

Spatial Orientation and Personality Traits Before and After Cerebral Ischemic Stroke: A Case Report

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Abstract—The study was designed to find connection between pre-and post-stroke personality and cognitive functioning in cerebral ischemic stroke survivor, male, 65, right-hander, with higher education, diagnosed as having motor aphasia, partial sensory aphasia, left hemiparesis in upper and lower shoulder, as well as left-sided spatial neglect and moderate depression. Caregiver was requested to compare the one year period before the stroke to the earlier period with respect to the personality and cognitive functioning of stroke sufferer. According to caregiver's witness, one month before stroke patient, when driving his car, used to disregard the left side of the road and counter cars, however, was not aware of this problem. Caregiver witnessed increase in the aggression and anxiety of the patient 10 months before the ischemic attack. Change in premorbid personality is suggested to predict the after-stroke moderate depression in cerebral ischemic stroke sufferer. Disregard to the left side of the road is suggested to associate with development of left-sided spatial neglect after cerebral ischemic stroke.

Keywords— cerebral ischemic stroke unilateral spatial neglect depression premorbid after-stroke.

I. INTRODUCTION

Ischemic cerebral stroke is among the leading causes of serious, long-term disability worldwide. Besides major predictors of stroke outcomes (mainly stroke severity, stroke localization and age of stroke sufferer), there is a great variety of health behavior and demographic risk factors that may influence the disease outcome in stroke survivors [1,2]. At the same time, the data obtained in the recent studies suggest, that the outcome of cerebral ischemic stroke may be predicted by premorbid personality of a stroke survivor. In particular, premorbid personality traits of

cerebral ischemic stroke sufferers may serve as predictors of changes in personality after stroke. Interview with stroke patients and their caregivers/household, as well as the use of questionnaires designed for this purpose, is accepted method for retrospective assessment of premorbid personality. At the same time, after-stroke follow-up psychological and clinical examination is undertaken to study the personality state of stroke sufferer. Reliable connections suggest premorbid personality state as having prognostic value, helping in organization of relevant rehabilitation. In three-months follow-up study of ischemic stroke survivors, the pre-stroke personality was assessed by interviewing a household/caregivers of patients under examination. The pre-stroke personality of stroke survivors was assessed by interviewing caregivers by NEO Personality Inventory-Revised. High neuroticism and low agreeableness in premorbid state were found related to post-stroke agitation and irritability. Authors suggest assessment of premorbid personality to serve for prediction of post-stroke behavioral and psychological symptoms [3]. In another study, neuroticism, extraversion and openness personality inventory was delivered to caregivers. Authors demonstrated that information about premorbid neuroticism is much more helpful in predicting post-stroke depression as compared to knowledge about age, sex, causes and location of stroke, duration of illness, level of education and the usage of drugs [4]. Association of premorbid neuroticism to the post-stroke depression was demonstrated in other studies as well [5]. Neuropsychiatric inventory was used to study predictive factors for after stroke dysphoria and apathy. Authors demonstrated that corresponding subscale baseline scores in Neuropsychiatric inventory predict dysphoria and apathy in the early and later stage of post-stroke period [6]. Higher premorbid IQ and no signs of

dementia is suggested to predict better outcome of ischemic stroke [7] while pre-stroke decline in memory was found to predict severe memory loss and slow thinking after the stroke [8]. However, to our knowledge, less is known if there is a deficit in premorbid cognitive functioning, other than memory, that may predict the outcome of the cerebral stroke. To extend data in this direction, current study was designed to look for possible association between pre-stroke personality and cognitive functioning and after-stroke depression and unilateral spatial neglect (USN) in cerebral ischemic stroke survivor. As it is described elsewhere, USN is a neuropsychological condition, in which, after the damage to one brain hemisphere, patient displays inability to report, respond or orient to the stimuli in one half of the space. In most of clinical cases USN results from the damage to the right brain hemisphere and USN sufferer neglects the left side of the space [9,10]. When tested on copying and drawing from memory, USN patients may fail to represent left half of an object. They may error to the right side when instructed to mark the center of lines, represented on the paper, while in Cancellation test USN patients fail to cancel items distributed on the left part of the sheet of paper. In everyday life patients with USN may bump into furniture, situated on their left, fail to react to left-sided bystander, neglect food in the left part of the dish and leave face unshaved on the left side [9,10,11]. In considerably rare clinical cases right-sided USN is described in patients with the damage to the left brain hemisphere. USN, ipsilateral to the side of the brain lesion is described in some clinical cases [12,13,14,15].

II. MATERIAL AND METHODS

Patient, male, 65, right-hander, with higher education, experienced ischemic stroke to the left brain hemisphere at the age of 65. One year before acute ischemic stroke he addressed physician by the reason of hypertension, increased anxiety and irritability. CT examination revealed mild decrease in the density of paraventricular white matter and increased density in the lumen of the left middle cerebral artery. Clinical examination did not reveal symptoms of sensory-motor and verbal deficit. Medicamentous treatment was prescribed to lower the arterial pressure and the level of cholesterol in blood. One year after, patient was admitted to hospital after acute ischemic attack. MRI was performed in axial, sagittal and coronal section with T2(tse), FLAIR and EPI impulse sequence. Cortical-subcortical liquor region of high intensity extending to the lateral ventricle in the frontal and temporal lobes and gliosis on the perimeter was identified.

Dilation of convexital subarachnoid space and lateral ventricle, increased intensity in the ventral part of the left pons Varolii and cerebral falx without perifocal and mass effect was identified as well. Midline structures, basal ganglia, cellular region and retrobulbar tissue was found without visible pathology. MR angiography revealed occlusion of the left carotid artery (intracranial branch) and middle cerebral artery, chronic lack of blood flow in the ventral regions of the brainstem. Clinical examination identified right-sided hemiparesis in the right upper and lower shoulder, motor aphasia, partial inability to understand verbal instructions. As it is described in our earlier report, two years after the acute stroke, patient was diagnosed as having USN [15].

Present study was designed two years and three months after the stroke. At that moment patient was already dismissed from hospital and stayed at home under the care of the household. Caregiver (daughter) was requested to fulfill Catherine Bergego Scale Checklist (CBS). CBS is the 10 item checklist designed to detect presence and degree of unilateral neglect in everyday situations at home (or hospital) as it is described in [16]. Caregiver was requested to fulfill CBS to describe the premorbid behavior for one year before stroke as compared to the earlier period. At the same time, caregiver had to recall significant changes in patient's behavior not only at home, but outside as well. For this purpose, CBS was modified and statements were added such as: "Does not pay attention to objects and/or people on his left/right when walking", "Does not pay attention to the left/right side of the road when driving", "Experiences problems in left/right orientation in the workplace or in the shop", "Experiences problems in left/right orientation when walking in the street". After completion of CBS, caregiver was interviewed to give detailed explanation to the scores, put for each statement of CBS. Partial sensory aphasia and problems to understand instructions made impossible to engage patient in interrogatory with the use of questionnaires. For this reason, caregiver was requested to fulfill Beck Depression Inventory (BDI) to assess the mood of the patient for throughout the year after the stroke. For this purpose, questions were modified as directed towards the patient. In addition, caregiver was requested to give an oral description of patient's personality for one year before stroke as compared to the earlier period.

III. RESULTS AND DISCUSSION

Scores in the BDI made up to 21, pointing to the moderate depression. Caregiver witnessed change in the personality of the patient, apparent in the several months before the

stroke as compared to the preceding period. In particular, 10 months before ischemic attack, patient started to display special interest in the TV broadcast forecasting the Doomsday. He was very anxious and concerned because of forthcoming catastrophe, increased the uptake of alcohol and had a long-lasting conversations with family members on the matter of the Doomsday. He did not accept any rational objections. One week before the ischemic stroke, he fulfilled his car boot with food and water, forced family members to get into the car and moved to the mountainside nearby to the city of residence. Family members expended a lot of efforts to convince him to drive back to home. At the same time, patient occasionally displayed aggression and could start quarrel with family members on the matter of delay in supper, listening to music in a loud voice etc. Data obtained are consistent with the reported association between premorbid neuroticism and post-stroke depression [3,4,5].

Caregiver witnessed the change in the premorbid cognitive functioning of the patient. In particular, statement concerning driving style in CBS was scored 3. All other CBS items were scored 0. After the words of caregiver, patient had at least 15 years experience of driving. However, one month before acute ischemic attack, patient dramatically change the style of driving. He started to drive car adjacent to the middle stripe of the road and from time to time crossed the middle stripe moving to the left counter part of the road. He displayed trouble in paying attention to the obstacles from the left side of the road. He felt into the car accident in very simple situation and crushed the left side of his vehicle. After the words of caregiver: "He himself was very surprised how could he miss the counter car". Evidently, patient was not aware of his troubles and displayed some kind of anosognosia. The cause for premorbid cognitive deficit and personality changes has not been investigated in the present study. However, as it was mentioned, CT examination of the patient before stroke revealed mild decrease in the density of paraventricular white matter and increased density in the lumen of the left middle cerebral artery, presumably leading to the pre-stroke change in the personality as well as to the problems in spatial orientation in the patient under examination. Some clinical data suggest that recovery from USN after right hemispheric lesion occurs within three months of stroke onset [17,18,19]. Some neglect patients, however, may remain impaired in both, cognitive and motor tasks as well as in daily living for a much longer period [19]. As it was already mentioned, patient under our observation, was diagnosed as having USN two years after the stroke [15].

Presumably, USN may be long-lasting not only in case of right-hemispheric lesion, but in case of the ischemic damage to the left brain hemisphere as well.

IV. CONCLUSION

Disregard to the left part of the space, displayed before acute ischemic stroke to the left brain hemisphere, was found associated with the development of the symptoms of unilateral spatial neglect after the ischemic stroke in reported clinical case. This findings are confined to the single clinical case and further study of the wide sample of cerebral ischemic stroke survivors is necessary to prove, that the pre-stroke symptoms of disregard to the half of visual space may serve as a predictor of post-stroke unilateral spatial neglect. Change in premorbid personality such as increased aggression and anxiety before the acute ischemic stroke was found associated with the post-stroke moderate depression in the reported clinical case. We suggest, that increased aggression and anxiety preceding cerebral ischemic stroke, may serve as a predictor of post-stroke depression.

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