AN OBSERVATION ON THE CURATIVE EFFECTS OF REHABILITATION INTERVENTION OF ADJUVANT HORTICULTURAL THERAPY FOR THE TREATMENT OF STROKE-INDUCED UNILATERAL SPATIAL NEGLECT

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ABSTRACT

Objective: This study was intended to observe the influence of rehabilitation intervention of adjuvant horticultural therapy on unilateral spatial neglect in the stroke.

Method: 46 USN patients were randomly divided into two groups: the observation group and the control group. Assessment was conducted between the corresponding treatments of two groups. FMA (Fugl-Meyer assessment) was used for the assessment of the motor function, and the modified Barthel Index or FIM (functional independence measure) was used for assessing ADL (activities of daily living). Finally, pre-therapy and post-treatment results were compared according to the assessment standards.

Results: After two groups of patients received the therapy, the scores of FMA, MBI and HAMD were of significant difference (P<0.01). FIM score: the comparison of two groups before therapy (P>0.05), the pre-therapy and post-therapy comparison of the control group (P>0.05), the pre-therapy and post-therapy comparison of the observation group (P<0.01).

Conclusion: it was of great clinical significance to conduct more rehabilitation intervention for those stroke patients who suffer from the unilateral spatial neglect.

Keywords: Unilateral Spatial Neglect, stroke, horticultural therapy.

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Introduction

USN (Unilateral Spatial Neglect) is a common clinical symptom after the stroke. It is manifested in the form of single limb bradykinesia and non-responses to contralateral limb stimulus or spatial stimulus. It is called a post-stroke cognitive disorder of advanced functions, different from the lack of responses caused by mere visual field defect, sensory disturbance and dyskinesia[13]. Therefore, it is of great clinical significance to make the rehabilitation assessment and conduct the rehabilitation treatment of the unilateral neglect for the functional recovery of the stroke patients.

Objects and methods

Objects 100 cases of stroke patients were received and treated between August, 2012 and August, 2018 in accordance with the diagnosis standards drawn up at the 4th Chinese National Conference of Cerebrovascular Diseases. USN grouping standards were as follows: clear-minded patients with ages of onset ranging from 65 to 80 cooperated during the medical examination and did not have the following symptoms: mental disorders, memory loss, visual impairment, and aphasia or hearing disorder. After the patients were hospitalized, a neurologist and a rehabilitation physician conducted the USN assessment screening, including Shenckenberg test, clock drawing test, Albert...
46 cases of USN patients were first assessed out of 100 cases of stroke patients, and then randomly grouped through the lottery method: experiment group (23 cases) and control group (23 cases). Next, they were asked to sign the informed consent forms. No significant differences were found between two groups of patients in terms of age, gender, stroke type and the time of rehabilitation initiation (P > 0.05), as shown in Table 1.

In the control group, after the patients were in a stable condition, they were treated through the Bobath operation combined with electroacupuncture, massage and physical therapy etc. Meanwhile, the patients were also guided to do the ADL capability training. In the experiment group, in addition to the routine rehabilitation treatment, the following USN treatment of rehabilitation intervention was conducted. The treatment lasted for 30 min once a day, and the method was as follows.

**Sensory stimuli and exercise training:** Cold stimulation (5~100°C), thermal stimulation (50~55°C), rubbing patients’ limbs and the weight training were all operated under the patients’ watch. Vision: A conscious scanning and neglect of limbs got trained. Patients looked at the mirror for washing and dressing as well as self-portrayal. The duration of the treatment was 5 min every time.

**Trunk rotation training:** Physicians helped patients to rotate the neglected limb to the left and the right by 15°, and the transcutaneous electrical stimulation could also be used to promote the motor functions of limbs(4). The errors of eyes’ directions and head’s directions were transferred and corrected through head and trunk rotation as well as translocation. The duration of treatment was 5 min every time.

**Visual training:** Patients were trained to scan and track the target objects in view, making their heads turn to the neglected side. Meanwhile, the active eye movement of patients should also get trained. For example, communication, ward rounds, treatment, bedside table, mobile phones, TV and so on were all on the neglect side(6). The duration of treatment was 5 min every time.

**Suggestive therapy:** The neglect side was color marked, such as the vision cues of reading, the motion cues of writing and the oriented motion of functional goals(6). The duration of treatment was 5 min every time.

**Change the environment:** Patients were reminded to notice the neglected side in making-up, dressing, washing and shaving as well as not to forget the food on the left side while taking food. Patients were guided to keep away from the heating location beside the table and avoid scalds. In addition, bedrails should be placed on the neglected side or the bed should be placed against the wall of the neglected side. Moreover, rehabilitation instruments should be placed at proper distances and good locations, and dosages should also be watched for the observation and nursing at any time. The duration of treatment was 5 min every time.

**Occupational therapy:** Patients were guided to receive the occupational therapy with clear objectives. Meanwhile, the neglect assessments should be regularly conducted. The duration of treatment was 5 min every time.

**Horticultural therapy:** With the guidance of rehabilitation physicians, patients did a lot of rehabilitation activities in the rehabilitation park: they sowed, grew seedlings, transplanted, loosened the soil, weeded, clipped, watered, removed the tray, reaped flowers, planted trees, raised flower beds, and picked vegetables and fruits. They also learnt to make miniature gardens or grow potted plants by using all kinds of containers.

**Rehabilitation assessment method:** FMA (Fugl-Meyer assessment) was used for the assessment of the motor function, and the modified Barthel Index or FIM (functional independence measure) was used for assessing ADL (activities of daily living) capabilities. According to the assessment results, the motor function and capabilities of daily living activities were compared before and after the treatment.

**Statistical analysis:** SPSS21.0 was used for the data analysis and the data are expressed as the mean value±the standard deviation. The data of intra-group pre-treatment and post-treatment were regarded as the paired data and the paired t test was used for data analysis. The rank-sum test was used for the comparison of ranked data.

### Results

Before therapy, the intergroup differences of FMA, MBI and HAMD scores were not significant (P > 0.05); After therapy, the intergroup differences of FMA, MBI and HAMD scores became significant P<0.01, @ P<0.01, #P<0.01.

It could be seen in Table 1 that: the intergroup differences of FMA, MBI and HAMD scores were not significant (P > 0.05) before therapy, but the
intergroup differences became significant after therapy (P<0.01) (Table 2).

### Discussion

USN (Unilateral Spatial Neglect) is a common perceptual dysfunction as well as a serious disability caused by the stroke. A lot of theories have been put forward to explore the pathogenesis of the disease, such as perceptual input disorder theory, hemisphere inhibition theory, attention arousal disorder theory and perceptual disturbance theory.

The lesion-induced neglect is relatively common in the right cerebral hemisphere. The test was affected by the disturbance of language expression or comprehension in the lesion of left cerebral hemisphere, so the left cerebral hemisphere has a lower incidence rate of unilateral spatial neglect than the right one. In the published literature and reports, it was found that: the incidence rate is influenced by test methods, testing time and the study objects, so the results are of great differences. The incidence rate of right cerebral hemisphere damage is higher than that of the left one because the lesion of the left cerebral hemisphere causes aphasia. The distribution of people’s visual space attention has an advantage in the right cerebral hemisphere. The asymmetry of the spatial neglect could be completely explained as: an intact right cerebral hemisphere focuses on the left-sided space, while an intact left cerebral hemisphere focuses on the right-sided space. When the lesion happens in the right cerebral hemisphere, patients could obviously experience the visual and spatial neglect because the left cerebral hemisphere lacks the compensatory mechanism. This is also why the left cerebral hemisphere has a lower neglect detection rate than the right one.

When the lesion happens at the right cerebral hemisphere, the perceptual processing of drawing and reading starts from the brain midline rather than from the left side, the patients fail to eat the left half part if they are given a plate of food, and they neglect the left body when dressing and shaving. Meanwhile, their postures, sight and gait all showed the left-side neglect. A professional rehabilitation physician needs to grasp USN remediation strategies, accurately identify USN and assess the seriousness and changes of sensitive USN before measuring and intervening in USN daily activities. In this way, USN could be treated with the optimal duration and at the best magnitude.

Generally, the lesion mainly starts at the junction of lobe, skull and occipital, but USN (unilateral...
spatial neglect) is also caused by the lesion of the following brain parts: inferior parietal lobule, posterior skull cortex, superior temporal gyrus, thalamus, basal ganglion and posterior face of frontal lobe, which is relatively rate. This study selected 46 cases of USN patients whose lesion parts are mainly at the junction of lobe, skull and occipital, and this is consistent with the point above. The pathogenesis may be interpreted as follows: the connection interruption of the network structure formed by the brain corticalization causes the clinical features of post-stroke USN 08).

It is really significant to screen the clinical stroke patients, detect the USN motion, sensation and daily living activities in an early stage and adopt the positive and effective USN rehabilitation for stroke patients, because the central nervous system has plasticity and recombination ability in terms of its functions or structure, serving as the basis of the post-stroke rehabilitation. In this study, stroke patients were not only treated with the routine rehabilitation training but also with the rehabilitation intervention of the adjuvant horticultural therapy including sensory stimulation, exercise training, trunk rotation training, visual training, suggestive therapy, occupational therapy etc. Through the horticultural therapy, both the unilateral spatial neglect and the scores of daily living activities got improved among stroke patients, suggesting that it was of great clinical significance to provide more rehabilitation intervention for stroke patients suffering from unilateral spatial neglect at an early stage.

This study also showed that: the routine rehabilitation therapy could not only improve the motor functions of stroke patients but also strengthen their abilities of daily living activities. Meanwhile, it could also alleviate the symptoms of USN. Therefore, the routine therapy plus the rehabilitation intervention of the adjuvant horticultural therapy improved the curative effects of USN treatment, deserving the clinical application and promotion.

To sum up, the stroke-induced USN could be controlled and treated through a reliable assessment method, the early detection of USN and the rehabilitation therapy. The horticultural therapy could not only improve the unilateral spatial neglect and the living quality of patients, which lays a solid foundation for patients to better return to the society, but also it is of great significance to facilitate the rehabilitation and prognosis of stroke patients.

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