Deep Brain Stimulation for Obsessive Compulsive Disorder: Exploring Long-Term Outcomes and Optimizing Device Settings

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Introduction

Deep brain stimulation (DBS) is a treatment for obsessive-compulsive disorder (OCD) often reserved for cases that are severe and treatment refractory. It is approved by the FDA under a Humanitarian Device Exemption. Previous studies suggest response rates of approximately 60-65%[1], although no large studies exist.

Current evidence offers little guidance in terms of standardized procedures for optimizing DBS device settings[2]. As more data accumulates and more patients are treated, the hope is that improved implantation and programming methods can be identified to increase response rates and allow for better management of these patients.

Method

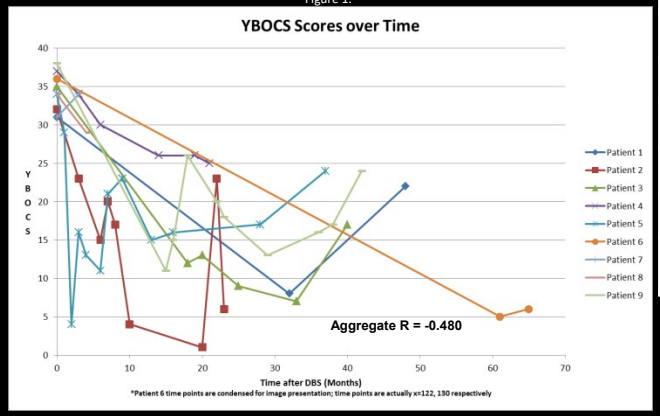
Retrospective chart review took place for 9 patients diagnosed with OCD who have had DBS devices implanted at the University of Iowa or who are currently followed in the University of Iowa Neuromodulation Clinic.

Demographics	
N	9
Mean age at implant (yrs)	40.2 +/- 13.6
Gender	5 male, 4 female
Mean time followed (mos)	54.8 *(8 of 9 for >22 mos)
DBS Target	VC/VS (8 of 9); NAcc (1)
Avg Med Trials (includes augmentation agents)	13.2 +/- 5.5 *All failed psychotherapy
Comorbidities	Depression (9); GAD (4); Eating disorder (2); Panic disorder (1); Tic disorder (1); Personality disorder (1); Unspecified psychosis (1)

Results

Average YBOCS score prior to DBS: 34.2 +/- 2.5

Figure 1.



Outcomes Data:

- 6 of 9 met remission criteria at some point post-DBS (YBOCS score < 14)[3]
- 4 of 6 remitters did not remit until >12 months post implantation (see Figure 2)
- 2 of 3 nonresponders were lost to follow up after 4 months
- Only 1 of 5 followed past 30 months remained in remission, but time to response was highly variable
- Patient 2 responded to DBS after a failed cingulotomy
- 4 of 6 in major depressive episodes had depression go into remission following DBS

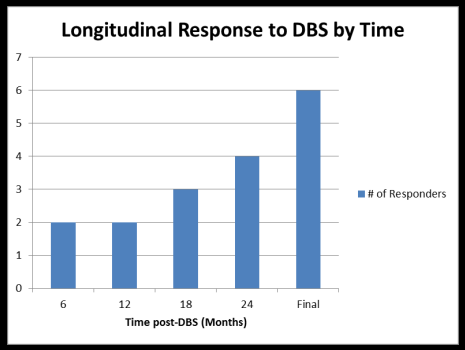


Figure 2.

Optimizing DBS Device Settings

DBS Settings Associated with Lowest YBOCS Score for Responders				
Patient #	Voltage	PW (ms)	Freq (Hz)	Contacts
1	5.2L/5.8R	180B	135B	C+/1-
2	3.8B	210B	135B	C+/1-
3	5.1B	120B	135B	C+/0-1-
5	2.5L/0.0R	210B	90B	C+/0-
6	4.0L/4.5R	210B	135B	C+/0-1-
9	8.0L/7.0R	90B	135B	C+/1- L C+/0- R

- Unipolar stimulation, higher PW and voltage seem effective
- Deeper contacts seem more effective
- 1 case of hypomania resolved with adjusting DBS settings
- 1st time unilateral L-sided DBS demonstrated effective (pt #5)

Conclusions

- The response rate of 66.7% is consistent with previous case series.[1] Our findings confirm other work that stimulating more ventral contacts with higher device settings seems to produce better effects.[2] Response often is unpredictable and does not occur until months after implantation. Comorbidities other than depression seem to be poor prognostic factors (2 of 3 nonresponders here suggest this).
- To our knowledge, these are the first case reports of 1) a patient responding to unilateral left-sided DBS[4] and 2) a patient responding to DBS after a failed cingulotomy.
- DBS remains a viable, relatively safe, and effective option for treatment-resistant OCD, but further study is needed.

References

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2. Morishita T, Fayad SM, Goodman WK, et. al. Surgical neuroanatomy and programming in deep brain stimulation for obsessive compulsive disorder. Neuromodulation 2014 June; 17(4): 312-319.
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4. Huff W, Lenartz D, Schormann M, et. al. Unilateral deep brain stimulation of the nucleus accumbens in patients with treatment-resistant obsessive-compulsive disorder: Outcomes after one year. Clin Neurol Neurosurg. 2010 Feb; 112(2): 137-143.