Praxis deficits in patients with Parkinson's disease: A neuropsychological study

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Background & Objectives

Limb apraxia is a higher motor dysfunction, comprising deficits in volitional learned and/or skilled movements despite intact motor, cognitive and sensory faculties (1,2). It has been described in a number of acquired brain disorders, such as in stroke and neurodegenerative diseases, including basal ganglia disorders and Idiopathic Parkinson's Disease (IPD) (2,3). The role of praxis deficits in the latter remains unclear. In particular the extent to which these overlap and the relationship of praxis deficit and motor deficits in IPD others remains unknown.

In this study:

1. We sought to identify praxis deficits and subtypes in a group of 19 Idiopathic Parkinson's disease (IPD) patients, with no known cognitive impairment o dementia.
2. We investigated how these deficits correlate with measures of dexterity, PD (using UPDRS -3), cognitive deficits (using MOCA) and deficits in activities of daily living (UPDRS - 2), controlling for time since levodopa use and multiple comparisons

Behavioural Assessments & Methods

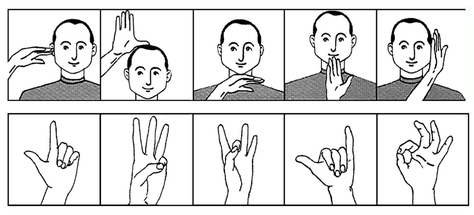
NeuropsychologyTasks

All patients undertook the following tasks:

1. Cognitive assessment with MOCA
2. Assessment of hand function/impairment (9 Hole peg test)
3. Apraxia tasks:

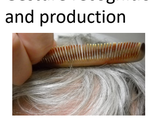
Praxis tests from the Birmingham Cognitive Screen:

- Meaningless Gesture Imitation
- Gesture Recognition
- Gesture Production
- Single Object Use



Meaningless Gesture Imitation (Goldenberg, Laimgruber & Hermsdo, 2001).

Gesture recognition and production



Single Object Use

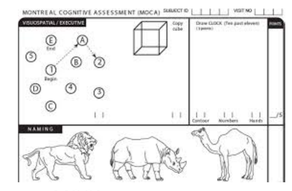
Parkinson's Disease Assessment

1. UPDRS (especially parts 2 (ADLS) and 3 (Motor))
2. Time since levodopa

Analyses

1. Correlation analyses were carried out between Neuropsychology, dexterity and MOCA and UPDRS as well as Time since levodopa, corrected for multiple comparisons
2. A hierarchical cluster analysis was performed in which each variable was entered as an individual cluster comparing their similarity or distance (squared Euclidian distance) – a dendrogram was computed to represent relationships of similarity among variables

9HP Dexterity



MOCA

Results

Patient Demographics

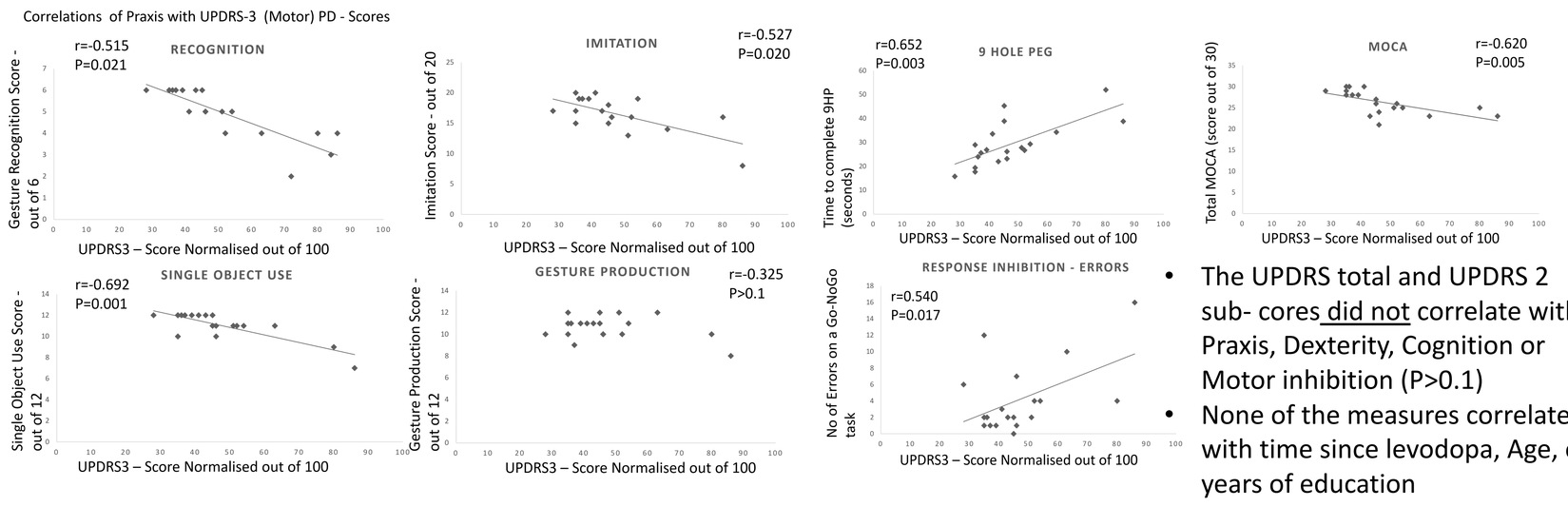
19 patients (6 Females, 13 Males), with a diagnosis of Idiopathic Parkinson's disease participated in the study.

9/19 patients scored below age-adjusted cut-off for ideomotor apraxia (on Meaningless Imitation and Gesture Production tasks), 2/19 scored below age-adjusted cut-off for ideational apraxia (on Single Object Use Task).

Patient Demographics are provided in the Table, below.

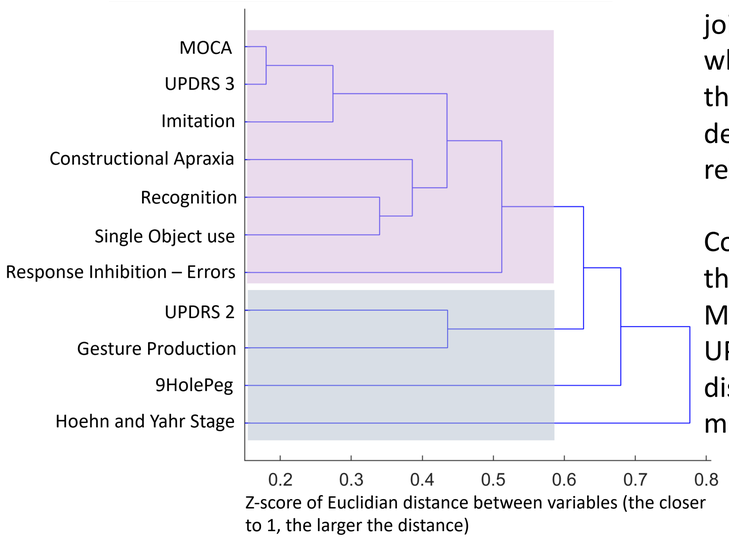
	Mean (+/-SD)
Age (years)	67 (4.8)
Disease duration (years)	7 (3.6)
Education (years)	14.5 (4)
MOCA	26.3 (2.7)
UPDRS (Total)	80.2 (24.8)
Levodopa equivalent daily dose (mg)	720.5 (195.3)
Average Time of Assessment since Medications (min)	123.7 (40.4)
Meaningless Gesture Imitation (Normalised out of /100)	81.7 (14.7)
Gesture Production (Normalised out of /100)	88.7 (9.3)
Gesture Recognition (Normalised out of /100)	94.7 (8.6)
Single Object Use (Normalised out of /100)	94.4 (10.7)

Correlations between UPDRS and Praxis, Dexterity, Cognition, Motor Inhibition:



- The UPDRS total and UPDRS 2 sub- cores did not correlate with Praxis, Dexterity, Cognition or Motor inhibition (P>0.1)
- None of the measures correlated with time since levodopa, Age, or years of education

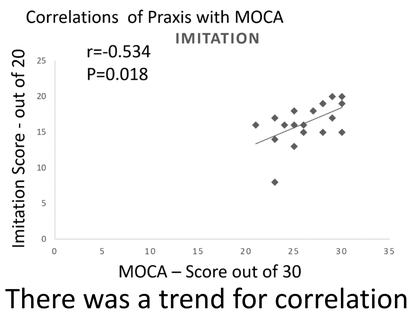
Hierarchical Cluster Analysis



On this dendrogram, similar variables are joined at the left (X values closer to 0), whereas less similar variables are joined at the right. A cut-off at less than 0.6 has delineated 2 possible groups of variable relationships.

Cognitive, spatial and praxis measures at the top (Purple box) seem to relate to Motor PD (UPDRS 3) severity. Conversely UPDRS2, and overall PD severity are more distantly related to Dexterity and to Praxis measure of Gesture Production (Blue box).

Praxis and MOCA:



There was a trend for correlation between Gesture Recognition and MOCA (r=0.441, p=0.059). There was no correlation between other Praxis tasks (single object use, gesture production), or measures of dexterity with MOCA

Summary of Findings

Using detailed neuropsychology testing we identified that over half (58%) of patients with IPD had upper limb apraxia. Most of the patients identified had ideomotor (82%), as opposed to ideational (18%), apraxia.

Apraxia Scores were particularly correlated with Motor deficits on UPDRS 3. Indeed there were no correlations between these scores and either PD severity (Hoehn and Yahr Stage) or total UPDRS score. There was also no correlation with demographic variables including patient's age, years of education or Levodopa treatment amount and duration.

The motor-updrs (UPDRS3) score correlated significantly with the following measures of apraxia: Meaningless Gesture Imitation, Single Object Use, Gesture Recognition.

The motor-updrs (UPDRS3) correlated with deficits in Dexterity, Response Inhibition and Cognition measured using MOCA. Of note none of the patients had dementia (MOCA score was above 24 in all patients)

Taken together these findings suggest that patients with Idiopathic PD have deficits in praxis that span both ideational and ideomotor domains, incorporating deficits in executive function and body schema.

Discussion

1) The study demonstrated deficits in limb praxis in a group of IPD patients. In addition to identifying idemotor and ideational apraxia in subgroups of these patients, praxis deficits were entered as continuous variables to identify their relationship to PD deficits in these patients

2) With the exception of one measure, namely Imitation, praxis deficits do not seem to correlate with cognitive dysfunction (MOCA). However they do correlate with motor PD deficits measured on the UPDRS 3 scale.

3) Our results should encourage further studies of higher-order motor impairments in Idiopathic Parkinson's disease. These motor deficits may supplement work on non-motor deficits, in allowing to predict response to treatments and prognosis.

Acknowledgements

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The Study was approved by the South Central - Berkshire Research Ethics Committee (14/SC/0074).

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