A comparative study of delayed verbal and visuospatial recall, and inhibition in Parkinson's disease dementia

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Abstract. The present study was to compare delayed recall of verbal memory and Visuospatial memory. The subjects were 26 Parkinson’s Disease Dementia (PDD) patients who received rehabilitation treatment and 35 healthy elderly. The healthy elderly group had significantly higher performance ability of SLVT-delayed recall, word reading-correct response, color reading-correct response than PDD group (p<0.05). On the contrary, there was no significant difference in RCFT-delayed recall between the two groups. The results of this study imply that decrease in such executive function as response inhibition is apparent in PDD in addition to verbal memory.

Keywords: Parkinson’s Disease Dementia, Verbal memory, Visuospatial memory

1 Introduction

Due to decline in the secretion of a neurotransmitter dopamine, patients with Parkinson's disease primarily experience motor disorders such as postural instability, bradykinesia, rigidity and tremor [1] and with the progress of disease, cognitive disorder also develops. Such dementia caused by Parkinson's disease is called Parkinson’s Disease Dementia (PDD) [2].

PDD begins after the onset of motor disorder and is characterized by steady progress of symptoms. Although certain studies have reported mild cognitive disorder at the time of diagnosis of Parkinson's disease [3], it is generally known that motor functions deteriorate faster than cognitive functions [2]. Like this, with the emphasis on motor disorders of Parkinson's disease in the rehabilitation process, cognitive function disorders have drawn relatively less attention. However, as studies find out that non-motor symptoms are as frequent as 9 patients with Parkinson's disease out of

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10 suffer from non-motor symptoms [4], recent studies focus on non-motor symptoms of Parkinson's disease such as cognitive decline or autonomic dysfunction. Especially, cognitive disorder by Parkinson's disease is known to be very common. 8 out of 10 patients with Parkinson's disease have cognitive disorder and 4 out of 10 progress into PDD, and the risk of Parkinson's disease developing dementia is 5 times higher than the healthy elderly [2]. Although it is necessary to pay attention to Parkinson's disease with its frequent cognitive disorder, little has been known about specific cognitive functions of PDD such as linguistic and visuospatial memory and response inhibition as preceding studies [5, 6] have mainly used overall cognitive assessment such as MMSE. In particular, inhibition function is a major cognitive function of frontal lobe [7] and is known to be much more sensitive to the changes which come with age than other cognitive functions [8], and its functional decline is found even in the healthy elderly without dementia after the age of 65 [9].

This study compared delayed recall of verbal memory and visuospatial memory and response inhibition of the healthy elderly with those of PDD.

2 Methods

2.1 Subjects

The subjects of the present study were 26 PDD patients who received rehabilitation treatment in B General Hospital in Inchon from May through December 2014 and 35 healthy elderly in the same age as its comparison group. Standards for selection of PDD group were first, those who were diagnosed with idiopathic Parkinson’s disease and PDD based on NINDS diagnostic criteria of Parkinson disease, second, those with severity of 1-3 stage in Hoehn and Yahr scale, third, those without secondary Parkinson’s syndrome such as neurological communication disorder and progressive supranuclear palsy, severe depression and past history of brain damage.

2.2 Measurements

Verbal delayed recall was measured by using Seoul verbal learning test (SLVT) which standardized Hopkins Verbal Learning Test with a word list suitable for Koreans. Procedure of the test was to play 12 words to the subjects in 2-second interval and after 20 minutes, make the subject recall them. 1 point was given to a correct answer and the total perfect points were 12.

Visuospatial delayed recall was measured by using Rey complex figure test (RCFT). 2 points were given when the subjects drew exact shape and location, 1 point when they drew exact location but incorrect shape or drew correct shape but incorrect location, 0.5 point when they drew a recognizable shape and location though nor
correct and 0 point when they did not try anything at all, with a perfect total points of 36.

Response inhibition of frontal lobe was measured by using Korean color word stroop Test (K-CWST). This test is composed of 'word reading' in which the subjects read only words while seeing words in various colors and color reading in which subjects told only the colors while ignoring the words.

### 2.3 Statistical analysis

In order to compare linguistic delayed recall, visuospatial delayed recall, motor control and response inhibition of the healthy elderly with those of PDD patients, this study conducted independent t-test by using IBM SPSS 23.0 with significance level of 0.05 in two-sided test.

### 3 Results

#### 3.1 General characteristics of subjects

There were more females than males in both groups and though age and the level of education were higher in PDD group, there was no significant difference between the groups. Average age was significantly higher in PDD group (mean age=68.6) than in healthy elderly group (mean age=72.5) (p<0.001).

#### 3.2 Comparison of verbal and visuospatial delayed recall, and inhibition

Comparison of verbal delayed recall, visuospatial delayed recall and response inhibition of the healthy elderly with those of PDD patients is presented Table 2. The healthy elderly group had significantly higher performance ability of SLVT-delayed recall, word reading-correct response, color reading-correct response than PDD group (p<0.05). On the contrary, there was no significant difference in RCFT-delayed recall between the two groups.

### 4 Discussion

In this study, there was no significant difference in executive function of visual delayed recall between the healthy elderly and PDD. This result is deemed to have two possibilities. First, since the subjects of this study were patients of early stage of PDD, there is a possibility that disorder of visuospatial memory was not prominent yet.
Second, since the level of difficulty of the visuospatial delayed recall test was excessively high, both the healthy elderly and PDD patients performed poorly in the test. Some point out that even though RCFT has proved to be a test with high reliability and validity in measuring visuospatial memory, it has poor discriminative ability in the case of the elderly due to its excessively complex pictures [10]. Thus, caution should be taken in interpreting the results of this study.

The results of this study imply that decline in executive functions such as response inhibition as well as verbal memory is apparent in PDD.

References