

Peripheral nerve grafts implanted into the substantia nigra in patients with PD during DBS surgery: 2-year follow-up study of gait parameters

Zain Guduru, MD ¹ • Geetanjali Gera, PhD ² • George Quintero, PhD ² • Craig Van Horne, MD, PhD ³ • Greg Gerhardt, PhD ²

¹Neurology, University of Kentucky • ²Neuroscience, University of Kentucky • ³Neurosurgery, University of Kentucky

Abstracts will be considered for both poster and platform presentations

Movement disorders

OBJECTIVE

Measuring gait parameters in patients with Parkinson's disease (PD) who underwent autologous peripheral nerve grafts implantation (surgical deployment of the Schwann cells obtained from sural nerve) into the substantia nigra at the time of deep brain stimulation (DBS) surgery {DBS plus}. Our goal was to determine the safety and feasibility of DBS plus and to see if DBS plus has long-term (two-year follow-up) benefits on disease severity and mobility.

BACKGROUND

Schwann cells are abundant in peripheral nerve tissue and transdifferentiate after injury into "repair cells." Peripheral nerve graft delivery to the substantia nigra at the time of DBS surgery is feasible and safe based on the results of our initial pilot study 1. Long-term improvement in gait parameters would be one of the aspects to study the benefits of DBS plus.

METHODS

Standard DBS surgery targeting the bilateral globus pallidi was performed in 8 study participants. We evaluated the effects of DBS plus on gait and disease severity at the baseline and at the 2-year follow-up after surgery. Various gait parameters (gait velocity, step length, cadence, single support and double support) were measured with Gaitrite along with UPDRS and H&Y scores, before and after DBS plus, during the OFF and ON stages. We present the data for 5 patients who have completed the two-year follow-up in the study.

RESULTS

Individuals with Hoehn and Yahr (H&Y) of ≥ 2.5 showed maximum increments in the gait velocity and step length. It persisted even after 2 years of DBS-plus implantation. Gait velocity improved in both on and off state. Three of the five subjects with H&Y ≥ 2.5 showed an improvement in the gait speed. These individuals also showed reduction in H&Y by at least 1 point. Unlike previous studies, changes in both spatial (velocity, step length) and temporal (cadence) measures were observed for gait over the two years, especially for the more impaired subjects.

CONCLUSIONS

With the preliminary data, we observed improvement in gait and disease severity parameters, especially for individuals who were most severely affected in the group. Interestingly, the observed changes persisted two years post-surgery. DBS Plus might prove to be an effective intervention in long-term changes of disease and gait symptoms in PD patients.