Supplemental Methods

Cognitive evaluations

The K-VCIHS-NP (Korean Vascular Cognitive Impairment Harmonization Standards: Neuropsychology Protocol) is Korean version of the 60-minute neuropsychology protocol proposed by the National Institute of Neurological Disorders and Stroke and the Canadian Stroke Network.[1]. It comprises 4 cognitive domains and 8 cognitive tests. Specifically, 4 domains were frontal executive function, language, visuospatial function, and memory. Detailed tests for each cognitive domain were 1) semantic fluency (animal), phonemic fluency (Korean-Controlled Oral Word Association Test),[2] Digit Symbol Coding, Korean-Trail Making Test-Elderly's version for frontal executive domain;[3] 2) Short Form of the Korean-Boston Naming Test for language domain; [4] 3) Rey Complex Figure Test: Copy for visuospatial domain; 4) Seoul Verbal Learning Test for memory domain.[5] In addition, Korean Mini-Mental State Examination (K-MMSE) for evaluating global cognitive function and the Korean version of Informant Questionnaire on Cognitive Decline in the Elderly(IQCODE) for assessing the patients' pre-morbid history of cognitive dysfunctions, Korean- Instrumental Activities of Daily Living (K-IADL), and Geriatric Depression Scale were also included.[6-9] All of the cognitive tests and questionnaires were validated and standardized in Koreans.

Trained clinical psychometricians, who were blinded to the clinical and neuroradiological profiles of each patient, administered the series of tests and questionnaires. A score on each cognitive test was transformed into a standardized z-score. ADL impairment was assessed using the K-IADL. The raters were requested to evaluate functional status independently of physical ADL. For a patient having hemiparesis, some items of IADL were not scored. In that case, we have used the average value of all scored items in IADL as the final score for subsequent

analysis. This method refered to that used in previous study to assess functional status of post-stroke patients.[10]

Not all of stroke patients but those who were available for long-term follow-up, seemed to be at high risk for dementia, and had good compliance have been assessed by the K-VCIHS-NP.

Because missing neuropsychological test values would not be randomly missing, treating all these values as true-missing could increase the risk of type 2 errors [11]. Missing values were therefore reviewed and classified into 2 categories: poor performance or true-missing. Values missing due to poor performance were then substituted with the lowest observed value within each test [11]. Missing variables were observed for 1,323 of the 11,907 cognitive test items of all subjects, and, the majority (84%) were in the executive domain tasks. After substituting values missing due to poor performance with the lowest observed values, the true-missing rate decreased to 3.0%.

Supplemental References

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