

Prehabilitation for patients with Parkinson's disease undergoing deep brain stimulation

Authors and Institution:

Dr LIU Chin Wai, Dr SEE Ka Wing, Dr POON Tak Lap
Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong
Dr Karen Lee

Department of Anesthesiology & OT Services, Queen Elizabeth Hospital, Hong Kong

Miss Ginger Keung

Physiotherapy Department, Queen Elizabeth Hospital, Hong Kong

Miss Cass Chu

Occupational Therapy Department, Queen Elizabeth Hospital, Hong Kong

Mr Andrew Au

Speech Therapy Department, Queen Elizabeth Hospital, Hong Kong



Figure 1: Multidisciplinary prehabilitation program

Occupational therapist



Aspire fall risk assessment

Balancing exercise

Hand-eye coordination training

Speech therapist



Swallowing biofeedback

Neuromuscular electrical stimulation (NMES) for dysphagia

Physiotherapist



Cardiovascular training

Spirometry

Objectives

To investigate the relationship between prehabilitation and outcomes of patients with Parkinson's disease undergoing deep brain stimulation.

Background

Parkinson's disease (PD) is the most common neurodegenerative movement disease. Deep brain stimulation (DBS) of the subthalamic nucleus (STN) is established treatment for Parkinson's disease with disabling motor symptoms despite optimal medical therapy. Prehabilitation in DBS has not been investigated.

Method

- A single centre, retrospective, cohort study
- Include patients undergoing DBS from January of 2021 to August 2023.
- Prehabilitation program with standardized multidisciplinary pre-DBS assessment and intervention by clinician and allied health was started since May 2022.
- Patients were followed up for 6 months after operation.

Outcome measure included:

1. Chest infection rate
Defined as documented chest infection/radiographical evidence of chest infection on chest X-ray
2. Length of hospital stay
3. Readmission rate
Defined as readmission related to Parkinson's disease, postop complications e.g., fall, chest infection

Outcomes were compared using chi-square and t-tests. Secondary outcomes includes spirometry performance after prehabilitation program.

Results

Total of 27 patients were included. Demographics of 2 groups were similar, but more patients were stick walkers in the group with prehabilitation (0% vs 66.7%) (table 1).

With the outlier case excluded (prolonged stay for significant on-off phenomenon), the length of hospital stay was similar between 2 groups (4.08 days vs 4.29 days, $p = 0.410$)

The readmission rate was similar between 2 groups (both 33.3%, $p = 0.519$).

Incidence of chest infection was decreased by 11.7% for the group of patients undergoing DBS after prehabilitation (25% vs 13.3%, $p = 0.388$) (Figure 2)

Outcomes are summarized in Table 2.

Table 1: Table summarizing demographics

	Before prehabilitation program n = 12, n (%)	After prehabilitation program n = 15, n (%)
Gender		
Male	7 (58.3)	9 (60.0)
Female	5 (41.7)	6 (40.0)
Age		
45-54	1 (8.3)	1 (6.7)
55-64	5 (41.7)	4 (26.7)
65-74	6 (50.0)	10 (66.7)
Preop walking status		
Unaided	11 (91.2)	4 (26.7)
Stick	0	10 (66.7)
Wheelchair	1 (8.3)	0
Chair-bound	0	1 (6.7)

Figure 2: Column chart of chest infection rate

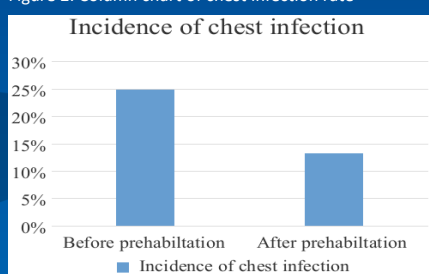


Table 2: Table summarizing outcomes

	Before prehabilitation program	After prehabilitation program
Length of hospital stay	4.08 days	4.87 days 4.29 days (Outlier excluded)
Readmission rate	33.3%	33.3%
Chest infection rate	25%	13.3%

Discussion

Multidisciplinary inputs for standardized assessment of baseline motor symptoms severity, cognitive function, and swallowing function were done after prehabilitation program, and there was no statistically significant difference between the 2 groups. (Table 3)

Spirometry monitoring preprogram and postop were arranged by physiotherapist after start of prehabilitation program, and 24.3% improvement in FEV1/FVC ratio was noted after program. Further investigation on its relationship with the decrease in incidence of chest infection would be needed.

Table 3: Table showing perioperative assessment by occupational therapist and physiotherapist

	Before prehabilitation program	After prehabilitation program
Unified Parkinson's Disease Rating Scale (UPDRS) Part III, mean	30.5	25.2
Berg Balance Scale (BBS), mean	47.9	40.2
Time Up and Go Test (TUGT), mean	20.9	17
The Parkinson's Disease Questionnaire (PDQ-39), mean	71.7	70.2
Perioperative ADL (Modified Barthel Index), mean	67.0	64.4
Royal Brisbane Hospital Outcome Measure for Swallowing (RBHOMS), mean	7.4	6.7

Conclusions

Multidisciplinary prehabilitation program decreases the incidence of chest infection in patients with Parkinson's disease who undergo DBS, with similar length of hospital stay and readmission rate.