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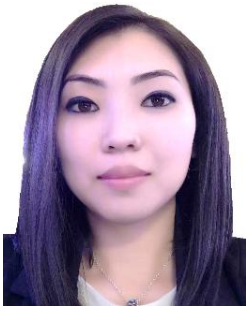
OPTIMIZATION OF DIAGNOSTIC MEASURES FOR ISCHEMIC STROKE IN YOUNG ADULTS

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ЁШЛАРДА ИШЕМИК ИНСУЛТДА ДИАГНОСТИКА ЧОРА-ТАДБИРЛАРИНИ ОПТИМАЛЛАШТИРИШ

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ОПТИМИЗАЦИЯ ДИАГНОСТИЧЕСКИХ МЕРОПРИЯТИЙ ПРИ ИШЕМИЧЕСКОМ ИНСУЛЬТЕ У ЛИЦ МОЛОДОГО ВОЗРАСТА

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Резюме. *Мақолада беморларнинг аҳволи оғирлигини баҳолаш шкаласи, макроструктуравий ва микроструктуравий кўрсаткичлар, ёш беморларда мия инфаркти хавфи биокимёвий белгиларининг клиник ва диагностик аҳамиятини аниқлаш ёрдамида неврологик статусни қиёсий таҳлил қилиш натижалари келтирилган. Олинган натижалар ушбу муаммога дуч келган ёшларда диагностика, даволаш тактикаси ва реабилитация тадбирларини такомиллаштириш ва сифатини ошириш, шунингдек, мия-қон томир касалликлари бўлган беморларда ишемик ўзгаришлар ривожланишининг олдини олиш имконини беради.*

Калит сўзлар: *ишемик инсулт, ёш, диагностика чоралари, неврологик статус, гомотсистеин, мия нейротрофик омили, нейровизуализацион феномени.*

Abstract. *The article presents the results of a comparative analysis of the neurological status using scales for assessing the severity of the patient's condition, macrostructural and microstructural indicators, determining the clinical and diagnostic significance of biochemical markers of the risk of cerebral infarction in young patients. The obtained results provide an opportunity to improve and increase the quality of diagnosis, therapeutic tactics and rehabilitation measures in young people with this problem, as well as to prevent the development of ischemic lesions in patients with cerebrovascular diseases.*

Keywords: *ischemic stroke, young age, diagnostic measures, neurological status, homocysteine, cerebral neurotrophic factor, neuroimaging phenomenon.*

According to WHO data, stroke in economically developed countries ranks second in the overall morbidity structure. [1,2,3]. In Uzbekistan, according to the chief neurologist of the Republic of Uzbekistan, prof. Majidova Y.N., in 2021 more than 100,000 cases of strokes were registered. The high percentage of brain infarction morbidity in able-bodied people and the persistent tendency to rejuvenation of this pathology should be emphasized. [2,4,5]. This pathology occurs in young people in 3-23 cases per 100 thousand population, which is an average of 30-35%. [6,7,8].

Today, studying the role of macro- and microstructural cerebral factors in the development and clinical course of ischemic stroke is of great importance, information about which we can obtain through neuroimaging methods. The concept of "neuroimaging phenomenon" has been defined, including such neuroimaging indicators as acute lacunar infarctions, lacunar lesions, white matter hyperintensity, expansion of perivascular spaces and the presence of hemorrhagic components, considered microstructural markers of ischemic brain damage. [9,10].

Also of great importance are biochemical markers of impaired cerebral circulation and haemostasis, in particular the antioxidant system, the consequence of which is endothelial dysfunction and endogenous intoxication [11,12].

Thus, knowledge of all macro- and microstructural cerebral factors will help to determine the criteria for choosing the most optimal treatment, prevent the development of possible complications, develop an algorithm of diagnostic and preventive measures, and develop a programme of rehabilitation measures.

The aim of the research was to optimise methods of diagnosing ischaemic stroke in young adults.

Materials and methods of the research. Our study included 133 patients with verified ischemic stroke in the acute period, divided into 2 groups depending on age category. The main group included 83 young patients (average age 38.7 years): of them 41 (49.4%) males and 42 (50.6%) females, in the comparison group - 50 elderly patients (average age 65.06 years): males - 37 (74%) and 13 (26%) females. The control group consisted of 54 practically healthy young people, whose average age was 30.59 years, with 31 males (57.4%) and females - 23 (42,6%).

Upon admission, patients underwent a comprehensive clinical-neurological (complaints, anamnesis, neurological status), laboratory (complete blood count, biochemical blood test, enzyme-linked immunosorbent test (homocsteine, BDNF), general urinalysis) and instrumental (ECG, CT/MRI) examination. The severity of neurological deficit was assessed using the NIHSS scale.

Results of the research. On admission to the neurology emergency department in group I, according to TOAST criteria, atherothrombotic stroke was diagnosed in 12% patients, cardioembolic stroke in 21.6% patients, lacunar stroke in 31.2% patients, haemodynamic stroke in 1.2% patients, and cryptogenic in 33.8% patients. In group II patients, atherothrombotic stroke was observed in 40% patients, cardioembolic stroke in 32% patients, lacunar stroke in 14% patients, haemodynamic stroke in 8% patients, and cryptogenic in 6% cases. At the same time, it should be noted that in the group I the persons with lacunar stroke and stroke of undetermined etiology prevailed, whereas in the 2nd group the patients with atherothrombotic variant of II prevailed.

The results of the analysis of anamnestic data and risk factors are given in table 1. As can be seen from the table, in group I, smoking (47% versus 28%) and alcohol abuse (47% versus 30%) predominated. Rheumatism and kidney pathology occurred in 6%, heart defects – in 8.4% of patients (in group II this pathology was not established). In patients of group II, hypertension prevailed in a ratio of 98%: 73.5%, diabetes mellitus (22%: 3.6%), coronary heart disease (50%: 22.9%) and obesity (10%: 4.8 %). Patients of group I also had these factors, but in combination with bad habits.

When determining the localization of the pathological focus (Fig. 1) in a comparative aspect, in 37.3% of patients of group I and 36% of group II, the lesion was detected in the left carotid system, in 48.2% and 40% - in the right carotid system, in 8.4% and 12% - in the vertebrobasilar area, in 6.1% and 12% of cases, respectively, a combined lesion of two areas was detected.

When assessing the neurological status of patients in the main group upon admission to the department, we identified symptoms characterizing the presence of general cerebral and focal neurological symptoms. According to the data obtained, in group I, convulsive syndrome (7.2% versus 4%) and impaired motor activity in the form of mild (24.1% versus 14%) and moderate hemiparesis (39.7% versus 26%) predominated.

In turn, in patients of group II, symptoms such as nausea/vomiting (36% versus 16.8%), decreased photoreaction (18% versus 9.6%), diplopia (10% versus 2.4%) and nystagmus prevailed. (18% vs. 8.4%), bulbar/pseudobulbar syndrome (30% vs. 6%), severe hemiparesis (26% vs. 7.2%), and the presence of pathological reflexes (82% vs. 56.6%). We did not reveal any significant differences in other characteristics.

Table 1. Distribution of patients depending on the etiological factor

Etiological factor	Group I (n=83)		Group II (n=50)	
	Abs.	%	Abs..	%
Alcohol abuse	39	47	14	28
Smoking	39	47	15	30
Rheumatism	5	6*	0	0
Diabetes mellitus	3	3,6*	11	22
Coronary heart disease	19	22,9*	29	58
Heart defects	7	8,4*	0	0
Hypertonic disease	61	73,5	49	98
Obesity	4	4,8*	5	10
Kidney pathology	5	6*	0	0
Combination of factors	31	37,3*	34	68

Note: *- significance of differences (P<0,05)

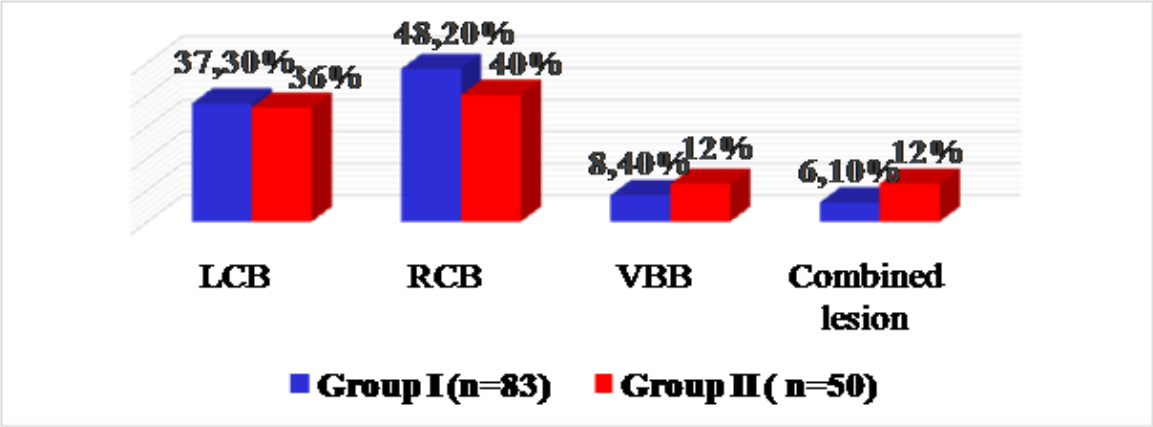

Fig. 1. Distribution of patients depending on the location of the pathological focusa

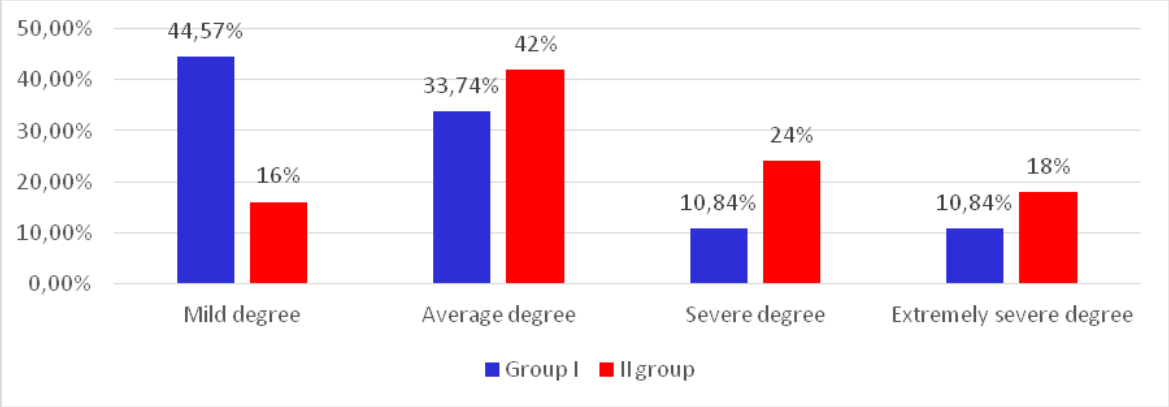

Fig.2. Comparative analysis of indicators for assessing the severity of the condition of patients according to the NIHSS scale

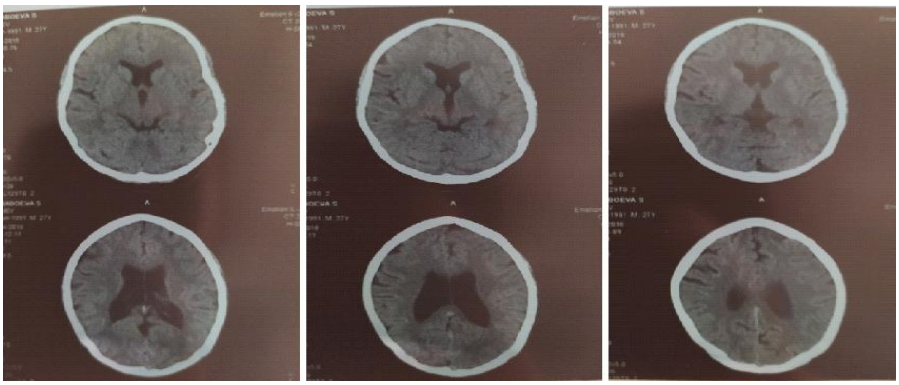

Fig.3. CT picture of IS with average severity of neurological deficit

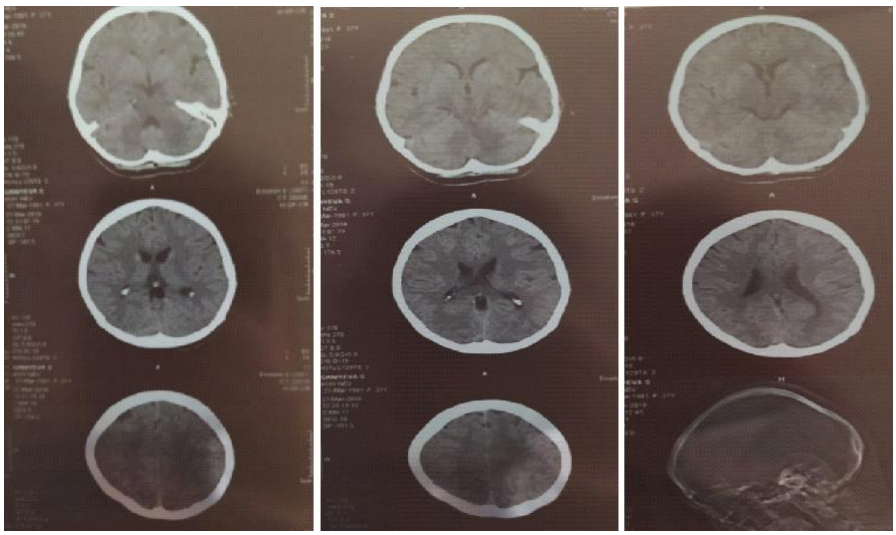

Fig.4. CT picture of IS with severe neurological deficit

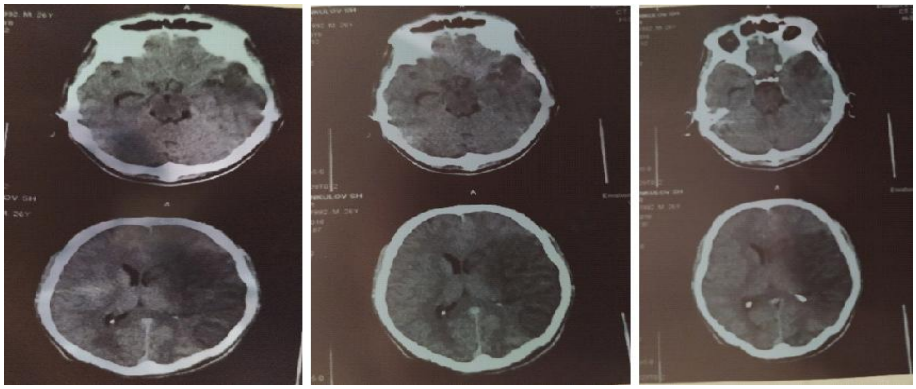

Fig.5. CT picture of IS with an extremely severe degree of neurological deficit

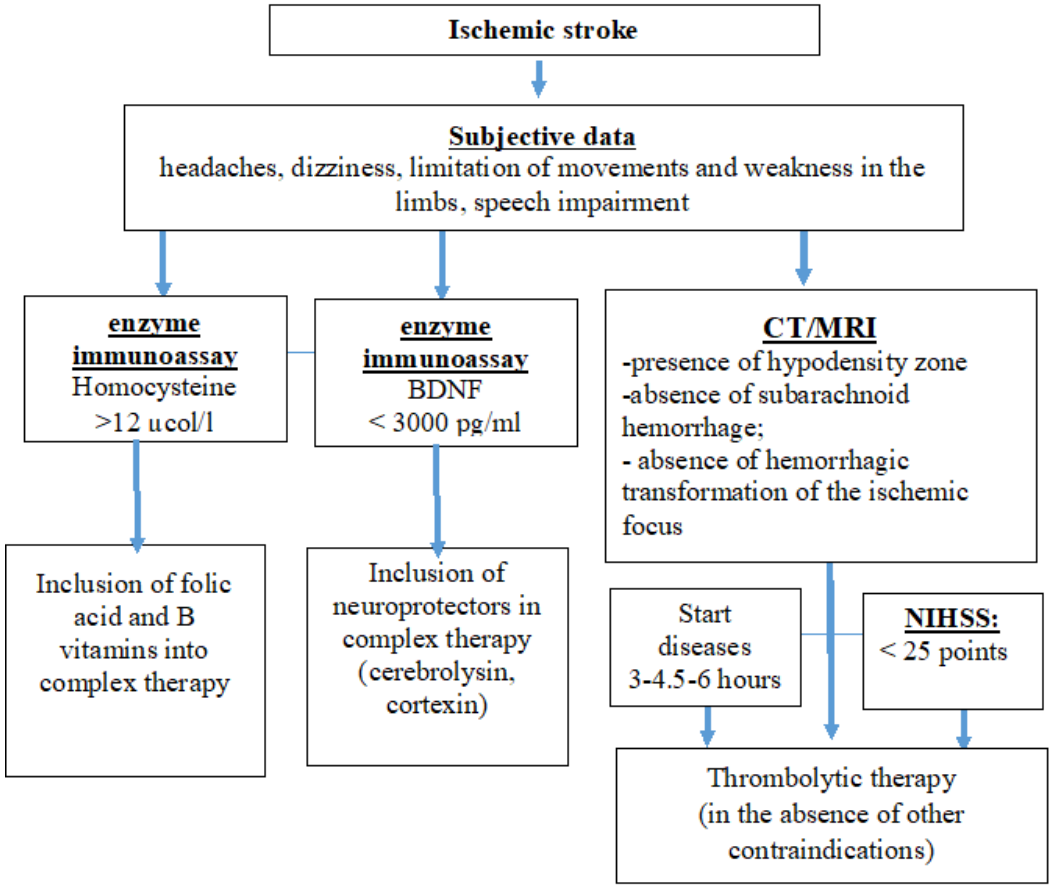

Fig.6. Algorithm of therapeutic and diagnostic measures for ischemic stroke

When comparing the severity of neurological deficits, some differences were also identified (P<0,05). According to the results of assessment on the NIHSS scale, the degree of severity in group I was assessed as mild in 44.57% of patients, as moderate in 33.74% of patients, as severe in 10.84% patients and as extremely severe - also in 10.84% patients, while in group II we observed a mild degree - in 16% patients, a moderate degree - in 42%, a severe degree – in 24% cases and extremely severe – in 18% cases.

As can be seen from Fig. 2, in group I there was a significant predominance of patients with a mild degree of neurological deficit (44.57%: 16%), while in group II patients were more often diagnosed with a severe degree (24%:10.84 %).

At the next stage, an enzyme immunoassay was performed to quantify the concentration of biomarkers of the risk of ischemic stroke. Thus, when determining the level of homocysteine and BDNF in the blood serum of patients with upon admission, a significant excess in the concentration of these biomarkers was found compared to the reference values (p<0,001). The average homocysteine content in the blood of individuals in the control group was 8.3±0.82 µmol/l. In patients with a mild degree of neurological deficit, the average homocysteine concentration was 22.7±1.65 µcol/l, with a moderate degree - 27.6±0.74 µcol/l, with a severe degree - 32.2±1.25 µcol /l, with extremely severe degree – 38.62±1.98 µmol/l. Results of quantitative determination of homocysteine concentration in the blood serum of patients with various subtypes of IS, comparable with the severity of neurological deficit according to the NIHSS scale.

When comparing serum BDNF levels, differences were also found. Thus, among the examined individuals in the control group, the average level of this biomarker was 2954.3 pg/ml (max=3758,9; min=2157,0). The average level of BDNF in the blood serum of patients of the main group with a mild degree of neurological deficit in ATS was 2028 pg/ml, in CES – 2369.8 pg/ml, in LS – 1991.3 pg/ml, in HDS – 2103.7 pg/ml, for cryptogenic stroke – 1791.1 pg/ml. In patients with average severity, its concentration in ATS was 1586.9 pg/ml, in CES – 1532.4 pg/ml, in LS – 1538.0 pg/ml, for cryptogenic stroke – 1526.9 pg/ml; with severe degree in ATS it was equal to 1307.0 pg/ml, in CES – 1247.5 pg/ml, in LI – 1392.1 pg/ml; with an extremely severe degree in ATS it was equal to 1179.5 pg/ml, in EI – 1334.7 pg/ml, and for cryptogenic stroke – 1147.6 pg/ml.

As the results of our study showed, there is a clear relationship between the severity of neurological deficit and the concentration of homocysteine and BDNF in the blood serum of the examined patients of group I, which is confirmed by data from neuroimaging research methods (Fig. 3-5).

As we see from a series of CT images, the severity of neurological semiotics depended on the severity of the "neuroimaging phenomenon," i.e. localization of the pathological focus, its size and degree of involvement of brain structures.

Conclusion. The data obtained during the study proved the diagnostic significance of molecular biomarkers, such as BDNF and homocysteine, in the development of ischemic stroke in young people, as well as their relationship with the clinical course and severity of neurological deficit. The presented results turned out to be especially informative in patients with IS of unknown etiology, which made it possible to develop and optimize an algorithm for therapeutic and diagnostic measures for young patients with ischemic stroke.

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ОПТИМИЗАЦИЯ ДИАГНОСТИЧЕСКИХ МЕРОПРИЯТИЙ ПРИ ИШЕМИЧЕСКОМ ИНСУЛЬТЕ У ЛИЦ МОЛОДОГО ВОЗРАСТА

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Резюме. *В статье представлены результаты сравнительного анализа неврологического статуса с применением шкал оценки тяжести состояния больных, макроструктурных и микроструктурных показателей, определения клинико-диагностической значимости биохимических маркеров риска инфаркта мозга у молодых пациентов. Полученные результаты дают возможность совершенствования и повышения качества диагностики, лечебной тактики и реабилитационных мероприятий у лиц молодого возраста с данной проблемой, а также профилактики развития ишемического поражения у больных с цереброваскулярными заболеваниями.*

Ключевые слова: *ишемический инсульт, молодой возраст, диагностические мероприятия, неврологический статус, гомоцистеин, мозговой нейротрофический фактор, нейровизуализационный феномен.*