



Long-term Quality of Life Outcomes Are Related to Patient Perception of Motor Symptoms Following Deep Brain Stimulation

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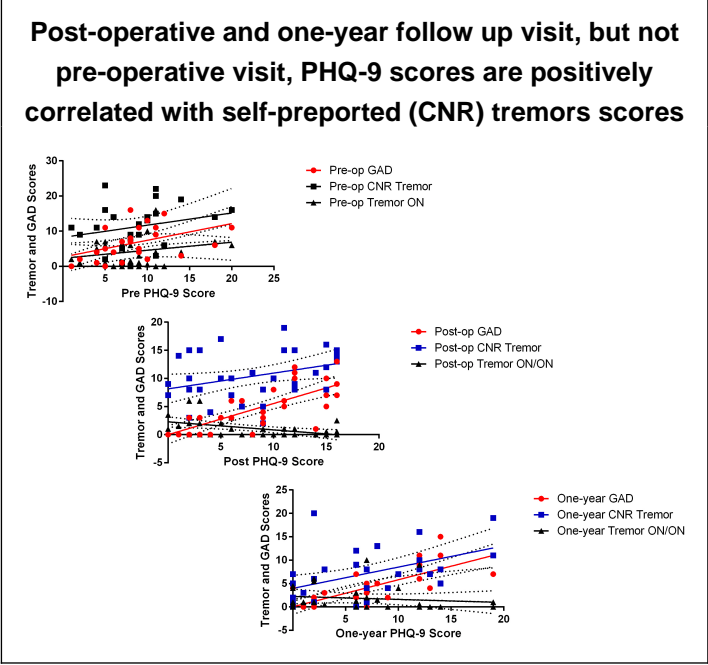


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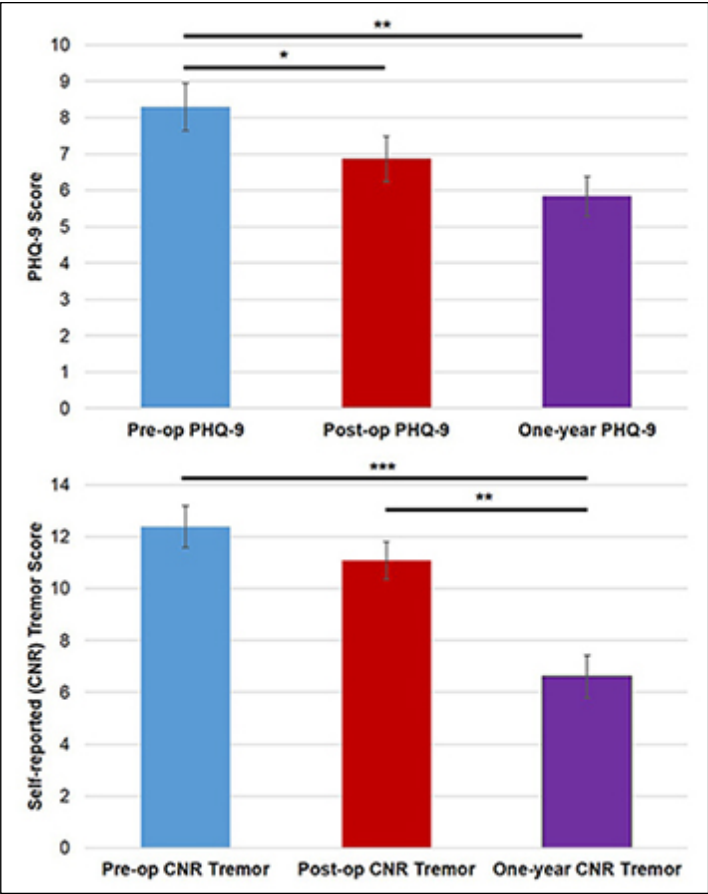
Introduction: Deep brain stimulation (DBS) is a well-established therapy for treating motor symptoms of movement disorders. However, little is known about how patient-perceived symptom severity affects quality of life (QoL). Similarly, the effects of DBS on QoL outcomes such as depression are controversial. Two relevant QoL measures include the PHQ-9 and the GAD-7 scales. The Patient-Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 questionnaire (GAD-7) are validated, standardized scales to assess depression and generalized anxiety. We analyzed the change in PHQ-9 and self-reported tremor scores following DBS. Furthermore, we examined the correlation between self-reported tremor, clinician-reported tremor, GAD and PHQ-9 scores at pre-operative, post-operative and one-year follow-up visits.

Variable	Value*
Age (yrs)	61.8 ± 6.9
Male sex	68 (84)
Disease duration (yrs)	10 ± 1.1
Movement disorder diagnosis	
Parkinson's disease	63 (77)
Essential tremor	15 (18)
Other**	4 (5)
Parkinson's disease (n = 62)	
Target nucleus***	
STN	61 (97)
GPI	2 (3)
Laterality	
Bilateral	27 (43)
Right	11 (17)
Left	25 (40)
Essential tremor (n = 15)	
Target nucleus***	
Vim	15 (100)
Laterality	
Bilateral	0
Right	1 (6.7)
Left	14 (93.3)
Other diagnoses	
Target nucleus***	
Anterior thalamus	1 - Tremors status post Chiari/syrinx decompression
Vim	2 - Tremors status post Chiari/syrinx decompression
	(1) and MS (1)
STN	1 - Tremors status post SAH and Acom aneurysm clipping
GPI	1 - Neuroacanthocytosis with chorea

* Continuous data are presented as mean ± SD. Categorical data are presented as number (%)
** Other diagnoses included (1) ET patient (included among ET patient count in table) with concomitant tremors status post chiari/syrinx decompression and possible cerebellar ataxia status post cerebritis, (2) tremors status post subarachnoid hemorrhage (SAH) and anterior communicating artery aneurysm clipping, (3) neuroacanthocytosis with chorea, (4) multiple sclerosis (MS) with bilateral middle cerebellar peduncle lesions
*** STN: Subthalamic nucleus, GPI: Globus pallidus interna, Vim: Ventral intermediate nucleus of the thalamus



PHQ-9 and self-reported (CNR) tremor scores significantly decrease from preoperative to one-year follow-up visit



Methods: A retrospective chart review was performed including patients with Parkinson's Disease (PD), essential tremor (ET) and other diagnoses resulting in tremor. Data from pre-operative, post-operative and one-year follow-up visits included: PHQ-9, GAD-7 UPDRS, clinician-reported and self-reported tremor scores. The Cleveland Clinic's Center for Neurological Restoration (CNR) self-reported tremor scores were obtained using a seven question self-assessment of how tremor impacted functional activity. A total score of 28 indicated maximum disability, whereas a score of zero indicated normal daily functioning. Repeated measures ANOVA was used to examine changes in PHQ-9 and self-reported tremor from pre-operative, to post-operative visits. Relationships between PHQ-9, UPDRS, clinician-reported and self-reported tremor scores were analyzed using linear regressions.

Results: Eighty-one patients who underwent DBS at the Cleveland Clinic from 2011-2013 were included (Table 1). PHQ-9 scores significantly decreased from pre-operative (8.3±.66) to post-operative (6.7±.62) and one-year follow-up visits (5.8 ± .54)[F(2, 159.7)=8.89, p=.0002]. Thirty-four patients completed self-reported tremor scores for all three visits. Self-reported tremor significantly decreased from pre-operative (12.4±.79) to one-year follow-up (6.6±.82)[F(1.6, 53.2)=23.9, p< .0001] (Figure 1). Prior to surgery, higher GAD scores were predictive of higher PHQ-9 scores [F(1, 24)=6.04, p=.022, β=.48, R2=.20]. However, there was no pre-operative relationship between PHQ-9 and self-reported tremor. Post-operatively, and at one-year follow-up, higher self-reported tremor scores were predictive of higher PHQ-9 scores [(F(1,33)=4.45, p=.043, β=.28, R2=.12] and [F(1,29)=8.55, p=.007, β=.45, R2=.23] (Figure 2). GAD scores were positively correlated with PHQ-9 scores at every time point. Interestingly, UPDRS and clinician-reported tremor scores were not predictive of PHQ-9 scores.

Conclusions: We observed long-term improvement in patient-perceived depression following DBS, accompanied by a reduction in self-reported tremor scores. Post-operatively, greater tremor-related impairment in daily activities was predictive of higher depression ratings. Objective measures of motor symptom improvement were not predictive of post-operative patient depression. These data suggest that patient-perceived DBS efficacy is critical to patient quality of life. Further investigation is warranted to understand the factors that influence how patients experience illness and outcomes after DBS.