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Preliminary communication

The relationship between post-stroke depression and physical recovery

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ABSTRACT

Background: Post-stroke depression (PSD) is a serious and common complication of stroke. In this prospective study on the relationship between clinical PSD and physical recovery, we focused on (1) distinguishing between depression and apathy, (2) issues in assessment of PSD, and (3) timing of assessment.

Methods: Japanese stroke patients ($n=117$) were studied. We used self-rating scales [Zung Self-Rating Depression Scale (SDS) for depression; Apathy Scale (AS) for apathy] and observer-rating scales [Montgomery–Åsberg Depression Rating Scale (MADRS) for depression; Neuropsychiatric Inventory-Nursing Home (NPI-NH) for apathy] to assess psychological state. We assessed physical disability using the Functional Independence Measurement (FIM). Two-way analysis of covariance was used to determine effects of depression and apathy on functional outcome. We evaluated PSD twice, within 10 days after hospitalization and four weeks later.

Results: Objective scales gave higher prevalence than subjective scales for both depression and apathy. A significant effect of apathy on FIM recovery was seen with objective scale assessment during hospitalization; there was a marginal effect of depression at the same time.

Limitations: We did not consider the stroke size and location. In addition, we excluded patients with severe comprehension deficits or with a history of stroke.

Conclusions: Our findings indicate that depression and apathy could occur independently after stroke and could individually influence functional recovery. We obtained more accurate estimates of functional recovery using objective measures. Furthermore, our findings suggest that depression and apathy should be assessed not only at admission but also during hospitalization to estimate and enhance the functional recovery of stroke patients.

1. Introduction

Post-stroke depression (PSD) is a serious and common complication of stroke, affecting one third of all stroke patients at any time during the follow up (Hackett et al., 2005). PSD has negative impacts on patient participation in rehabilitation at the most crucial time to functional recovery and leads to poor outcomes (Hinojosa et al., 2011). On the other hand, there is an increasing evidence that antidepressants do treat PSD effectively and improve functional status (Gonzalez-Torrecillas et al., 1995; Dam et al., 1996; Miyai and Reding, 1998; Gainotti et al., 2001; Narushima et al., 2007). Therefore, early detection, correct diagnosis, and appropriate treatment of PSD are essential to enhance the functional recovery of stroke patients.

In this prospective study, we investigated the relationship between the clinical condition of PSD and physical recovery of stroke patients in a rehabilitation hospital. We focused on the following three issues. The first was to distinguish clearly between depression and apathy. Apathy is defined as the absence or lack of feeling, emotion, interest, or concern (Marin, 1990). The symptom has been considered to partially overlap with the expression of depression; however, several recent studies have revealed neuroanatomical and symptomatological differences between the two symptoms (Marin et al., 1994; Levy et al., 1998; Andersson et al., 1999). Apathy is also often observed after stroke and can interfere

Abbreviations: PSD, post-stroke depression; SDS, Zung Self-Rating Depression Scale; AS, Apathy Scale; MADRS, Montgomery–Åsberg Depression Rating Scale; NPI-NH, Neuropsychiatric Inventory-Nursing Home; FIM, Functional Independence Measurement; MMSE, Mini-Mental State Examination

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with patient's engagement in rehabilitation programs. Depression and apathy require completely different therapeutic approaches. Thus, it is necessary to analyze depression and apathy separately in order to evaluate the influences of PSD on the recovery of physical function.

The second issue we focused on is the assessment of PSD. In a review of the assessment of PSD, Salter et al. (2007) noted that the use of self-report measures may be limited by the reliance of such scales on personal insight, but administration of self-report measures requires few resources and represents little patient burden. In contrast, results obtained via observer-rating scales based on psychiatric interviews are more diagnostically accurate, but the amount of time and level of expertise required for their administration make them less feasible assessment tools in most clinical settings (Salter et al., 2007). As with depression, patients with apathy may also lack insight into their disease. Therefore, we evaluated depression and apathy after stroke using both self-report (subjective) scales and observer-rating (objective) scales.

The third issue is the timing of the assessment of PSD. The majority of cases of PSD were developed between one and six months post stroke (Whyte and Mulsant, 2002). Some patients may develop depression during hospitalization for rehabilitation. Because the mental status of patients might be different according to the time between admission and assessment, a single assessment at admission makes it difficult to evaluate the influence of PSD on the rehabilitation effect. Therefore, we evaluated depression and apathy twice using a first assessment at admission and a second one during hospitalization (four weeks after the first one).

2. Method

All procedures for the present study strictly followed the 2011 Clinical Study Guidelines of the Ethics Committee of Kumamoto Takumadai Rehabilitation Hospital (Kumamoto, Japan) and were approved by the internal Review Board. Written informed consent was obtained from all patients after a complete description of all procedures of the study was provided.

2.1. Subjects

This study was a prospective rehabilitation hospital-based cohort study. The subjects were consecutively selected from patients who were admitted to Kumamoto Takumadai Rehabilitation Hospital between July 2011 and June 2013. All patients underwent routine laboratory tests and standard neuropsychological examinations including the Mini-Mental State Examination (MMSE) (Folstein et al., 1975). The inclusion criterion in the present study was hospitalization for sub-acute stroke rehabilitation. The exclusion criteria were as follows: 1) patients with a rehabilitation plan to be finished within four weeks, 2) patients after sub-arachnoid hemorrhage or transient ischemic attack, 3) history of previous stroke, 4) presence of severe aphasia that would make screening test for PSD difficult, 5) history of major psychiatric illness, such as major depression, bipolar disorder, schizophrenia, or schizoaffective disorder, 6) complication of dementia based on DSM-III-R criteria (American Psychiatric Association, 1987), and 7) inability to obtain informed consent.

2.2. Assessment

In this study, we assessed depression and apathy separately using both subjective and objective scales. The assessments were performed twice, first within 10 days of the admission and then again at four weeks after the first assessment. Depression and apathy were assessed by two experienced neuropsychiatrists (M.S. and Y.S.). Patients with severe depression were treated appropriately through medication by the experienced neuropsychiatrists.

2.2.1. Assessment of depression

2.2.1.1. Subjective assessment. We used the Japanese version of the Self-rating Depression Scale (SDS) to examine the subjective severity of depression (Zung, 1965; Fukuda and Kobayashi, 1973). The SDS scale consists of 20 items and patients choose their answer to each item from 4 categories: always, often, sometimes, or rarely. The total score is the sum of the 20 items and the SDS scores ranged from 20 to 80. We classified the patients into two groups according to their score: a non-depressed group (SDS score <40 points) and a depressed group (SDS score $\geqq 40$) (Zung, 1965; Fukuda and Kobayashi, 1973).

2.3. Objective assessment

We used the Japanese version of the Montgomery–Åsberg Depression Rating Scale (MADRS-J) to examine the objective severity of depression (Montgomery and Asberg, 1979; Takahashi et al, 2004). The MADRS-J consists of 10 items, each of which is scored on a scale that ranges from 0 to 6. The total score is the sum of the 10 items and the MADRS-J scores range from 0 to 60. We classified the patients into two groups according to their score: a non-depressed group (MADRS-J score <12 points) and a depressed group (MADRS-J score $\geqq 12$) (Montgomery and Asberg, 1979; Takahashi et al, 2004).

2.3.1. Assessment of apathy

2.3.1.1. Subjective assessment. To quantify the apathetic state subjectively, we used the Japanese version of the Apathy Scale (AS) (Starkstein et al., 1992; Okada et al., 1998). The AS consists of 14 questions concerning spontaneity, initiation, emotionality, activity level, and interest in hobbies. This scale is self-assessed. The answers to each question are scored against four grades (0–3) and the total score was used for the analysis. We classified the patients into two groups according to their score: a non-apathetic group (apathy score <16 points) and an apathetic group (apathy score $\geqq 16$ points) (Starkstein et al., 1992; Okada et al., 1998).

2.4. Objective assessment

We assessed the patients' apathetic state objectively using a Japanese version of the Neuropsychiatric Inventory-Nursing Home (NPI-NH) (Wood et al., 2000; Shigenobu et al., 2008). The NPI-NH is a structured interview with professional caregivers in which 10 neuropsychiatric symptoms are assessed: delusions, hallucinations, agitation/aggression, dysphoria, anxiety, euphoria, apathy, disinhibition, irritability/lability, and aberrant motor behaviors. In this study, we focused on the apathy item on the NPI-NH and interviewed patients' primary nurses, physiotherapists (PT), or occupational therapists (OT). Screening questions are asked to determine whether apathy is present. In the case of a positive answer, further questions are asked and the severity and frequency of the symptom are determined. Frequency is rated on a five point scale from 0–4 and severity is rated on a four point scale from 0–3: the larger the score, the higher the severity or frequency. The NPI-NH score (severity $\times$ frequency) was calculated (range of possible scores, 0–12).

2.5. Physical function

Physical function was assessed with the Functional Independence Measurement (FIM) (Data Management Service of the Uniform Data System for Medical Rehabilitation and the Center