

Gait and balance in Parkinson's disease (PD) following bilateral Subthalamic Nucleus (STN) and Globus Pallidus Interna (GPI) stimulation: 36 month follow-up of CSP#468 cohort

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Objective:

To study the effect of bilateral deep brain stimulation (DBS) of Subthalamic nuclei (STN) and Globus Pallidus interna (GPI) on gait and balance in patients with Parkinson's disease (PD).

Background:

The subject of long-term effects of DBS of STN and GPI on gait and balance in PD remains in evolution. We analyzed the results pertaining to changes in gait and balance as measured by Unified Parkinson's Disease Rating Scale (UPDRS)-items 13, 14, 15, 27, 28, 29 and 30 for subjects with 36-month follow-up data who underwent bilateral STN or GPI DBS as a part of the CSP 468 study cohort.

Methods:

The scores for UPDRS items 27, 28, 29, 30 were analyzed from unblinded assessments at 3, 6, 12, 18, 24 and 36 months after surgery under 2 different settings: ON medication and ON stimulation; OFF medication and ON stimulation. T-tests were examined at each time point to detect differences in the mean change from baseline to various time points. No adjustments were made for multiple comparisons.

Results:

159 patients (STN=70, GPI=89) completed the 36 months follow up. Both groups showed an improvement in sum of UPDRS items 27, 28, 29, 30 in the ON stimulation/OFF medication state at all follow up time points. ON stimulation/ON medication, improvement was seen only at 3, 6 and 12 months. No statistically significant difference was found between the two surgical targets. There was a significant improvement in the mean score of freezing while walking (UPDRS item 14) at 6, 12 and 18 months ($p=0.04, 0.01, 0.01$) in favor of STN with the same trend continuing at 24 and 36 months ($p=0.05$) There was no significant difference in subjective reports of falls or walking between the groups. There were no statistically significant interactions between the surgical target and certain characteristics including: age, years since diagnosis, years on medications, baseline Hoehn & Yahr and UPDRS part 1 scores.

Figure 1: Sum of UPDRS items 27 – 30 difference from baseline over time for GPI and STN, off and on medication

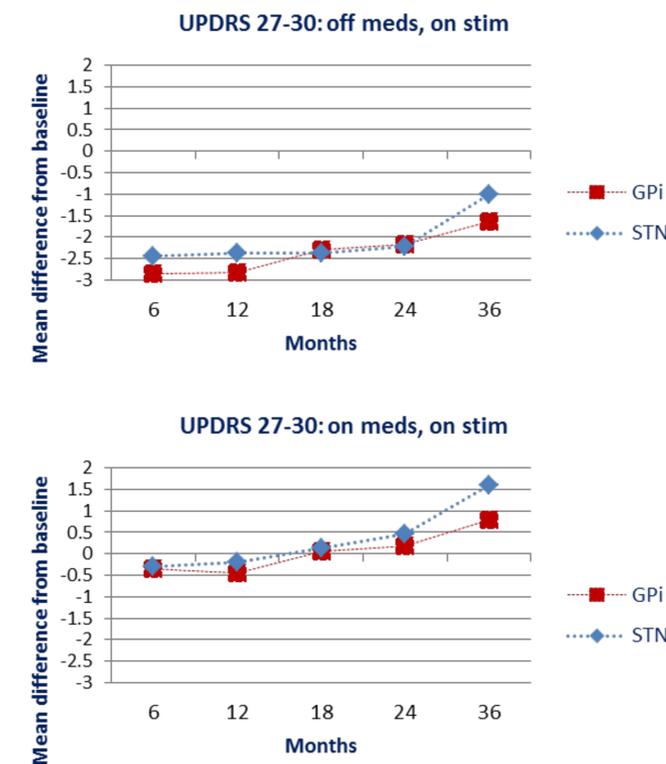


Figure 2: Individual UPDRS items 27 – 30 difference from baseline over time for GPI and STN, off medication

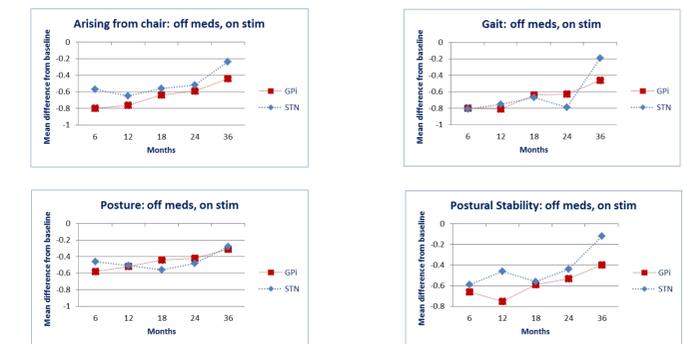
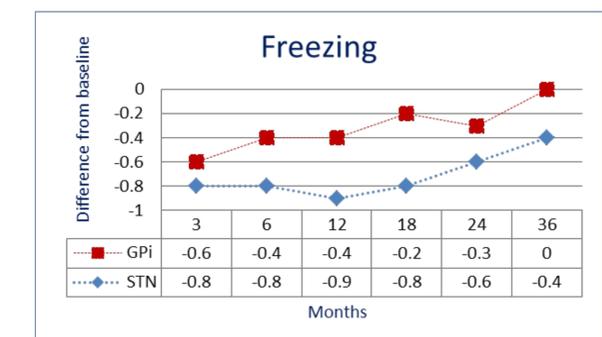


Figure 3: (UPDRS Item 14) Freezing while walking difference from baseline over time for GPI and STN, on stimulation, off medication



Conclusions: Bilateral deep brain stimulation of Subthalamic nuclei and Globus Pallidus interna improves gait and balance in Parkinson's disease. The stimulation effect appears to be sustained to 36 months after surgery. There is no significant difference with respect to these measures between the two surgical targets, except regarding freezing of gait which is significantly less reported in the STN group. No demographic or disease related feature could be identified as a predictor for improvement in either group.