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ЭНЕРГЕТИКА

ESTIMATION OF THE EFFECTS OF HYPERTENSION, INCREASED VISCOSITY OF THE BLOOD AND DYSLIPIDEMIA ON THE TIGHTNESS OF COGNITIVE DISORDERS IN PATIENTS MOVING THE ISCHEMIC INSULT OF THE HEAD BRAIN

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Abstract. A clinical and laboratory study was carried out in 72 patients in the recovery period after ischemic stroke. Neuropsychiatric examinations were performed to assess cognitive function. We used a brief assessment scale of the cognitive status of MMSE (Multi Mental State Examination), scale NIHSS (National Institute Health Stroke Scholl), Barthel index. The conjugacy of blood pressure, disorders in the coagulation, anticoagulation and fibrinolytic systems and the level of total cholesterol and its fractions and the neuropsychic status of patients in the early recovery period in patients with ischemic stroke has been established.

Keywords: ischemic stroke, cognitive status

The high urgency of the problem of ischemic stroke is predetermined by the breadth and continuing increase in morbidity with high rates of disability and the development of a number of complications and high mortality (1,2,3,4).

Patients with the consequences of cerebral stroke constitute the heaviest contingent of neuro-rehabilitation institutions. This situation is due, according to the researchers, primarily long-term preservation and insufficient regression of the main symptoms of ischemic stroke - cognitive disorders that have arisen as a result of acute vascular disorders of the brain (5,6).

In recent years, great strides have been made in studying issues related to the pathogenesis, diagnosis and treatment of stroke and its consequences. In published monographs, manuals, numerous articles and reviews, great attention is paid to the consequences of stroke, including cognitive impairment (7,8,9).

Despite the fundamental nature of research on the effects of ischemic stroke, today there is not enough clarified and sometimes contradictory information concerning factors that have a negative impact on the manifestation of cognitive disorders in the recovery period and their consequences. Most researchers unanimously recognize the negative role of manifestations of the cognitive impairment of individual hypertension, dyslipidemia, increased activity of the blood coagulation system (10,11,12). However, in the available literature there is no information about the combined effect of these factors on cognitive functions. All of the above defined the purpose of this study and its relevance.

Objective: to study the significance of blood pressure disorders, the state of homeostasis, lipid metabolism in the clinical picture and the manifestation of cognitive disorders in the recovery period after a history of ischemic stroke.

Materials research methods

The present study is based on our own clinical and neurological examinations of 72 patients with post-stroke effects with arterial hypertension and disorders of lipid metabolism and homeostasis. Among them were 27 (37.5%) women and 45 (62.5%) men aged from 52 to 65 years. The average age of patients was 59.1 ± 5.2 years.

Patients were included in the study in the early recovery period (3-4 months later) after suffering an acute circulatory disorder of the brain.

The control group consisted of 19 primary donors-volunteers of the same sex and age, according to anamnesis and surveys that have no neuropsychiatric or other somatic diseases that do not require treatment at the time of the study.

A comprehensive clinical examination was carried out according to the generally accepted method: a clinical examination of a patient according to organs and systems, clarification of complaints, anamnesis of the disease, blood and urine tests, blood tests for specific markers of HIV infection and viral hepatitis.

Laboratory methods included the determination of coagulative and fibrinolytic properties of blood, the concentration of free cholesterol and its fractions.

To assess changes in blood pressure during the day, a two-time measurement of systolic and diastolic pressure was carried out, and the daily monitoring method was used (if necessary).

All patients underwent extended neuropsychiatric examination testing using questionnaires that allowed a quantitative assessment of the studied traits. In the work, the most informative instrumental techniques most frequently used in neurological practice were used: a brief scale of assessing the cognitive status of MMSE (Multi Mental State Examination); NIHSS (National Institute Health Stroke Scholl) scale, Barthel index (Barthel) - to measure the state of independence.

Comparison of cognitive functions was carried out in two groups. The first group (control) consisted of 34 patients who did not have blood pressure disorders without significant changes in homeostasis and blood lipid spectrum. In accordance with the study protocol, 38 patients with arterial hypertension, impaired blood viscosity and lipid metabolism were included in the second group.

The results of the research discussion

An individual analysis of the state of blood pressure indicators in 72 patients revealed the presence of hypertension in 38 (52.8%) cases. An increase in the level of blood pressure was noted in all these patients above 140/90 mm Hg. The mean value of systolic blood pressure was 171.6 ± 5.9 mm Hg, and diastolic 99.7 ± 2.4 mm. Hg. For the rest of the subjects (34 people (47.2%)), there was no impairment of height or decrease in systolic and diastolic pressure. The range of its oscillations was in the range of <140/90 mm Hg. (on average, 124.8 ± 3.2 mm Hg and 72.5 ± 2.1 mm Hg).

It is important that in the early recovery period there is a persistent increase in 38 patients with hypertension, the number of platelets in the blood serum (on average up to 264.1 ± 2.9 versus 242.2 in healthy). At the same time, a change in

the blood coagulation system parameters was observed in the analyzed patients. Reduction of recalcification time (up to 109.3 ± 0.5 seconds with the conditional rate of 129.4 ± 0.3 seconds), prothrombin index (up to 90.8 ± 0.5 seconds against 98.2 ± 0.1 seconds in healthy people) , thrombin time (up to 15.6 ± 0.3 seconds against 16.8 ± 0.1 against in control subjects).

It was revealed against the background of a pronounced decrease in one of the strongest inhibitors of blood coagulation, antithrombin III (up to 76.9 ± 0.8%, with a rate of 92.0 ± 0.4%), and fibrinolysis deficiency (respectively, up to 9.3 ± 0.4 seconds against 7.2 ± 0.1 sec in the control group), a quantitative increase in the fibrinogen content (respectively, to 5.1 ± 0.3 g / l at a rate of 3.9 ± 0.1 g / l) on the presence of this category of patients increased blood viscosity.

Disorders in the coagulation, anticoagulant and fibrinolytic blood systems in 34 patients not suffering from concomitant hypertension, were less significant, although they had statistically significant differences ($p < 0.05$) with the healthy group. These patients showed an increase in the number of platelets, on average, to 250.8 ± 2.9; recalcification time (up to 122.8 ± 0.7 sec), prothrombin index up to 95.9 ± 0.4%, thrombin index up to 16.0 ± 0.2; decrease in antithrombin III to 85.7 ± 0.5%; fibrinolysis up to 4.1 ± 0.3 minutes, an increase in the blood content of fibrinogen to 4.2 ± 0.3 g / l.

In patients with hypertension and increased blood viscosity (38 people), there were clear signs of dyslipidemia. In these patients, elevated levels of total cholesterol were recorded (on average up to 6.14 ± 0.2 mmol / l); triglycerides (on average up to 1.62 ± 0.04 mmol / l); low-density lipoprotein cholesterol (on average up to 3.83 ± 0.2 mmol / l) while reducing the concentration of the anti-atherogenic fraction of high-density lipoprotein cholesterol (average 1.31 ± 0.03 mmol / l), which ultimately affected the growth of dyslipoproteinemia (mean 4.62 ± 0.4 mmol / l). In the group of healthy people, the studied parameters respectively amounted to 4.58 ± 0.2 mmol / l; 0.99 ± 0.14 mmol / l; 2.58 ± 0.3 mmol / l; 1.73 ± 0.14 mmol / l and 2.2 ± 0.5 mmol / l; $p < 0.05$.

In the absence of hypertension and significant disorders in patients with coagulation, anticoagulation and fibrinolytic blood systems (34 people), some biochemical indicators of lipid metabolism tended to change. It was noted that the average levels of total cholesterol, triglycerides, low-density lipoprotein cholesterol slightly exceeded the higher limits of normal values (averaged respectively 5.1 ± 0.2 mmol / l; 1.24 ± 0.05 mmol / l; 2.89 ± 0.4 mmol / l) amid some reduction in high-density lipoprotein cholesterol levels (up to 1.6 ± 0.09 mmol / l).

The obtained information allowed forming for the upcoming studies of clinical and neuropsychiatric conditions 2 groups of patients. The first group included patients (34 people) who had no blood pressure disorders and a significant change in blood viscosity and lipid metabolism. In the second (38 people), patients with concomitant hypertension were selected, with statistically significant ($p < 0.05$) abnormalities in the homeostasis system, elevated levels of cholesterol and its fractions.

A comparative analysis of the clinical status revealed in patients with arterial hypertension, disorders in the coagulation system, anticoagulation and fibrinolytic system, blood lipid spectrum, the frequency of complaints prevailed over those in people without these factors. So, in patients of group II, complaints of headaches were recorded in 32 (84.2%), general weakness in 33 (86.8%), fatigue during mental and physical exertion in 32 (84.2%), dizziness in 19 (50%), weakness in the limbs in 17 (44.7%), disruption of sleep rhythm in 20 (52.6%), memory loss in 16 (42.1%).

Patients of group I mainly complained of headache 11 (32.4%), dizziness 9 (26.5%), general weakness 15 (44.1%), weakness in the limbs 8 (23.5%), decreased performance 14 (41.2%), sleep disorders 13 (34.2%), memory loss 10 (29.4%).

The results of a neurological examination of patients after a stroke clearly demonstrated the negative impact on the state of cognitive functions of concomitant hypertension, increased blood viscosity and significant disturbances in lipid metabolism in the recovery period. So, when comparing the results of neuropsychic testing using the scale in patients of group II, the most frequent (in 84.2% of patients) moderate degree of neurological disorders was recorded, and in representatives of group I only in 17.6% of cases. A mild degree of cognitive disorders was detected in 15.8% of patient's in-group II and in 82.4% of patient's in-group I.

The averages of the MMSE scale are shown in Table 1.

Table 1

Changes in cognitive function indicators on the MMSE scale in patients with groups I and II

Groups of studies	Indicators of cognitive functions				Total group average
	Fluctuations in range <28 -> 25 points		Fluctuations in range < 25 - > 20 баллов		
	n	M ± m	n	M ± m	
Group I (n = 34)	28 (82,4%)	27,2±0,6	6 (17,6%)	23,8±0,9	25,6±0,5*
Group II (n = 38)	6 (15,8%)	26,8±0,5	32 (84,2%)	22,2±0,4*	22,9±0,5*

Note: * - p <0.05 - the significance of differences between the indicators of groups I and II

In addition, in patients with groups II, differences for points on the NIHSS scale, reflecting an objectively clinical and neurological state and severity of neurological deficit, and I were obtained. Based on a total score of patients with ischemic stroke, it was found that the violations of blood pressure, increased blood viscosity and dyslipidemia in patient's in-group II of patients have a significant impact on the test results. The severity of neurological deficit in these patients increases and most often corresponds to the average degree of neurological disorders (in 81.6% of patients), less often - a slight degree (in 18.4% of patients). On

the contrary, the absence in patients undergoing ischemic stroke, hypertension and significant changes in the coagulation, anticoagulation system and lipid metabolism in the vast majority was recorded mild degree of impairment of neurological deficit (85.3% of patients). A pattern was revealed that clearly demonstrated the differences in the average scores obtained on the NIHSS scale in patients with group I and II (respectively, 8.62 ± 0.3 points versus 13.5 ± 0.2 points; p <0.05).

Using the Barthel index in each group, the degree of household activity / inability in everyday life was assessed. It turned out that in patients of group I, the index indicators were most often in the range from 86 to 71 points, which indicated that patients were weakly dependent on outside help (Table 2).

table 2

Changes in the Barthel index in patients with groups I and II

Groups of studies	Indicators of the Bartel index				Total group average
	Range of fluctuations from 26 to 71 points (weak dependence)		Range of fluctuations from 70 to 51 points (moderate dependence)		
	n	M ± m	n	M ± m	
Group I (n = 34)	27 (79,4%)	78,2±4,1	7 (20,6%)	62,6±5,9	74,9±5,7*
Group II (n = 38)	9 (25,7%)	73,2±6,3	29 (76,3%)	54,8±4,3	59,2±3,9*

Note: * - p <0.05 - the significance of differences between the indicators of groups I and II

The data in Table 2 give grounds to assert that in patients of group II, the Bartel index is lower than in patients of group I, which indicates their ability to self-care.

The correlation history revealed a direct relationship between the indicators of neuropsychiatric disorders on the MMSE scale and the NIHSS scale (r = + 0.81). It was established that the number of points on the Barthel scale correlates with the number of points on the MMSE scale (r = + 0.76) and on the NIHSS scale (r = + 76).

As follows from the data presented, factors that adversely affect cognitive function in the early recovery period in patients undergoing ischemic stroke are hypertension, increased blood viscosity and dyslipidemia.

Findings

1. In patients undergoing ischemic stroke, hypertension, increased blood viscosity and dyslipidemia may occur in the early recovery period, which have a negative effect on the state of cognitive functions.

2. The conjugacy of violations in the coagulation, anticoagulant and fibrinolytic system, arterial hypertension, altered levels of total cholesterol and its fractions, and the neuropsychic status of patients undergoing ischemic stroke in the

early recovery period was established: pronounced disorders are more often combined (84.2% of cases) with mild cognitive impairment; slightly significant - with mild cognitive impairment (82.4% of cases).

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