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A COMPREHENSIVE APPROACH TO THE DIAGNOSIS OF IMPAIRED WALKING IN PATIENTS WITH DYSCIRCULATORY ENCEPHALOPATHY

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Abstract:

One of the fundamental problems of medicine is considered to be vascular disease in general. of the brain in particular. Each case of vascular accident is considered on an individual basis and depends on the specific vessel involved in the pathological process. But the problem also has common points: factors provoking the disease, the mechanism of destruction of the vessel, where the blood supply organ is disturbed, the structure of the vessel itself and the quality of the blood . According to the WHO, more than 18 million people died of CVDs in 2020, of which 90% were non-communicable diseases . The main risk of CVDs is infarcts, both of the heart and of the brain tissue. Most vascular diseases are accompanied by severe, sometimes irreversible physiological consequences for humans. Although cardiovascular diseases and cerebral vascular diseases have different localisations, symptoms and specific characteristics, it is necessary to treat the problem in a comprehensive and comprehensive way in the process of diagnosis and treatment.

Keywords: dyscirculatory encephalopathy, neurology, chronic lower limb ischaemia, cerebrovascular changes

INTRODUCTION. Chronic ischaemia of the lower limbs is a disease where the blood vessels are affected for a number of reasons, impairing the blood flow in the lower limbs and pelvis. This symptom complex was described by Lerish in 1923, has tended to increase in the last decades (smoking, sedentary lifestyle, dietary disturbances), is progressive and provokes acute cerebral and cardiac circulatory disorders. Numerous authors of scientific works (Schmidt E.V., 2015, Gusev E.I., 2017) explain the development of cerebrovascular changes on the background of pathologically significant, functionally compensatory blood flow collaterals of the peripheral blood supply (vascular reactivity disorders, stenotic lesions of VAS). Open, questions remain about the parameter of hemodynamics in the entire blood flow system at different stages of cerebral circulatory disorders, what are the early subclinical signs of the combination of cerebrovascular disorders and chronic ischemia in Lerish syndrome.

PURPOSE OF THE STUDY: To study the clinical and neurological symptoms of cerebrovascular disorders in patients with Lerish syndrome.

MATERIAL AND RESEARCH METHODS. According to the objective, 80 patients with dyscirculatory encephalopathy (DE) undergoing in-patient treatment in MC SamGMU in the period 2021-2023 aged 40 to 65 years, with an average age of ≈58 years were examined. The study group was composed of men only (taking into account the earlier literature search for Lerish disease - obliterating atherosclerosis of lower limb arteries or occlusive aortoiliac arterial disease characterized by gender preference on the male side) (5, 10). Patients were divided into two groups Group II - patients with DE and Lerish syndrome, Group I - patients with DE without Lerish syndrome. Since the issue of DE needs to be considered in terms of stage, it was decided for the purity of the study to address patients with DE only stage II-III (given that stage I is questionable during inpatient treatment, stage IV requires separate attention and study by symptoms). In addition, a group of healthy men (26) of identical age was selected from among volunteers (close to the MC SamGMU of the district, who applied for medical preventive examination in the polyclinic during the study period). The clinical diagnosis is established on

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the basis of anamnesis, neurological examination, paraclinical additional diagnostic methods according to standards (no. 266 of 28.10.2019). Laboratory tests - blood biochemistry, ECG, EEG, consultation with a general practitioner, ophthalmologist, MRI of the brain and cervical region, blood pressure monitoring, coagulogram in dynamics. Transcranial Dopplerography and duplex scanning of lower limb vessels were performed in all patients. In parallel with the clinical and laboratory instrumental study, the use of scales (questionnaires) to assess cognitive deficits (MMSE, Schulte) was envisaged. Patients with DE and Lerish syndrome (LEL) accounted for 24% (30 patients), which is in line with statistical literature (16-30% for middle-aged and elderly males) (4, 10, 13). Thus, DE group I consisted of 50 patients, DEL group II (Lerish syndrome) 30 patients, and control group III healthy 26 volunteers. All study participants submitted a written agreement. Statistical processing of the material was carried out on an individual computer, according to standard Student's indices, where $p<0.05$.

RESEARCH RESULTS. As presented in the study materials section, a percentage of the main two groups consisted of patients with DE, which had common subjective and somatoneurological symptoms and revealed signs of chronic brain ischaemia characteristic of this category of patients. Thus, complaints of headache in both groups (I and II) made up 92,3%, dizziness 89,7%, memory loss 92,6%, emotional lability (with elements of anxiety and depression) made up 88,5%, sleep disturbance 90%, hence, low working capacity 70,9%. Examination of patients for neurological symptoms revealed various focal motor and sensory symptoms in 80.9%, cerebellar signs in 70%. Distinctive features of group II were complaints of intermittent claudication, pain in the lower extremities, and twitching (at night, similar to restless legs syndrome). The second characteristic complaint in group II patients was signs of decreased (in some cases complete absence) potency. In terms of somatic status, complaints of occasional high blood pressure (patients with diabetes mellitus, or patients with chronic kidney disease, liver disease, were excluded from the study). The ECG showed evidence of tachycardia and left ventricular failure in only 17% of the two main groups. Overweight patients had a high percentage in the study, over 70%, but the main percentage of obese patients was in group II.

Table 1.
Analysis of clinical and neurological signs in the patients examined (%)

Indicators	Group I DE group II-III.	II группа ДЭ II-III ст. с синдромом Лериша	P
Headache	81±1,5	100	<0,05
Dizziness	54±1,9	86,3±4,7	<0,05
Sleep disturbance	33,3±1,2	56,9±4,1	
Fatigue	60±1,5	70,6±7,1	<0,05
Cognitive decline on the MMSE scale	20-23 score 38-56%	24-27 score 19-44%	
Walking impairment			
Shuffle	12		
Stirring limp		100	
Pain in the legs	38	100	<0,05
Trophic changes in the legs	30,2±1,2	100	<0,05
No pulsation in the legs		100	
Impaired sensitivity	20,0±8,1	80,5±1,5	
Weakness of convergence	25,5±10,0	45,1±9,8	
Smoothing of the nasolabial folds	19,9±10,0	38,2±9,8	
Pathological reflex			
Oral autolatry		15,1±5,5	
Рефлекс Маринеско-Радовига		15,1±5,5	<0,05
Reflex asymmetry			
Hands off	64,7±1,3	89,1±5,3	<0,05
Leds off	79,1±1,3	100	
Disruption of coordination			

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Romberg pose	20,1±1,5	53,3±3,3	
Palcenos	20,1±1,5	53,3±3,3	
MRI			
Brain atrophy	48,1	64,2	
Leukoreosis	40,4	100	
Foci of ischaemia	15,7	45,5	
Ventricular enlargement	23,2	27,5	

An important step in the study of patients with DE is the assessment of cerebral haemodynamics. Changes in hemodynamic parameters in the examined patients of both main groups (I and II) with stage II-III DE clearly demonstrate a decrease in blood flow velocity in the form of LSC decrease on both sides of the carotid pool, where the low level prevails in the area of CMV on the stenosis side 48.1±2.5 cm/sec on average. There is a slight increase of LSCs insilateral (56.3±1.9 cm/sec on average, in addition, 33.3±7.0 cm/sec contralateral to ZMA. These values indicate a significant decrease of pressure in the blood supply (perfusion) zones on both sides of the carotid pool and possible involvement of the blood flow from the vertebrobasilar pool. Group II showed a different progression of the process, against a background of decreased vascular blood flow. Asymmetry in the SMA pools was found to be greater on the insilateral side of the carotid pool up to 55.3 cm/sec. Blood flow asymmetry along the SMA was 24%, but at the same time compensatory activity on the stenotic side of the SMA was preserved. According to the results of duplex vascular scanning, more than 50% of cases revealed atherosclerosis on the background of moderate stenosis. C- and S-shaped tortuosity of the internal carotid and vertebral arteries predominated in Group II. In addition, stenosis, 60% on the internal carotid artery, and lesions along the vertebral artery changed in isolated cases, thereby confirming the signs of "steepening" syndrome in the vertebrobasilar basin on the background of carotid stenosis was detected.

The indication for a separate examination of patients by angiography (MSCT) is the presence of complaints of claudication and leg pain. The study revealed a lesion in 90% of cases with bilateral changes, with haemodynamically significant stenosis in 55% of these patients. Only one patient with a unilateral change had haemodynamically significant stenosis. In 39% of cases, the stenosis was detected in the area of abdominal aortic bifurcation, in 36% it was the area of external iliac artery, in the remaining cases the level of femoral artery in the lower third of femur. The nature of the disturbance itself, visually noted multiple (along the course of the vessel) narrowing of the lumen, respectively, manifested as an irregular flow contour, in such areas there was no contrast effect, or the filling had the contour of a defect. The comparative analysis of changes in the main blood flow and peripheral blood flow, particularly in the lower section revealed a correlation that gives grounds to study patients with Lerish syndrome not in a narrow profile (the responsibility of vascular surgeons), but on a body-wide scale and consider the problem as a factor aggravating chronic circulatory disorders, with possible transition to CABG and lethal outcome. According to the literature, in recent decades, patients with Lerish syndrome who have chronic cardiovascular disease or cerebrovascular shifts have a life expectancy of 1.6 years for men (Freming Study, 2017).

To diagnose structural changes in the brain of the examined patients, neuroimaging was carried out using MRI brain imaging. Signs of hypertension in the form of dilated ventricles and subarachnoid space were observed in both groups, in Group I amounted to 43.3%, in Group II 74.0%. Changes in the form of small focal (ischaemic areas) leucorrhoea, in Group I 18.2%, in Group II 43.9%, respectively, which shows a significant difference between the groups, for the worse in Group II. Signs of cerebral atrophy in Group II were observed in 100% of cases, indicators of subatrophy (atrophy) of brain substance in Group I were 63.5%.

Analysis of cognitive outcomes in the comparison groups revealed a predominance of mild cognitive impairment in Group I with 57% on the MMSE scale, 38% with a moderate degree of deficit; in Group II, the advantage was for moderate cognition in 60% of cases, the remaining percentage for mild cognitive dysfunction. 2 patients were at the borderline pre-diagnostic level.

Thus, cognitive impairment is more pronounced in group II, where there is an excess stenosis of more than 30%. Based on the complaints of the patients, the need to study the signs of "fatigue" and rapid fatigue is presented. According to studies (Longitudinal), normal fatigue increases with age, "pathological fatigue" is an inherent feature of DE (according to a number of foreign authors (Choi-Kwon S. Et al. 2013, Duncan F. et al, 2014)). Pathological fatigue has been linked to neurological deficits, e.g. in relation to disturbed sleep and low activity, but the main cause is thought to be structural changes in the brain

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(lesions of the basal ganglia), a disconnection in the brain in chronic central nervous system disorders leading to the development of fatigue. The frequency of the relationship between pathological fatigue and pain syndrome is mixed, with research (Naess, 2010) indicating a correlational parallel between the two. A study of morbid fatigue (FFT), in the groups examined, the scale revealed that FFT in group II was significantly higher than in group I, so in group II the figures were between 12 to 18 and in group I between 6 to 12, where p=0.04. Correlation analysis between morbid fatigue and cognitive capacity on the Schulte scale (table) revealed a correlation. Thus the speed of the test with a step control speed (normal, habitual step for the patient) of 60.5 sec. - 1.2 m/s, which clearly reflects the degree of limitation, both physical and mental. From this we can see that cognitive deficits depend on pathological fatigue and vice versa. In addition, in group II, because of the presence of Lerish syndrome, the difficulty in walking reinforces the signs of pathological fatigue and as a consequence exacerbates cognitive dysfunction. Impaired walking, in itself, is one of the main early signs and then a major factor of dyscirculatory encephalopathy. Clinically progressive breakdown of the walking pattern, i.e. deterioration of locomotion, leads to apraxic walking. The characteristic localisation of signs of leucorrhoea (MRI) (around the anterior lateral ventricles) is indicative of impaired walking in patients in the groups examined. In group II patients where no signs of leucorrhoea (frontal) were detected, patients' walking was impaired, which was associated with Lerish syndrome. Thus, patients with DE need to be differentiated for signs of walking, especially at the stages of compensatory change. Thus, the study of patients with stage II-III dyscirculatory encephalopathy, middle-aged men (over 45 years), revealed significant disorders of chronic brain ischemia; in cases with the presence of concomitant Lerish syndrome, which worsens and exacerbates the process of central nervous system dysfunction and provokes the growth of cognitive impairment. The results of clinical and neurological signs, instrumental, neuroimaging study, neuropsychological testing, carried out during the study period, confirm the need for extended diagnosis of chronic aortic obstruction (occlusions), where the leading manifestations of the disease is the reduction of the vascular bed with impaired microcirculation and severe complications, which gradually lead to fatal outcome against a background of ONCC. The impact of Lerish syndrome on the aspects of decreased physical activity, deterioration of cognitive functions (attention and memory), increased pathological fatigue have been significantly revealed. The above conclusion allows us to recommend that in everyday outpatient practice, patients (men) older than 45 years should be included in the risk group and be more attentive to patients' complaints of fatigue, weakness in walking, painful symptoms in the vascular bifurcation with consultation with specialists dealing with vascular disorders, for the prevention of CHF and reduction of the severity of chronic circulatory disorders syndromes.

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