Longitudinal outcomes of LRRK2 gene mutation parkinsonism undergoing either Subthalamic Nucleus (STN) or Globus Pallidus Internus (GPi) Deep-Brain stimulation (DBS): a multi-group comparison

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Objective: To improve our understanding of DBS in LRRK2 G2019S mutation carriers.

Background: Data regarding DBS in LRRK2 PD are limited, and there are no published data comparing STN-DBS to GPi-DBS for LRRK2 mutation carriers.

Design/Methods: Chart review for clinical, motor, and neuropsychiatric features was performed for 40 LRRK2 G2019S mutation PD (with or without DBS) and 15 non-LRRK2 PD with DBS who were part of genetics research at Mount Sinai Beth Israel. GBA mutation carriers were excluded.

Results:
LRRK2 DBS patients had a significantly younger age of onset than LRRK2 PD without DBS, (50.11 years (range 26-70) vs 63.72 years (range 44-85); p=0.006), and were more likely to be male (77.8% vs 18.7%; p=0.002).

Among LRRK2 PD, 4 patients underwent GPI-DBS, and 5 patients underwent STN-DBS. There was a greater reduction in baseline to two-year levodopa equivalency dose (LED) for STN-DBS vs GPI-DBS (46% vs -1%, p=0.02). However, there was no difference in motor score or neuropsychological tests.

LRRK2 DBS did not differ from iPD DBS in age of onset and diagnosis, sex, disease duration, motor score or medication use at surgery. The average time to diagnosis was greater in LRRK2 DBS (0.67 years vs 1.67 years; p=0.03). LRRK2 PD DBS had a greater reduction in motor score than iPD DBS from baseline to two-year follow-up (69% vs. -11%; p=0.02). There was no difference in LED or neuropsychological tests.

Conclusions: LRRK2 PD DBS are more likely male and have a younger age of onset than non-DBS LRRK2 PD. Both LRRK2 STN-DBS and GPI-DBS lead to reductions in motor scores, although STN-DBS may provide a greater reduction in LED. LRRK2 mutation carriers maintain a robust response to DBS at two-year follow-up. More data are needed as genotyping may be a consideration when identifying optimal patient and target for DBS.