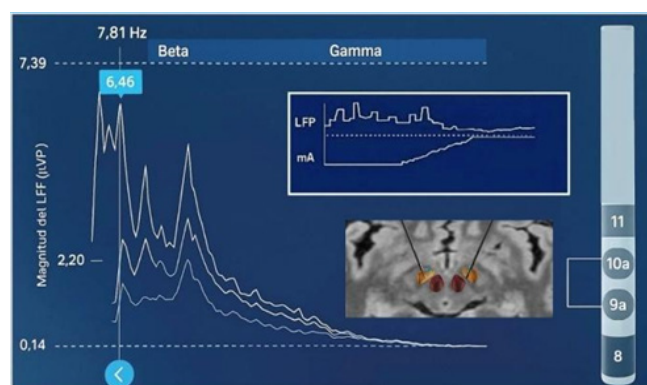


Figure 1. Unusual high power local field potential (LFP) in the theta band (7.81Hz) that was clearly reduced by increasing stimulation.

pathogenesis. The ventral capsule (VC) and ventral striatum (VS- Nucleus accumbens) are frequently targeted regions. VC/VS DBS significantly decrease OCD symptoms with up to 46% improvement in YBOCS score. A randomized controlled trial of amSTN DBS demonstrated that active stimulation reduced YBOCS score by 11 points (40% improvement) compared to sham-stimulation and 75% of patients were responders. Metanalyses comparing both targets failed to show superiority of one over the other. However, amSTN but not VC/VS DBS significantly improved cognitive flexibility, whereas VC/VS DBS had a greater effect on mood. Capsulotomy and cingulotomy can effectively reduce OCD symptoms with similar results compared to DBS, although with higher incidence of adverse events, as these are irreversible and non-adjustable procedures. Our patient responses to cingulotomy and DBS were comparable to those in the literature and had a great impact in his quality of life. In this case, DBS acted as a rescue therapy after the disappearance of the cingulotomy effects and proved to be very helpful. Other cases of ventral capsule stimulation after capsulotomy have been reported with good results

Conclusions: Either ablative or DBS techniques are effective to alleviate symptoms of severe treatment-resistant OCD. Combining these therapies after one of them has failed may be a reasonable option in selected patients.

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