

THE SIGNIFICANCE OF EVALUATION SCALES FOR THE DETERMINATION OF COGNITIVE DYSFUNCTION IN ISCHEMIC STROKE

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Annotation: A stroke is the main factor in the development of cognitive impairment. Cognitive dysfunctions are one of the earliest manifestations of nervous system dysfunction. In clinical practice, it is customary to use various psychophysiological tests and their combinations. The article describes the results of using the MMSE and MoCA scales. The study included 53 patients (23 women and 30 men) aged 55 to 75 years.

Keywords: cognitive dysfunctions, scales, MMSE, MoCA

Relevance of the study. Cognitive functions are usually understood as the most complex functions of the brain, with the help of which the process of rational knowledge of the world is carried out. Cognitive functions include memory, gnosis, speech, praxis, and intellect [3]. Since cognitive functions are associated with the integrated activity of the brain as a whole, cognitive impairment naturally develops with a wide variety of focal and diffuse brain lesions. With an increase in the time elapsed since the development of a stroke, the role of cognitive disorders (CD) as a cause of disability increases. The type of stroke, ischemic or hemorrhagic, greatly affects mortality and disability. It is known that ischemic stroke (IS) is more common and leads to decreased performance in stroke survivors, but non-hemorrhagic stroke (HI) is associated with higher mortality rates. In recent decades, the number of people who survived the acute stage of ischemic stroke has been growing. According to the Global Burden of Disease Study, since 2016 the incidence of stroke worldwide is about 13 677 million people (9556 AI and 4120 GI), while the number of people living with the consequences of stroke is much higher: 79 574 million (67 595 AI and 15 310 GI) [4].

A stroke is the main factor in the development of cognitive impairment (CI). According to different studies, the incidence of CI after a stroke varies significantly, which may be due both to the difference in age and comorbidities in patients included in the study, and to the use of different diagnostic criteria, sets of neuropsychological tests [5, 6]. In a study conducted in 12 countries, 30% of patients had CI (<27 points on the Mini-Mental Status Assessment Scale, SMPS) [8]. Studies performed in Sweden and the UK have shown that, according to the KShOPS data, CIs are found in 24–39% of patients, and in the vast majority of patients (96%) after a detailed neuropsychological examination 3 months after the onset of a stroke [8, 9]. Researchers from Finland found that 3 months after a stroke, impairment of at least one cognitive function can be detected in 83% of patients, while half of them have CI of a multifunctional type [6]. In France, in patients who had a first stroke in their lives and did not have signs of dementia before its development, CI was detected in half (47%) of cases 3 months after the onset of a stroke [5].

The leading role in the genesis of CI is played not by the volume of the infarction or hemorrhage, but by the damage to strategic areas of the brain for cognitive functions [8, 10]. Post-stroke CIs are caused not only by focal vascular lesions of the brain, but also by the presence of concomitant vascular and degenerative or other lesions that may intensify (decompensate) after the development of a stroke [1, 2]. The frequency of CI increases with age, with repeated strokes, arterial hypertension (AH), atrial fibrillation, diabetes mellitus, depression, and decreases with a high educational level of the patient.



The choice of evaluation criteria in clinical trials is an urgent problem, since the quality of the study and its evidence component are of key importance for the efficacy and safety of the drug.

Assessment of cognitive functions is an important direction in the management of patients who have had a stroke, since the progression of CI often causes disability. Neuropsychological research methods are used to assess cognitive functions. They are various tests and tests for memorizing and reproducing words and pictures, recognizing images, solving intellectual problems, studying movements, etc. A complete neuropsychological study makes it possible to identify the clinical features of cognitive impairment in order to develop criteria for including patients in clinical trials and determine the dynamics of their condition in the course of a clinical trial. Although neuropsychological examination alone is not able to determine whether a patient has organic lesions, or pinpoint the side and location of the lesion, it provides cognitive information that is interpreted in conjunction with other diagnostic measures, such as neuroimaging data or clinical data.

In the group of patients observed by us with a small degree of neurological deficit, the presence of CI served as one of the causes of disability, assessed by the Barthel index.

Another reason for possible errors in determining the degree of cognitive impairment, assessed using both complex and some simple tests, lies in the different types of thinking in patients. For example, there are people who can easily count mentally, but find it difficult to draw a correct circle. At the same time, there are people who draw well, but cannot perform the simplest arithmetic operations in their minds. The same goes for the ability to memorize unrelated words. The use of a complex of psychophysiological tests makes it possible to evaluate different cognitive functions, however, each test takes a certain time, as a result of which a significant total duration of the patient's examination can cause fatigue, increasing the likelihood of errors and reducing the speed of processing the test material, which is also a studied value in some methods.

The use of combined scales, such as the Minimal Mental Status Assessment (MMSE) [3, 10] or the Montreal Cognitive Assessment Scale (MoCA) [6], significantly reduces the time required to examine a patient. Both of these scales were developed to detect moderate cognitive impairments and allow not only to assess the general state of cognitive functions in a relatively short time (patients spend about 10 minutes to complete tasks on each of these scales), but also to find out which function impairment causes a decrease in the overall value. According to some authors, the MoCA test is more sensitive in terms of diagnosing mild cognitive impairment than the MMSE.

Purpose of the study. To study the features of the development and clinical course of cognitive impairment using rating scales in patients with ischemic stroke.

Materials and methods. The study included 53 patients (23 women and 30 men) aged 55 to 75 years. All patients were diagnosed with CVD. Ischemic stroke. Early recovery period (they had hemiparesis at the start of the study - from 3 to 4 points). Prescription from 1 to 6 months. All 53 patients completed the study.

The study did not include patients with gross motor or sensory impairments, which could complicate neuropsychological testing, as well as patients with severe or unstable somatic diseases, severe depression, or other clinically significant neurological or psychiatric diseases. All patients underwent complex clinical, neurological, and neuropsychological testing; MMSE and MoCA scales were used from neuropsychological tests.

Results and discussions. 92% of patients included in the study had a long-term history of arterial hypertension. Coronary heart disease occurred in 54.5% of cases, diabetes mellitus was detected in 32% of patients.



Using the Montreal Cognitive Scale, it was determined that at the age of 55–65 years, indicators such as memory, speech, and executive skills most often deteriorate. At the age of 66–75 years, they are joined by a deterioration in abstract thinking, and after 75 years - attention (Table 1).

In general, cognitive functions in middle-aged patients corresponded to the average level, in elderly patients - below average, or the level of cognitive functions corresponded to the pre-dementia state.

Table 1

The state of cognitive functions in patients with IS of different age groups, assessed using the MoCA scale ($M \pm m$)

Indicator	Norm, score	Age groups		
		55-65	66-75	>75
Memory	5	3,19±0,21	2,56±0,34	2,51±0,21
Attention	6	5,43±0,12	5,25±0,12	5,18±0,20
Speech	3	1,87±0,12	1,58±0,12	1,50±0,20
Executive Skills	5	3,58±0,16	3,16±0,20	3,12±0,27
Orientation in space	6	6,00±0,05	5,90±0,04	5,9±0,06
Abstract thinking	2	1,87±0,04	1,41±0,08	1,30±0,13
Delayed playback	5	3,25±0,12	3,10±0,16	2,98±0,17
Overall score on the scale MoCA	26-30	24,9±0,64	23,7±0,66	22,60±0,72

The use of the Mini Mental Status Assessment (MMSE) to identify cognitive dysfunction revealed that at the age of 55–65 years, indicators such as memory, attention, and numeracy are more likely to deteriorate relatively. At the age of 66–75 years, they are joined by memory deterioration, the performance of operations from three actions, and after 75 years - perception, speech (Table 2).

Table 2

The state of cognitive functions in patients with IS of different age groups, assessed using the MMSE scale

Indicator	Norm, score	Age groups		
		55-65	66-75	>75
Orientation	10	8,89±0,18	7,36±0,34	6,41±0,21
Perception	3	2,43±0,12	2,15±0,12	1,78±0,20
Attention and account	5	3,87±0,14	3,18±0,12	2,70±0,20
Speech	3	2,58±0,16	2,16±0,20	1,82±0,27
Memory	3	2,00±0,12	1,74±0,14	1,33±0,18
Performing three-step operations	3	2,87±0,04	2,11±0,08	1,63±0,13
Reading, writing, copying	3	2,65±0,10	2,10±0,16	1,88±0,17
Overall score on the scale MMSE	28-30	25,3±0,65	22,12±0,72	18,55±0,82

Conclusion. The peculiarity of our study is that the patients had minimal speech and movement disorders, their disability was largely due to CI, while the progression of CI over time could be of great importance for the increase in the degree of disability and deterioration in the quality of life.



The use of a comprehensive study, including a dose and a qualitative neuropsychological one, allows not only to more accurately determine the nature of a neurological defect and the state of higher brain functions in patients with ischemic stroke, but also to correctly select an adequate therapy and evaluate its effectiveness. Various methods can be used to assess the state of cognitive functions, but the most appropriate in practical neurology are such combined scales as MMSE and MoCA.

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