FRONTAL DYSFUNCTION AND MEMORY DEFICIT IN DEPRESSION AND PARKINSON'S DISEASE

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INTRODUCTION

Cognitive and memory impairment is a frequent finding in patients with Parkinson's disease (PD) (Taylor et al., 1986; Growdon and Corkin, 1986) and in depression (Sternberg and Jarvik, 1976; Wertman et al., 1993). Heterogeneity of memory dysfunction in different neurological illnesses has recently raised interest. The impaired memory in the PD patients has been suggested to be an indication of mild frontal lobe dysfunction (Taylor et al., 1986). In positron emission tomography, depression in PD has been associated with hypometabolism in the inferior frontal lobe and the caudate nucleus (Mayberg et al., 1990). Structural changes in the caudate nucleus and white matter in magnetic resonance imaging have been associated with late age onset depression (Figiel et al., 1990). Despite similar memory dysfunction, the underlying cognitive processes contributing to dysfunction may differ. We, therefore, examined working memory, learning ability, and retrieval from semantic memory and their relationship to frontal dysfunctions in PD patients, in depressive patients and in controls.

PATIENTS AND METHODS

Patients

We examined 20 patients with idiopathic PD, 10 patients with major depression and 20 controls matched for age, education and cognitive level.

The Parkinson's disease patients (PD group) underwent clinical neurological examination, routine blood examinations, electroencephalogram, and computed tomographic brain scan if necessary. Patients were diagnosed as suffering from PD, if they presented at least two of the three major signs (tremor, rigidity, bradykinesia). Parkinsonian patients with severe depressive symptoms were excluded. The mean age of the patients was 65.0 + 8.8 years, and duration of the disease 5.2 + 13.2 years. The severity of PD ranged from 0 to 6 according to the Hoehn & Yahr scale (1967).
Depressed patients (D group) were selected from the psychogeriatric department. Based on formal psychiatric evaluation by a psychiatrist, they were found to meet the DSM III-R criteria for major affective disorder. Depressed patients were treated pharmacologically and with psychotherapy.

Controls (C-group) were selected from a random population sample examined for the prevalence of dementia. The controls underwent the neurological examination and psychometric evaluation. Persons who had some evidence of dementia or other diseases were excluded.

Methods

Memory tests. Memory was examined with the Digit Span subtest of the Wechsler Adult Intelligence scale (Wechsler 1981), and Corsi Block Span (Milner 1971). In the list learning test using shopping items (Helkala et al., 1988), 10 unrelated shopping items were read and then asked for immediate recall of the entire list. This procedure was repeated five times. The score was the number of words recalled on five trials.

In the Heaton visual memory test the subjects must reproduce a complex geometric figure from memory immediately following a 10-second presentation (Russell, 1975). The subjects were asked to reproduce the figures again from memory after 30-minutes delay. Finally, the stimulus figures were asked to be copied. Moss visual recognition span was also used (Moss et al., 1986). Semantic memory was examined with Category and Verbal Fluency tasks (Borkowski et al., 1967).

Frontal lobe functions were examined with the Wisconsin Card Sorting Test using Nelson's version (1976). The number of category rules "learned" was scored. Moreover, correct responses, errors and perseverative errors were recorded. Trail Making test A and B were also used (Reitan 1958). In Trail Making B, the letters were replaced with the names of the months using the first three letters of each month. The time in seconds to complete each trial were recorded. The maximum time of 150 seconds for Trail Making A and 300 seconds of Trail Making B were allowed. The Stroop test was also used (Stroop, 1935).

Statistical methods

Differences between groups were analyzed with analysis of variance (SPSS PC+ package). Post hoc analyses were done with the Duncan method. When the data did not meet the assumptions of parametric methods, Kruskall-Wallis analysis of variance was used. Post hoc analysis was done with Mann-Whitney. Correlations were calculated with the Spearman rank-rorer correlation.

RESULTS

Memory functions

Short-term memory. Analysis of variance did not reveal any differences between the groups in the Digit Span or Corsi Span Tests (Table 1.). In the list learning test there was a significant group effect. Post hoc analysis showed that both the PD and D groups recalled less words than the C group. There was also a significant group effect for immediate reproduction of the Heaton visual memory test. The PD patients recalled fewer details of the figures than the C group.

Long-term memory. An analysis of variance revealed a significant group effect for delayed reproduction of the Heaton visual memory test (Table 2). Both the PD and D patients reproduced fewer details of the figures than the C group. The difference between immediate