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The importance of methods for early diagnosis of pathologies of the carotid arteries in ischemic type disorders of cerebral circulation.

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Currently, ischemic type disorders of cerebral circulation (ITDCC) are one of the most common pathologies worldwide. According to the World Health Organization (WHO), ITDCC has been identified in 10-15% of the population, ranking it second in mortality after acute myocardial infarction. It is possible to cite stenosis (Takayasu's disease) and pathological deformities of the carotid arteries as the causes of ITDCC [1,3,6]. To date, stenosis and pathological deformities of the carotid arteries have been detected in 70-80% of cases, causing problems in the course of these diseases with severe complications, as well as in the conduct of treatment and prevention. Numerous pathologies of other organs of the body can be observed as an additive in patients, and this category causes its influence on the results of surgical treatment of patients, as well as the emergence of serious complications [5,7]. Improving the results of primary prevention of stenosis and pathological deformities of carotid arteries are an important issue in scientific and practical medicine. Therefore, the mechanisms of etiology, clinical aspects of these pathologies, as well as the improvement of technology, including methods of less invasive surgery, are currently one of the most pressing problems.

The aim of the study: to assess the importance of methods for the early diagnosis of stenosis and pathological deformities of carotid arteries, which lead to acute disorders of the ischemic type of cerebral circulation.

Research material and methods: The work examined the history of the diseases in the Department of Vascular Surgery at the Multidisciplinary Medical Center of the Khorezm region, 80 patients undergoing inpatient treatment with ischemic type disorders of the cerebral circulation, stenosis of carotid arteries and pathological deformities, 50 patients treated with a diagnosis of ischemic type disorders of the cerebral circulation in the resuscitation department. The age range of patients is from 40 to 70 years. To determine the diagnosis, we identified: anamnesis, age, course of the disease, comorbid diseases. Of the total number of

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patients examined (130), 82 (63%) are male and 48 (37%) are female. The average age of patients is 54.2±7.1 years.

Patients were divided into 2 groups:

Group 1 – main - patients with ischemic type disorders of cerebral circulation, stenosis of carotid arteries and pathological deformities. They were treated with invasive and less invasive surgery.

Group 2 – control - patients with ischemic type disorders of cerebral circulation. They were given conservative treatment that improved cerebral circulation.

Criteria for inclusion in the study: individuals male and female, age >40 years <70 years, presence of ischemic type disorders of cerebral circulation

Criteria for exclusion from the study: patients under 39 years old, heart failure, the presence of congenital heart defects, the presence of signs of bleeding according to CT; if the patient has active liver disease of clinical importance, kidney disease; availability of information on oncological diseases; patients with brain damage, acute myocardial infarction less than 30 days, patients with mental, psychological, behavioral disorders.

According to gender and age, patients were distributed as follows (Table 1). There are no statistically significant differences between groups in gender and age ($p>0.05$).

Table 1.

Distribution of patients by age (according to WHO, 2016)

Age		Main group (n=80)		Control group (n=50)	
		Quantity of patients	%	Quantity of patients	%
41-50		13	27,1	12	30
51-60		47	35,4	25	33,3
61-70		20	20,8	13	20
Sex	E	44	55	28	60
	A	36	45	22	40
Total		80	100%	50	100%

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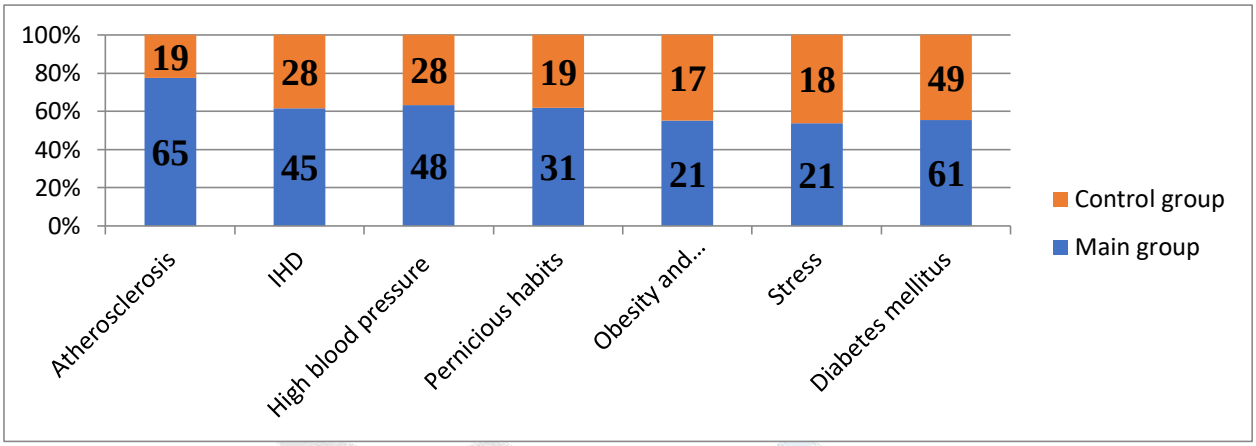
Table 1 shows that the vast majority of patients are 51-60 years old and only 33 patients are over 61 years old.

Of the total number of patients examined (130), 82 (63%) are male and 48 (37%) are female.



3 - picture. Frequency of occurrence in groups with risk factors for stroke.

During hospitalization, risk factors leading to stroke were assessed: atherosclerosis, ischemic heart disease (IHD), pernicious habits (smoking, alcohol consumption), obesity (body mass index > 25) and physical inactivity (hypodynamia), stress (data from anamnesis), diabetes mellitus (DM). As can be seen from the table presented, among the risk factors that lead to stroke, atherosclerosis, high blood pressure, IHD, diabetes mellitus were found to be abundant in both groups, compared to other factors (Figure 3).

According to CT (MRI), the vessels in which ischemic stroke is located have been identified (Table 4).

Table № 4

Localization of ischemic furnace in vascular lesions

Vascular basins	N (%) =
Right midbrain artery (MBA)	27 (33,75)
Left midbrain artery (MBA)	35 (43,75)
Vertebra-basilar basin	18 (22,5)

In 43.75% of cases, the ischemia furnace was located in the left midbrain artery (spinal cord) basin, while the right spinal and vertebrobasilar basin (VBB) accounted for 33.75% and 22.5%, respectively. In total, the hemispheric position of the ischemic furnace accounts for 88.6% of cases, corresponding to literature data [51].

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During the clinical examination, we evaluated the depth of impairment of the clarity of the patient's consciousness depend on the Glasgow scale [6] during the acute period of ischemic stroke (Table 5).

Table 5.

Distribution of ischemic stroke patients according to Glasgow Coma Scale

Glasgow Coma Scale	n (%) = 80 (100%)
Good	49 (61,25)
Stupor	17 (21,25)
Sopor	12 (15)
Coma	2 (2,5)

When analyzing the table, it was found that the large part of patients good (49.6-1.25%) were obvious, 21.25% were Stupor, and 15% were in sopor. The distribution of patients in the research group according to the neurological deficits is shown in Table 6.

Table № 6.

Distribution of patients in the research group according to the neurological deficits in the preoperative period

Neurological deficits	1 - group n (%) =80 (100 %)	2 – group n (%) = 50 (100%)
Dizziness	68 (85%)	35(70%)
Memory decline	65 (81,25%)	24 (48%)
Noise in the ear	52 (65%)	21 (42%)
Headache	72 (90%)	39 (78%)
Ataxia	24 (30%)	15 (30%)
Passer neurological signs	12 (15%)	8 (16%)
Focal neurological symptoms	8 (10%)	12 (24 %)

According to Table 6, both groups were dominated by partial dizziness, decreased memory, noise in the ear, headaches.

The nature of focal neurological symptoms in patients with ischemic stroke, depending on the affected blood vessel itself, is shown in Table 7.

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Table № 7.

Distribution of patients with ischemic stroke by the nature of neurological deficits in relation to the location of the ischemic furnace (according to CT)

n(%)=80 (100%)	Right MBA n(%) = 34 (42,5%)	Left MBA n(%) = 37 (46,25%)	VBB n(%) = 9 (11,25%)
Left-sided hemiparesis	8 (26,1%)		2 (25%)
Right-sided hemiparesis		8 (23,1%)	1 (12,5%)
Sensorimotor aphasia		10 (25,6%)	
Eye movement disorder			1 (12,5%)
Bulbar symptom complex	5 (21,7%)	6 (17,9%)	1 (12,5%)
VII pair cranial nerve paralysis	9 (21,7%)	4 (10,3%)	2 (25%)
Vestibular-ataxic syndrome	7 (13,1%)	7(17,9%)	1(12,5%)
Sensitive hemi type disorders	5 (17,4%)	2(5,1%)	1(12,5%)

During analysis of data presented in tables 6 and 7, there is a complete correspondence of neurological symptoms to the topical center: hemiparesis is recorded with the location of the ischemic furnace in the hemisphere, slightly less often with its location in a variable structure in the VBB. Bulbar symptom complex and oculomotor disorder syndrome occur in the presence of lesions in the VBB; sensory-motor aphasia - the location of the furnace in the left spinal basin was observed. Damage to the facial nerve is mainly observed when ischemia is localized in the vertebrobasilar basin, whereas with ischemia in the MBA basin it is less common.

Hemitype sensitivity disorders can be caused by both hemispheric ischemia and VBB damage (also as part of variable syndromes). Vestibulo-atactic syndrome and oculomotor disorders syndrome are characteristic of ischemic stroke with a vertebrobasilar location.

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The National Institutes of Health (NIHSS) scale was used to assess the severity of neurological deficits (Table 8).

Table №8.

Severity assesment of neurological disorders during admission

Neurological deficit level	number of NIHSS points	n (%) 80(100)
Mild	1-7	62 (77,5)
Moderate severity	8-16	16(20)
Severe	more than16	2 (2,5)

Table 8 shows that patients with mild and moderate neurological defects (according to the NIHSS scale) prevailed, which amounted to 77.5% and 20%, respectively. 2.5% of patients had severe neurological manifestations exceeding 16 points on the NIHSS scale, but the level of hemiparesis or other focal symptoms was below average or severe with rapid regression of symptoms.

To identify circulatory disorders in the brain of the ischemic type, all patients underwent a study of TCD in the brachiocephalic arteries.

When examining patients with stenosis and pathological deformities of the carotid arteries, it was found that the most informative parameter of prognostic value is the degree of cerebrovascular reactivity and a decrease in blood flow velocity in the intracranial segments of the ICA on the affected side. We have witnessed a significant difference in the analyzed indicators in the groups.

Table №9.

Indicators of cerebrovascular reactivity and blood flow velocity in patients with stenosis and pathological deformities of the carotid arteries

	Number of patients	LSK	PI	R	LSK	PI	R
1 group	80	65,3± 3,2	0,77± 0,03	1,21± 0,025	40± 0,5	0,44± 0,03	1,04± 0,01
2 group	50	56± 5,6	0,72± 0,08	1,27± 0,061	31± 1,4	0,54± 0,11	1,09± 0,02

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The study showed that the most valuable and predictably informative parameters for occlusive lesions of the brachiocephalic arteries and their intracranial networks are: the degree of cerebrovascular reactivity, decreased blood flow rate and pulsation index in the main ICA networks on the occlusion side.

Cerebrovascular reactivity is a quantitative characteristic of the circulatory control system in the brain and reflects the state of perfusion reserves. ITDCC was observed in patients with stenosis and pathological deformities of the carotid arteries, patients with reduced reactivity to hypercapnia were recorded 44/130 (33.8%) more often than patients with normal reactivity in the carotid basin at 27/130 (20.8%) ECG with focal pathological changes ($\chi 2=8.8$; $p=0.003$). At the same time, pathological activity on the EEG was observed mainly in 49/130 (37.7%) patients with reduced reactivity to hypercapnia from 19%, while pathological activity at normal or slightly reduced reactivity values (up to 20%) was observed in 29 (22.3%) patients ($\chi 2=14.7$; $P=0.00013$).

In the control group of patients, no significant differentiated changes in cerebrovascular reactivity in the carotid and vertebrobasilar systems, respectively, were observed in 32 (24.6%) patients. While assessing the state of hemodynamic parameters, attention was paid to the following: pulse indices in the left carotid basin increased in 62 (48%) patients who had an ischemic stroke, decreased in 8 (6%) and were normal in 60 (46%) patients. There were also no differences in the indices of the pulse index in the right carotid basin in both sexes of patients in the main and control groups ($\chi 2=3.2$; $p=0.20$): in 43 (53.7%) patients in the main group and in 23 (46%) patients in the control group, pulse indices increased, decreased - in 6 (7.5%) patients in the main group.%) and in 2 (4%) patients of the control group, while normal indicators were in 30 (37.5%) patients of the main group and 24 (48%) patients of the control group.

After functional probes, 36 (45%) patients of the main group of patients with stenosis and pathological deformities of the carotid artery showed a large change in autoregulation on the right compared with 8 (16%) patients of the control group ($P<0.01$). When assessing the state of autoregulation on the left, there was also a predominance of changes in the main group (33 (41%)) compared with the control group (12 (24%), $p<0.05$).

In our study, no significant difference was found when the main group and the control group were compared in terms of the frequency of occurrence of the stenosing process of the brain stem arteries, expressed to varying degrees. However, there is a tendency for more than 50% occurrence of stenosing processes in patients of the main group, which is consistent with the opinion that occlusive lesion of large

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vessels is one of the main causes of ischemic brain disease and the leading pathogenetic factor of the disease [2,4,8]. At the same time, according to O. Camilo, D. Darry, B. Goldstein (2004), angiography and ultrasound examination of patients with stenosis and pathological deformities of the carotid arteries with hypertension showed that mild atherosclerotic stenoses are more common in the carotid artery basin compared with hemodynamically significant stenoses and occlusions of the main arteries. And in our work, the predominance of stenosis of the main vessels of the brain was revealed in patients with stenosis and pathological deformities of the carotid arteries, whose stenoses were detected in more than 70%.

This condition can serve as confirmation of the existing theory that the symptoms of an attack develop against the background of prolonged vascular insufficiency caused by stenosing damage to the stem blood vessel of the brain, and are the only sign of a transient circulatory disorder in the brain or an “ischemic” stroke, which can only be detected retrospectively using computer or magnetic resonance imaging [1,4,8].

As a result of a comprehensive examination of patients with stenosis and pathological deformations of the carotid arteries, it was possible to obtain information about clinical and neuroimaging features, the functional state of the cerebral hemispheres, the state of the cerebral stem vessels and the mechanisms of cerebral circulation control.

Conclusion. Identification and prediction of the development and course of stenosis and pathological deformations of the carotid arteries serves as the basis for early diagnosis of cerebral circulatory disorders, which allows to increase the effectiveness of treatment.

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