

The unilateral hemispacial neglect phenomenon in right hemiplegia

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ABSTRACT

One of the most important perceptual function disorders following a cerebrovascular accident (CVA) is the unilateral hemispacial neglect phenomenon (UHNP). In this case report, we present a 73-year-old male patient with UHNP accompanying right hemiplegia, which was identified with detailed examination. Clinical picture was characterized by right-sided hemiparesis in the upper right shoulder and relative weakness in the right leg. Patient was tested on hemineglect (HN) with star cancellation test and detailed neuropsychological evaluation. This article highlight the latest findings regarding the cognitive-behavioral syndrome of neglect for hemiplegia that occur following left hemisphere stroke.

Keywords: Cerebrovascular accident, cognitive dysfunction, hemiplegia, neglect.

Many complications may develop following a cerebrovascular accident (CVA). Approximately half of the patients may experience problems in their high-level cognitive functions. Problems in high-level cognitive functions involve speech, behavioral, cognitive, memory, and attention disorders.^[1] One of such dysfunctions with a significant impact on the rehabilitation process is perceptive dysfunction. Titus et al.^[2] have defined perceptual performance as the ability to organize, process, and interpret incoming visual information, tactile-kinesthetic information, or both and to act accordingly.

Unilateral hemispacial neglect phenomenon (UHNP), also known as hemineglect, unilateral neglect, or spatial neglect, is one of the most prominent perceptual function disorders following CVA. Unilateral hemispacial neglect phenomenon

is defined as unconcern about or irresponsiveness to a stimulus from the opposite side of a brain lesion, which is unexplainable by existing sensory and motor defects.^[3] It is characterized by inability to name, define, talk to, or respond to the stimuli, objects, or individuals manifesting themselves on the opposite side of the brain lesion. Unilateral hemispacial neglect phenomenon is one of the major parameters unfavorably influencing prognosis and rehabilitation outcomes.^[3]

Unilateral hemispacial neglect phenomenon is known to occur particularly in left hemiplegia patients with a right hemisphere lesion. However, detailed examination and assessment techniques developed recently have revealed that it can also develop in right hemiplegic patients, and in fact, it may present more severely.^[4]

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Unilateral hemispacial neglect phenomenon often emerges as a clinical condition involving insufficient functional activity, extended periods of hospitalization, and increased risk of falls compared to other stroke patients. The clinical course of neglect symptoms can differ from patient to patient, and additionally, other cognitive disorders, vision disorders, and depression are more common in stroke patients with UHNP.^[5]

While the left hemisphere is responsible for modulating the stimuli and attention from the right spatial field, the right hemisphere performs a controlling role for both the right and left spatial fields. In individuals with left hemisphere damage, compensation of the right hemisphere comes into play. Therefore, UHNP is more common in right hemisphere lesions.^[6]

The functional outcomes of stroke patients show heterogeneity according to the brain regions affected. The mentioned heterogeneity of the physiopathological lesion areas (frontal, subcortical, or posterior cortical and white matter) may be a pivotal factor for the rehabilitation outcome. There are two types of neglect according to the location of the detected object: egocentric and allocentric. The former type is discernible when objects are omitted in terms of the patient's position, such as objects that are at the left side of the patient. Contrastingly, the latter defines the neglect appearing according to the object itself, irrespective of its position relative to the patient. For example, the left part of an object would be ignored, albeit the object was located on the right side of the patient.^[3] Impairment of the dorsal stream related with visual processing, particularly the right supramarginal gyrus, was interrelated with egocentric neglect and involvement of the ventral stream of visual processing, specifically the posterior inferior temporal gyrus, with allocentric neglect.^[7]

This case report aimed to present a case of right UHNP that was identified with detailed examination and imaging methods in a patient with right hemiplegia and elaborate on rehabilitation processes utilized in this condition.

CASE REPORT

A 73-year-old right-handed male patient who had been previously diagnosed with primary hypertension and type 2 diabetes mellitus presented to the emergency service with weakness in the right half of their body and speech difficulty. As the patient's cranial diffusion magnetic resonance imaging (MRI) revealed left temporal

and left thalamic diffusion restriction, the patient was referred to the neurology clinic, where they were diagnosed with right hemiplegia due to a thromboembolic CVA. In the neurology clinic, the patient was administered edoxaban 60 mg daily for anticoagulant therapy.

The patient was admitted to a tertiary physical medicine and rehabilitation hospital for treatment in the second month after the event. The patient's general health condition was good, cooperation and orientation complete. Although the patient's speech was non-fluent, their terms and phrases served the intended purpose. Cranial nerve examination was normal. In the psychiatric examination, the Brunnstrom stage was 4 in the right upper extremity and 5 in the right hand and the right lower extremity. The patient could transfer and ambulate with one-person assist for short distances. Neither spasticity in the muscles nor joint limitations were observed on the affected side. The patient's deep tendon reflexes were bilaterally normoactive, and pathologic reflexes were absent. The patient struggled to maintain a static standing position in the Berg Balance Scale assessment and scored 32.

Despite reasonable motor level was observed in the evaluation, it was later realized that the patient functionally fared worse than expected; hence a cognitive assessment was considered appropriate, and a clinical psychologist evaluated the patient. As the presence of UHNP was suspected during the patient's assessment, a star cancellation test was administered, and it was found that the patient could mark the left half of the test but not the right half (Figure 1a). In the neuropsychological evaluation, the patient scored 30 in the mini-mental state test, and assessment with Wechsler Memory Scale showed that the patient's personal and actual information and orientation functions were impaired. Although the patient could maintain simple attention, their working memory seemed contracted. A story recall test showed that the patient's immediate recall capacity was way below average, and they had difficulty maintaining attention and copying words. Visual confrontation naming was tested by the Boston Naming Test (BNT) and the patient was impaired.

The patient was admitted to a rehabilitation program for stroke-associated walking difficulty and fine skill and coordination difficulties in the upper extremities and prescribed strengthening exercises for the intact side, joint range of motion exercises, assisted resistance exercises, posture exercises, balance

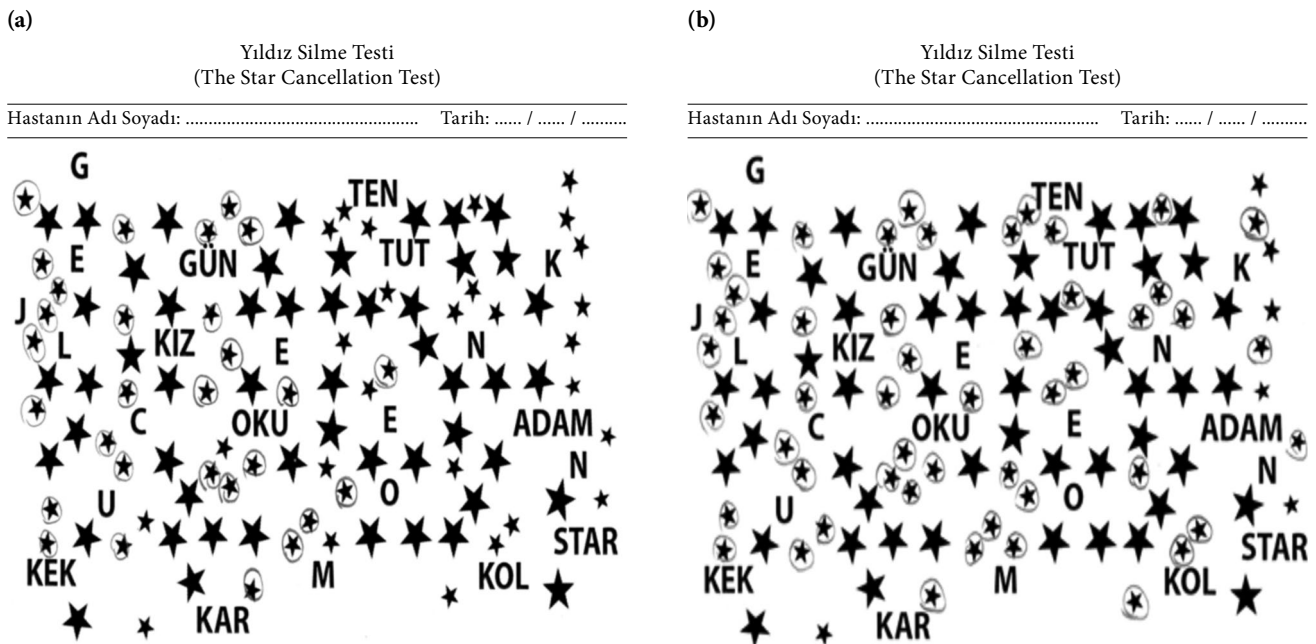


Figure 1. (a) Star cancellation test, pre-treatment. (b) Star cancellation test, post-treatment.

coordination exercises, neurophysiological exercises, and hand rehabilitation for his affected side, as well as electrical stimulation on the side with neglect, visual scanning exercises, and feedback strategies for cognitive rehabilitation and treatment of neglect phenomenon. At the end of 45 sessions, the patient was able to walk 4 m independently without any support and progressed in balance-and coordination-requiring skills and cognitive functions. The patient was discharged with distinct improvements in neglect and cognitive functions and was independent in his daily activities. The patient achieved marked improvements in the star cancellation test (Figure 1b), mini-mental state test, and Wechsler Memory Scale assessment with respect to his personal information and orientation functions. The patient's working memory was observed to subside and the magnitude of immediate recall, coping and the length of maintaining attention increased. As for the Boston Naming Test, the impaired language function was observed to improve.

DISCUSSION

Stroke is the second most common cause of death and the third most common cause of disabilities worldwide.^[8] Besides physical disabilities, cognitive disorders constitute a substantial part of disabilities. Following a stroke, the cognitive functions of

attention and executive functions are more affected compared to memory and orientation, which considerably affect the rehabilitation potential of a patient.^[9]

Unilateral hemispatial neglect phenomenon is present in approximately 23% of patients with stroke, 42% of patients with right hemisphere lesions, and 8% of those with left hemisphere lesions.^[10] Meanwhile, a study by Kleinman et al.^[11] revealed that when tasks examining allocentric spatial representation (e.g., copying words) and egocentric spatial representation (e.g., line cancellation) were combined, the percentage of neglect was equal for right brain lesions (31%) and left brain lesions (32%). Studies by Spaccavento et al.^[12] and Kleinman et al.^[11] reported that egocentric and allocentric neglect appears in a patient with left hemisphere lesions by 12% and 22%, respectively. In our case, the patient was diagnosed with both egocentric and allocentric neglect by the positive star cancellation test, limitation in coping words, and a large left temporal lesion on MRI.

Unilateral hemispatial neglect phenomenon disappears within the first six months in most of the cases regarded as a poor prognosis for functional recovery after a stroke, UHNP has been found to cause delays in patients' participation, achieving the rehabilitation goals, restrictions in movements, and consequently decrease in functioning and increase

in dependency after discharge.^[10] Detecting UHNP in patients with left hemisphere lesions may be overlooked due to accompanying problems, such as aphasia, dysarthria, and swallowing difficulty. If these are left unnoticed, it may cause a delay in the rehabilitation process. Our patient required support for his functions regarding coordination and high-level cognitive abilities. If these are noticed and treated in an early stage, the recovery can be achieved swiftly. In our case, detection of UHNP at the time of admission and insertion of cognitive rehabilitation principles into the conventional treatment regimen helped improve the patient's condition rapidly.

The treatment of UHNP involves two lines of practice, primary treatment of the deficiency and compensatory techniques. Sustained and specific strategies such as visual scanning training, virtual reality, and forced alertness, as well as task-specific practices improve cognitive-comprehension abilities. The compensatory techniques include practices targeting the sense of position and spatial representations, prism adaptation, limb activation, eye-patching and hemispacial glasses, caloric stimulation, optokinetic stimulation, transcutaneous electrical nerve stimulation, neck muscles vibration, and repetitive transcranial magnetic stimulation.^[13] Along with rehabilitation, two different classes of pharmacological agents have been used for UHNP, targeting dopaminergic, noradrenergic, or both systems.

Although UHNP is a relatively more common clinical condition in left hemiplegia, it should be remembered that it can also occur in right hemiplegia resulting from lesions in the left hemisphere. Recovery can be seen in some patients within the first six months; however, specific treatment regimens for UHNP combined with the conventional rehabilitation programs may further accelerate the recovery process.

In conclusion, the probability of UHNP in right hemiplegia patients should be kept in mind, and if possible, routine screening for this condition should be added to other cognitive evaluation tools. Whenever the presence of UHNP is detected, conventional rehabilitation programs for hemiplegia must be enriched with additional rehabilitation, cognitive therapies, and, if needed, compensatory techniques.

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Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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