Characteristics of Verbal and Visuospatial Memory in Mild Cognitive Impairment

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Abstract. This study investigated the MCI (mild cognitive impairment) is related to the decline of specific memory by analyzing the relationship among verbal memory, visuospatial memory and MCI. Subjects were 511 seniors over 60 years old (270 healthy seniors and 241 MCI) who completed the standardized neuropsychological battery in Korea. Memory was measured using the Seoul Verbal Learning Test (SVLT) and Rey Complex Figure Test (RCFT). In the logistic regression analysis, adjusting for covariates (Age, gender, years of education, MMSE, and depression), both immediate recall (OR=0.90, 95% CI: 0.83-0.96) and delayed recall (OR=0.86, 95% CI: 0.75-0.98) of verbal memory and delayed recall (OR=0.72, 95% CI: 0.61-0.84) of visuospatial memory had independent relationship with MCI (p<0.05). MCI had relationship with decline of verbal and visuospatial memory and especially had significant relationship with decline of delayed recall ability.

Keywords: dementia, mild cognitive impairment, verbal memory, visuospatial memory

1 Introduction

Since decline of memory can also happen with deterioration of physical functions such as muscle strength and speed of response in normal aging process [1], it is critical to distinguish cognitive difference between normal aging process and early dementia.

Despite the importance of early screening of dementia, as most of cognitive functions are normally maintained in the early stage of dementia, it is difficult to distinguish dementia not only from cognitive impairment of normal aging process but also from cognitive decline associated with depression [1].

Recently, with the advent of the concept 'Mild Cognitive Impairment (MCI)' as a prior stage of Alzheimer’s disease, attention has been paid to early screening and prevention of dementia [2]. Although MCI is not a screening standard for dementia, it is distinguished from normal aging as patients Plead with subjective memory decline and is known as prior clinical stage of dementia [3].

Like this, although memory decline is known to be a major symptom and screening standard specifically found in MCI, there is lack of ground if MCI is related to the impairment of specific memory. Even though many studies have supported the
result that damage to verbal memory has significant relationship with early dementia [4], several studies have reported that visuospatial deficits or the damage to visuospatial memory is a predictor of dementia [5].

This study aims 1) to investigate if MCI is related to the decline of specific memory by analyzing the relationship among verbal memory, visuospatial memory and MCI, and 2) to confirm which one is a significant method to predict MCI among memory measuring methods of immediate recall, delayed recall and recognition.

2 Methods

2.1 Subjects

This study analyzed 511 seniors over 60 years old (270 healthy seniors and 241 MCI) who completed the standardized neuropsychological battery in Korea.

2.2 Measurement

Verbal memory was measured using the Seoul Verbal Learning Test [6]. SVLT is composed of immediate recall with 3 tests, delayed recall after 20 minutes and recognition. The verbal memory was conducted through the following procedures. The subjects first were asked to listen to 12 words every 2 seconds and recall them immediately (immediate recall). Then, the subjects were asked to recall the same words 20 minutes later (delayed recall). A score of 1 was assigned for correct response, regardless of the order of measurement, and the total score was 12. A recognition trial was done following the delayed recall test. The recognition task consisted of 24 words, 12 from the recall list, 6 distracters that are semantically related to the recall items, and 6 unrelated words.

Visuospatial memory was measured using the Rey Complex Figure Test (RCFT) [6]. Visuospatial memory tested immediate recall, delayed recall and recognition respectively.

Age, gender, years of education, MMSE, and depression were included in the confounding factors.

2.3 Data analysis

For the comparison of the relationship between the memory test and cognitive impairment, the raw scores of the test were converted into a T-score, and the odds ratio and 95% confidence intervals were presented using logistic regression analysis.
3 Results

As the result of adjustment covariables (age, gender, level of education) and the level of depression, verbal memory and visuospatial memory has significant relationship with MCI. As the result of analysis of T-score converted from raw score for the comparison between tests, the memory test with the greatest relationship with MCI was delayed recall of verbal memory, and with the decrease of 1 point in delayed memory, the risk of MCI increased by 31% (OR=0.75, 95% CI: 0.70-0.80).

Even when all the compounding variables were adjusted, both immediate recall (OR=0.90, 95% CI: 0.83-0.96) and delayed recall (OR=0.86, 95% CI: 0.75-0.98) of verbal memory and delayed recall (OR=0.72, 95% CI: 0.61-0.84) of visuospatial memory had independent relationship with MCI (p<0.05).

4 Discussion

In this study, MCI showed significantly lower performance in both verbal memory and visuospatial memory than normal elderly, the result of which corresponds with that of preceding studies that both verbal memory and visuospatial memory are important standards in the diagnosis of MCI [7].

Although memory impairment is a prodrome of Alzheimer's disease, the characteristics of memory impairment are still unclear. Numerous studies which analyzed memory of early Alzheimer's disease specifically reported the impairment of verbal memory [8]. On the contrary, there are reports that impairment of visuospatial memory rather than verbal memory is a characteristic of Alzheimer's disease [9].

In this study, delayed recall in both verbal memory and visuospatial memory was confirmed as a major method to identify MCI group, which corresponds with the result of preceding study [7] that delayed recall had the lowest performance in both verbal memory and visuospatial memory in the case of Alzheimer's disease and delayed recall was an important factor in classifying Alzheimer's group and depression group.

In this cross-sectional study, MCI had relationship with decline of verbal and visuospatial memory and especially had significant relationship with decline of delayed recall ability.

References