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Robotic Gait Training for a Patient with Parkinson's Disease after Deep Brain Stimulation – A Case Study

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Introduction

Deep Brain Stimulation (DBS) is one of the effective treatment options in patients with advanced Parkinson's Disease (PD). Physiotherapy Rehabilitation may play an important role in alleviating the impairments associated with the procedure.

Objectives

(1) To investigate the effectiveness of robotic gait training for a patient with PD after DBS; (2) To set up a framework for future study in similar patient group.

Methodology

A 46 years old patient, who was diagnosed with PD and underwent DBS to bilateral Subthalamic Nuclei ("the patient"), was recruited from the Department of Neurosurgery of the Queen Elizabeth Hospital. The patient received robotic gait training (Body weight unloading: 50%, Guidance Force: 100%, Speed: 2.4-2.8 km/hr); and physiotherapy training program, 90 minutes a day, 1 session per week for 6 weeks. The kinetics gait parameters: stride length, cadence and walking speed were measured by a portable gait assessment system. The functional mobility and the risk of fall were measured by Timed Up and Go Test (TUG).

Result

By 6 weeks, the patient showed improvement for all the outcome measures as compared to baseline. At 6 week, the mean stride length and walking speed increased from 73.0 to 78.02cm (6.9%) and 40.6 to 41.22cm/s (1.5%) respectively. The cadence reduced from 66.74 to 63.4steps/min (-5.0%). The TUG reduced from 20.4 to 19.1s (-6.3%). Robotic gait training was shown to improve gait pattern, functional mobility and reduce fall incidence in the patient studied. This study can thus facilitate the setting up a framework for future studies on similar patient group, in a larger sample size and for a longer follow up period. Until such time, the long-term effects of additional robotic gait training together with conventional physiotherapy programme

can be demonstrated in alleviating the symptoms of PD that have caused impact on patients' daily functions.