THE OUTCOME OF DIRECTIONAL SUBTHALAMIC DEEP BRAIN STIMULATION IN ADVANCED PARKINSON'S DISEASE

Koivu M[1], Scheperjans F[1], Eerola-Rautio J[1], Resendiz-Nieves J[2], Marjamaa J[2], Kivisaari R[2], Pekkonen E[1]

1. Department of Neurology, Helsinki University Hospital and Department of Clinical Neurosciences (Neurology), University of Helsinki, Helsinki, Finland
2. Department of Neurosurgery, Helsinki University Hospital

OBJECTIVE To assess the outcome of patients with advanced Parkinson's disease (PD) treated with directional DBS.

BACKGROUND Subthalamic deep brain stimulation (STN-DBS) has proved to be an efficient option for treatment of advanced PD. Frequently, the benefit of STN-DBS stimulation is diminished by the side effects such as dysarthria, paresthesia and poor balance. These adverse effects could be averted with directional DBS. We report the outcome of first 18 patients with directional DBS treated in Helsinki University Hospital.

METHODS The patient eligibility for DBS was based on general clinical guidelines. Levodopa equivalent doses (LED) and Unified Parkinson's Disease Rating scale part III scores at medication off (UPDRS-III med off and with L-dopa challenge test) were obtained at the screening visit and UPDRS-III at medication off, DBS on (UPDRS-III med off, DBS on) at the 6 months' follow up. DBS operations were performed according to common clinical practice. Monopolar survey on DBS electrodes and the choice of the best active segment was conducted at 1 month's programming.

RESULTS Bilateral directional DBS were applied with 18 patients with advanced PD. There were no permanent complications related to DBS operation.

Median preoperative LED was 1160 mg (IQR 808 - 1668 mg), and 613 mg (IQR 376 - 849 mg) at 6 months' follow up, respectively. Baseline median UPDRS-III med off was 37 points (IQR 32 – 40 points), and 21 points (IQR 17-28 points) at 6 months' follow up, 43 % decrease (Wilcoxon signed rank test=0.00).

At six months' follow up, directional stimulation was applied in 16 out of 18 patients. Six patients had one directional segment active bilaterally. Four patients had two segments active unilaterally and contralaterally one segment active. Six patients had unilateral ring-mode stimulation and one or two directional segments active contralaterally. Two patients had bilaterally ring-mode stimulation active.

Median amplitude was 2.7 mA (IQR 2.3 – 3.2 mA), pulse width 60 us (IQR 60) and frequency 130 Hz (IQR 130-160 Hz). No permanent stimulation related side effects (dysarthria, gait and balance problem) were reported. Therapeutic window for directional stimulation ranged from 1.9 mA to 3.5 mA (IQR 1.8 – 3.9 mA).

CONCLUSION STN-DBS with directional stimulation improves motor symptoms in patients with advanced PD and enables LED reduction. Our results suggest that directional stimulation reduces frequent DBS-related side effects.

SUOMEN PARKINSON-SÄÄTIÖ
THE FINNISH PARKINSON FOUNDATION