Assessment of Risk Factors For Stroke In The Vertebrobasilar System And Their Impact On Rehabilitation

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Abstract - Relevance: The high prevalence, high risk of social maladjustment as a result of the consequences of acute cerebrovascular accident and, accordingly, one of the main causes of mortality gives cerebrovascular pathology a special status, as evidenced by numerous publications. the task was to identify in the studied patients the entire spectrum of clinical manifestations corresponding to the lesions of the brain structures supplied by the blood vessels of VBD and to determine the presence of a statistically significant dependence of clinical manifestations of COPD. As well as the identification of risk factors and their influence on the rehabilitation of patients with stroke in the vertebrobasilar system.

Patients with IS in VBD and COPD - 62 people (group I) - 29 men and 33 women aged 50 to 74 years (59.8 ± 5.8). Patients with IS in VBD - 64 people (group II). Of these, 31 were men and 33 were women aged 51 to 80 years (62.4 ± 5.4). All patients received traditional treatment in the most acute and acute periods of IS, patients with COPD received COPD treatment in parallel with traditional IS therapy. in group I, BMI averaged 29.3 ± 5.8 kg / m2, in men - 28.9 ± 6.3 kg / m2, in women - 29.9 ± 5.1 kg / m2 (the difference is not significant, p = 0.58), while 11 patients (17.7%) had a normal BMI, 1 patient (1.6%) had a body weight deficit, 26 patients (41.9%) had preobesity, 15 patients (24, 2%) had first degree obesity, 9 patients (14.5%) had second degree obesity. Accordingly, preobesity or obesity was recorded in 50 patients of group I (80.65%) (Figure 3.3)

And in group II, BMI averaged 28.7 ± 6.1 kg / m2, in men - 27.8 ± 5.7 kg / m2, in women - 30.1 ± 5.6 kg / m2 (the difference is not significant, p = 0.6), while 17 patients (26.6%) had a normal BMI, 3 patients (4.7%) were found to be underweight, 29 patients (45.3%) had preobesity, 8 patients (12 , 5%) had first degree obesity, 7 patients (10.9%) had second degree obesity. Accordingly, preobesity or obesity was recorded in 44 patients of group II

(68.8%). In patients of group I, among the clinical manifestations of IS in PBS, ataxia prevailed, which occurred in 35 patients (56.5%), including hemiataxia, which occurred in 20 patients (31.3%). Paresis and paralysis of the limbs were detected in 31 patients (50%). Complaints about a subjective feeling of unsteadiness, instability in an upright position, and imbalance occurred in 25 patients (40.3%). Dysarthria also occurred in 25 cases (40.3%). Nystagmus was detected in 22 cases (35.5%), rotational dizziness (vertigo) - in 20 cases (32.3%), depression of consciousness - in 21 cases (33.9%). Symptoms such as hemianopsia and ophthalmoparesis occurred each in 14 cases (22.6%). Sensory disorders were detected in 12 patients (19.4%), autonomic disorders - in 8 patients (12.9%), diplopia - in 8 patients (12.9%), dysphagia - in 7 patients (11.3%) , aphasia and headache - 6 patients each (9.7% each), dysphonia - 7 patients (11.3%), confusion and visual agnosia - 4 patients each (6.5% each), respiratory failure - 3 patients (4.8%). There were also 2 cases (3.2% each) of amnesia, ignorance syndrome and a feeling of generalized weakness.

Keywords: risk factors, impact, stroke, rehabilitation

Among the patients of group II, paresis and paralysis of the extremities prevailed; they were detected in 37 patients (57.9%). Dysarthria occurred in 30 cases (47%), nystagmus - in 23 cases (35.9%), sensory disorders - in 19 cases (29.6%). Ataxia was detected in 26 patients (40.6%), including hemiataxia in 7 patients (10.9%). Complaints about a subjective feeling of unsteadiness, instability in the upright position, imbalance occurred in 20 patients (31.2%). Consciousness suppression was also detected in 17 cases (26.6%). Rotational dizziness (vertigo) was detected in 13 cases (20.3%), diplopia - in 11 patients (17.2%). Symptoms such as ophthalmoparesis and hemianopsia occurred each in 12 cases (18.7% each), confusion - in 8 cases (12.4% each), autonomic disorders - in 9 patients (14.1%), visual agnosia and headache - in 8 cases (12.5% each), neglect syndrome and dysphagia - in 5 patients (7.8% each). An episode of syncope, like amnesia, occurred in 2 patients (3.2% each), epileptic seizures at the onset of the disease occurred in 1 case (1.6%). Finally, symptoms such as dysphonia, non-rotational dizziness, positive visual phenomena, nonspecific binocular visual impairment, visual hallucinations, and feelings of generalized weakness did not occur in this group of patients. Based on the studies, the following conclusions can be drawn.

1. A high level of such traditional IS risk factors as COPD, AH, smoking, diabetes mellitus leads to high mortality from cerebrovascular diseases and an increase in mortality dynamics is observed.

2.It is extremely important to study the mechanisms of compensatory processes in the nervous system after injury in order to create new methods that will improve the effectiveness of neurorehabilitation.

Among the reasons for persistent disability in most countries, AI takes the first place: 90% of patients who have suffered a stroke have limited working capacity due to persistent impairment of motor functions, 10% of them become severely disabled [1, 12-14; 16, 930-933]. A year after intensive treatment, only 25.4% of stroke patients return to work, 33.4% can return after several years (2-3 years) of rehabilitation, 35.8% are steadfastly losing their work opportunities [8, 3-5] ...

In terms of economic damage, according to the American Heart Association, more than 700,000 cases of AI are registered in the United States annually; in 1999, more than 4.4 million patients needed care after a stroke, economic losses amounted to $ 51 million, and in 1998 it was 43.3 million American dollars. The total amount (direct and indirect costs) spent by healthcare organizations in relation to strokes was $ 3.6 billion [9; 10, 2599-2603; 13, 43-53].

Thus, the high prevalence, high risk of social maladjustment as a result of the consequences of acute cerebrovascular accident and, accordingly, one of the main causes of mortality gives cerebrovascular pathology a special status, as evidenced by numerous publications.

That is why the assessment of risk factors and the correct tactics of rehabilitation of patients in the early (up to 6 months after the event) and late (6 - 12 months after the event) rehabilitation periods of IS are of great importance, which is what this research work is devoted to.

Interest in the study of QOL in patients with COPD is also due to the fact that the emotional significance of these diseases exceeds the pain syndrome [5, 77 - 80; 11, 597-601].

A characteristic feature of COPD is the frequent presence of comorbid conditions, and one of the most significant of them is hypertension. AH occurs in patients with COPD with varying frequency: from 6.8% to 76.3% according to different authors, averaging 34.3% and is the leading risk factor for the development of cerebrovascular pathology [4, 535-538]. The high level of such traditional risk factors as COPD, AH, smoking, diabetes mellitus is associated with the high mortality from cerebrovascular diseases in Russia compared to other Western European countries, as well as the growing dynamics of mortality [2, 4-8].

To date, several validated questionnaires are available to assess the severity of symptoms in patients with COPD. GOLD recommends the use of the Modified British Medical Research Council (mMRC questionnaire) or the COPD Assessment Test (CAT). The common mMRC

questionnaire assesses only the dyspnea-related physical disability; COPD assessment test (CAT) has a broader purpose, this questionnaire makes it possible to assess the impact of COPD on the daily life and health of the patient.

The above questionnaires facilitate everyday diagnosis and help to select individual treatment for patients [6, 231-234].

The St George's Clinic Respiratory Questionnaire (SGRQ) is used to assess the quality of life. The indicator of the quality of life reflects the degree of adaptation of a person to the disease and the ability of the patient to perform his usual daily functions, corresponding to his socio-economic status. This indicator gives a picture of the physical, psychological and social functioning of the patient, which makes it possible to assess the impact of COPD on the patient [7, 19-27].

There is no doubt the influence of COPD on the severity of IS, and, accordingly, on the rehabilitation of patients after IS and the overall quality of life of patients. Therefore, the study of the effect of COPD as a comorbid IS disease is of great interest.

Since in our study, among the studied patients, 62 patients had COPD in a comorbid background, we divided all patients into 2 groups based on the presence of COPD.

Patients with IS in VBD and COPD - 62 people (group I) - 29 men and 33 women aged 50 to 74 years (59.8 ± 5.8). Patients with IS in VBD - 64 people (group II). Of these, 31 were men and 33 were women aged 51 to 80 years (62.4 ± 5.4). All patients received traditional treatment in the most acute and acute periods of IS, patients with COPD received COPD treatment in parallel with traditional IS therapy. Comparison of the two groups did not reveal significant differences in the main characteristics that determine the possibility of subsequent statistical analysis (number of patients, distribution by sex and age) (Table 2.1, Figure 2.1).

Distribution of patients by groups by sex and age

Groups	I Group		II Group		Overall	
Number of patients	62 (49,2%)		64 (50,8%)		126 (100%)	
Average age	59,8±5,8		62,4±5,4		61,2±6,2	
Floor	M	W	M	W	M	W
Number of patients	29 (46,8%)	33 (53,2%)	31 (48,4%)	33 (51,6%)	60 (47,6%)	66 (52,4%)
Average age (M±σ)	57,9±4,7	61,1±4,1	61,2±3,7	63,6±3,9	59,6±5,6	62,8±7,1

Patients were included in the study if they underwent IS, which was confirmed by studying the medical history (complaints, medical history, results of medical examination, instrumental studies, CT and MRI studies), regardless of the pathogenetic mechanism of development and clinical severity of the disease, no more than 2 weeks after the expiration of an acute period of AI and in the presence of a written consent to participate in the study from the patient himself or the next of kin. Required the absence of conditions limiting the use of treatment methods used in the work and / or influencing the state of neurological deficit.

All patients underwent a standard clinical and neurological examination (analysis of patient complaints, life history and medical history, physical examination, including the study of neurological status) and somatic examination.

For each patient, his height and weight were taken into account in order to calculate the body mass index (BMI) according to the formula:

$$BMI = m / h^2, (1)$$

where m is body weight in kilograms and h is height in meters.

BMI is a value that allows you to assess the degree of correspondence between a person's mass and his height and determine whether the mass is insufficient, normal or excessive. In accordance with the recommendations of the World Health Organization (WHO), the interpretation of BMI indicators, presented in table 2.2, was adopted [19]. The interpretation of BMI indicators, recommended by WHO, does not take into account the sex and age of a person [19].

Interpretation of BMI indicators in accordance with WHO recommendations

BMI	Correspondence between the mass of a person and his height
Less than 16,5	Severe underweight
от 16,5 до 18,4	Insufficient (deficiency) body weight
от 18,5 до 24,9	Norm
от 25 до 30	Overweight (pre-obesity)
от 30,1 до 34,9	Obesity (Class I)
от 35 до 40	Obesity (Class II - Severe)
More than40	Obesity (Class III - Extremely Severe)

To assess the patient's self-care capabilities, the Bartel index (score for daily activities and the ability to care for oneself) (IB) was used (Appendix 1). On the Bartel scale, the scores from 0 to 45 correspond to severe disability (significant or complete impairment of neurological functions), 50 to 70 points - moderate disability (limitation of neurological functions), 75 to 100 points - minimal limitation or preservation of neurological functions [12, 1429 - 1438; 18, 56–61].

The degree of disability after IS was studied using the Rankin scale [3, 42-48] (Appendix 2).

To assess the neurological status in the early and late rehabilitation periods, the B. Lindmark scale was used, (a point assessment of movement disorders (active and passive) [17, 1-40], muscle tone, sensitivity, walking, balance, social skills).

The Lindmark scale includes 7 subscales that characterize various parameters of the motor system, sensitivity and coordination: subscale A - performing active movements in the arm and leg, B - performing fast variable movements, C - general mobility of the patient, D - balance parameters, E - state superficial and deep sensitivity, F - the strength of pain in the joints and G - mobility in them. Each parameter is evaluated in points and has a different maximum for each parameter. The point estimate is maximum in case of normal function (a healthy subject can score a maximum of 446 points) and is equal to zero in the case of the greatest severity of disorders. The degree of decrease in the integral indicator correlates with the severity of the functional consequences of stroke [17, 1-40] (Appendix 3).

To assess the neuropsychological status of patients, we used the following scales in the early and late rehabilitation periods: the Montreal Cognitive Assessment Scale (MoCA) and the Hospital Anxiety and Depression Scale (HADS).

The time for MoCA was about 10 minutes for each patient. The maximum points - 30, 26 points and more were considered a normal indicator [3, 56-62] (Appendix 4).

The time for self-filling by the patient, after instructing, the form of the HADS scale was also about 5-10 minutes. The classic form of the HADS scale for cognitively safe patients includes odd-numbered anxiety subscale questions, even-numbered depression subscale questions, odd and even-numbered scores were calculated separately, giving two scores for each subscale. Each patient was asked separately to prevent data corruption. The point score was interpreted according to the following criteria: 0-7 points "normal" (no reliably expressed symptoms of anxiety and depression), 8-10 points "sub clinically expressed anxiety / depression", 11 points and higher "clinically expressed anxiety / depression". [3, 66-69] (Appendix 5).

In recent years, a short questionnaire for COPD patients has been used - the CAT test (COPD Assessment Test). The test was created by a group of scientists led by Professor P.W. Jones from St. George's University (London, UK) [17, 648-654].

The main requirements for the questionnaire are the reliability of the assessment of QOL, simplicity and the possibility of using it in different languages. In the CAT-test questionnaire, 8 questions that validly characterize the state of the disease, regardless of gender, exacerbation or remission of the disease, assess the following symptoms and sensations:

• cough;

• sputum;

• tightness in the chest;

• shortness of breath when climbing stairs;

• activity at home;

• confidence when leaving home;

• quality of sleep;

• energy / fatigue.

The Russian-language version of the CAT-test is presented in Appendix 7. The sum of the scores of the questionnaire states how much COPD affects the patient's quality of life:

0-10 points - insignificant impact;

11–20 - moderate;

21-30 - pronounced;

31-40 is very serious.

The CAT test is completed by the patient or healthcare professional according to the patient's words. CAT test cannot replace pulmonary studies in patients with COPD, but it is applicable to assess the QOL of patients [15, 208-215].

Height and weight were determined in all 126 patients with IS in the VBD. The height of the patients varied from 152 cm to 188 cm (on average, 168.4 ± 9.1 cm). At the same time, the average height for men was 173.9 ± 6.7 cm, for women - 162.4 ± 8.4 cm (the difference is significant, $p = 0.005$). The weight of the patients varied from 51 kg to 118 kg (mean 84.3 ± 14.9 kg). At the same time, the average weight in men was 89.6 ± 11.3 kg, in women - 79.4 ± 12.6 kg (the difference is not significant, $p = 0.4$).

The body mass index of patients with IS in VBB varied from 17.5 to 38.9 kg / m² (on average 28.5 ± 5.3 kg / m²). At the same time, the average BMI in men was 28.3 ± 5.4 kg / m², in women - 29.5 ± 4.6 kg / m² (the difference is not significant, $p = 0.55$). Based on the reference BMI values, 28 patients (22.2%) had a normal body weight, 4 patients (3.2%) had a

body weight deficit, 55 patients (43.7%) were overweight, 23 patients (18.3%) had first degree obesity, 16 patients (12.7%) had second degree obesity. Accordingly, preobesity or obesity was detected in 94 patients with IS in the VBD (74.6%) (Figure 3.2).
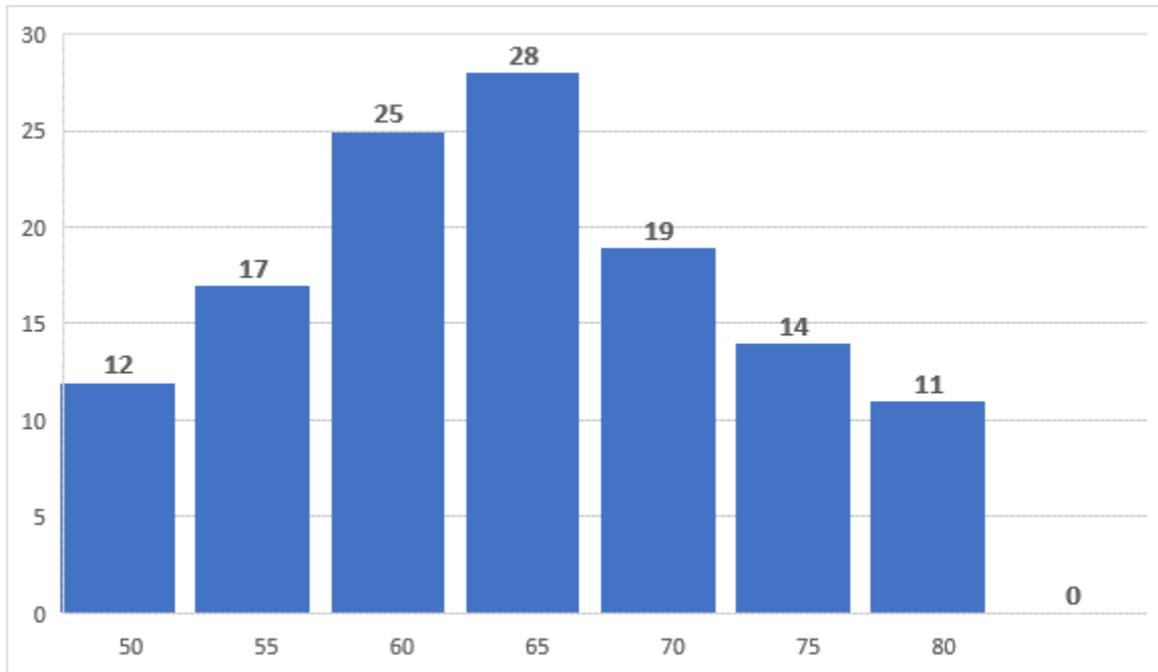

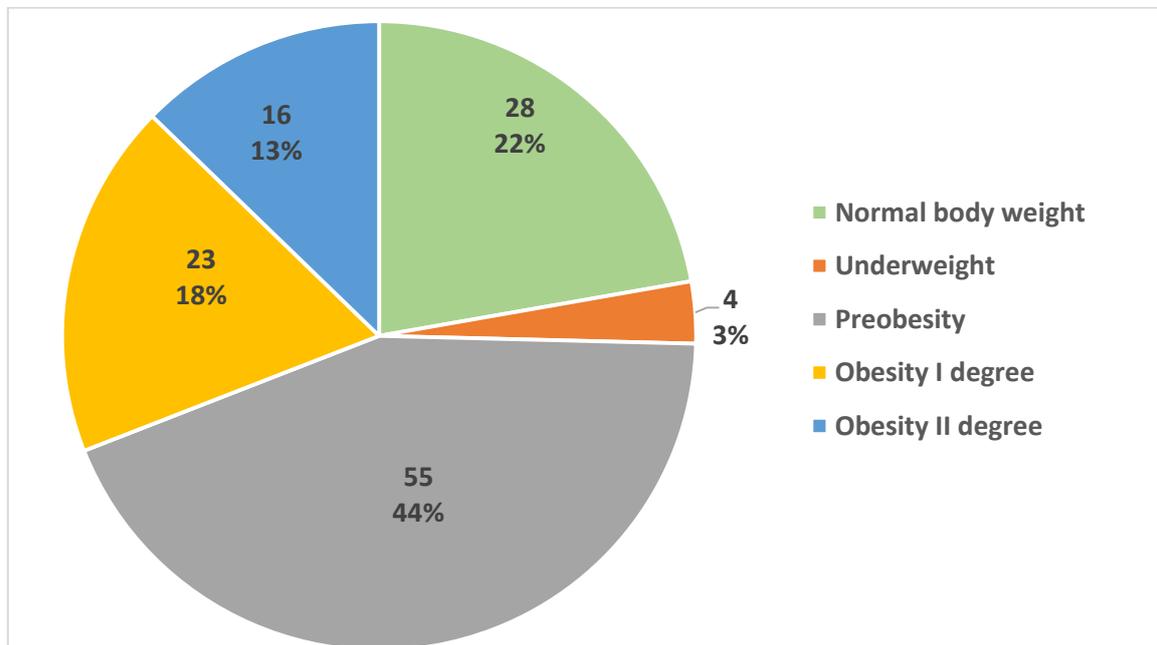Figure 3.1 Distribution of patients with IS in VBD by age

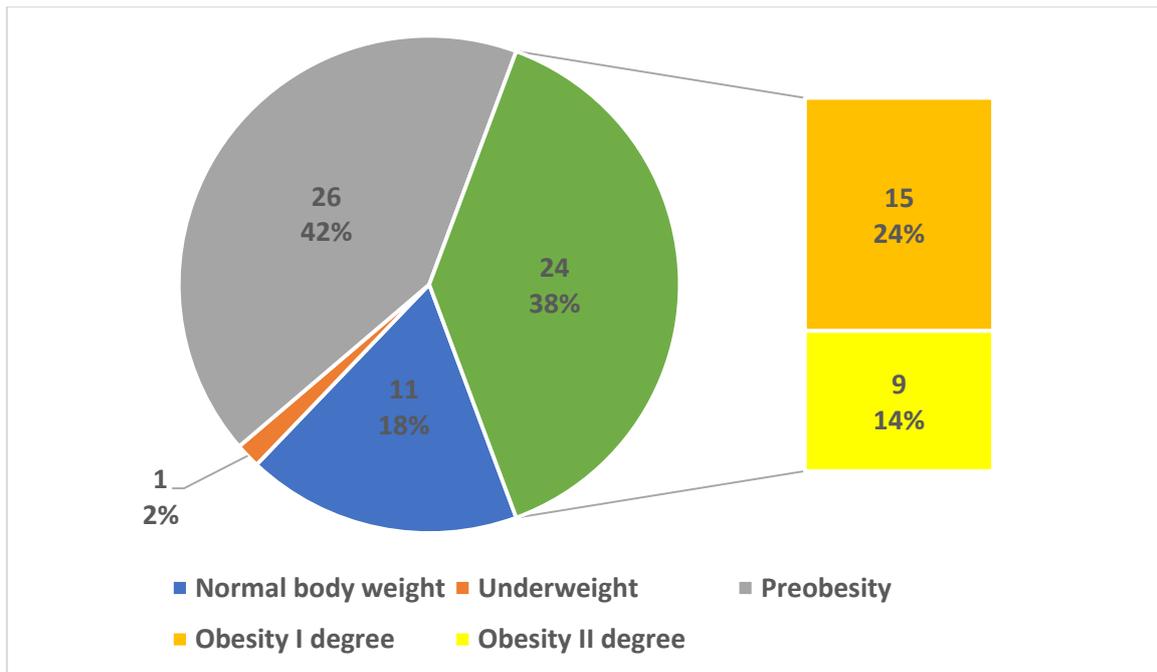Figure 3.2 Distribution of patients with IS in VBB by BMI

Figure 3.3 Distribution of patients by BMI in group I

At the same time, in group I, BMI averaged 29.3 ± 5.8 kg / m², in men - 28.9 ± 6.3 kg / m², in women - 29.9 ± 5.1 kg / m² (the difference is not significant , p = 0.58), while 11 patients (17.7%) had a normal BMI, 1 patient (1.6%) had a body weight deficit, 26 patients (41.9%) had preobesity, 15 patients (24.2%) had first degree obesity, 9 patients (14.5%) had second degree obesity. Accordingly, preobesity or obesity was recorded in 50 patients of group I (80.65%) (Figure 3.3).

And in group II, BMI averaged 28.7 ± 6.1 kg / m2, in men - 27.8 ± 5.7 kg / m2, in women - 30.1 ± 5.6 kg / m2 (the difference is not significant, p = 0.6), while 17 patients (26.6%) had a normal BMI, 3 patients (4.7%) were found to be underweight, 29 patients (45.3%) had preobesity, 8 patients (12 , 5%) had first degree obesity, 7 patients (10.9%) had second degree obesity. Accordingly, preobesity or obesity was recorded in 44 patients of group II (68.8%) (Figure 3.4).
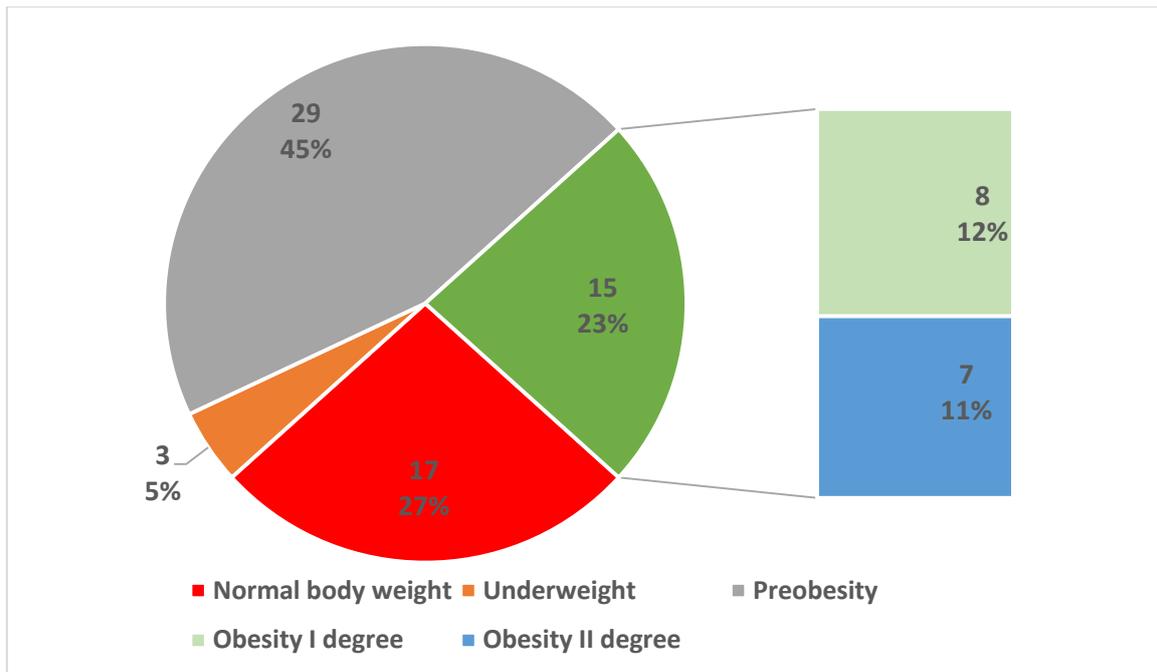
Figure 3.3 Distribution of patients by BMI in group II

Consequently, according to BMI, patients in group I had a more aggravated background, compared with patients in group II, we assume that COPD influenced the increase in mean BMI in group I, as a limiter of dynamic load and a kind of provoking factor of hypodynamia.

In the studied patients, only in 42 cases (33.3%) it was possible to reveal complete or partial classical clinical syndromes corresponding to circulatory disorders in certain vessels of the VBD. At the same time, paramedian pontine syndrome occurred in 9 cases (23.7%), ventral pontine syndrome - in 8 cases (21.1%), lateral thalamic (thalamogeniculatory) syndrome - in 8 cases (21.1%), posterior lower cerebellar artery (lateral medullary syndrome) - in 5 cases (13.2%), anterior inferior cerebellar artery syndrome - in 4 cases (10.5%), superior cerebellar artery syndrome - in 4 cases (10.5%), lateral pontine syndrome - in 2 cases (5.3%) and anterolateral thalamic (tuberothalamic) syndrome - in 2 cases (5.3%).
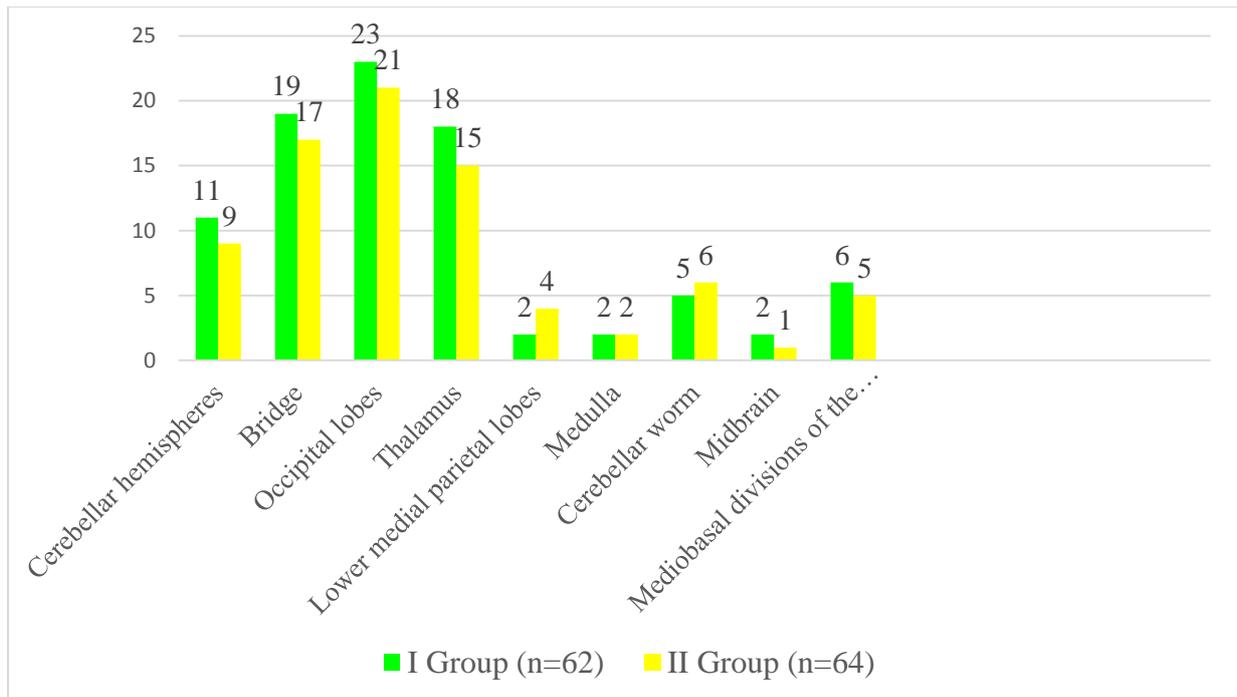
Figure 3.8. Involvement of brain structures in patients with IS in VBD with their division into groups

Based on the foregoing, an important task was to identify the entire spectrum of clinical manifestations in the studied patients, corresponding to the damage to the structures of the brain supplied by the blood vessels of VBD and to determine the presence of a statistically significant dependence of clinical manifestations on COPD.

In one patient, as a rule, several clinical symptoms of stroke were determined, both subjective, found during the collection of complaints and interviewing the patient, and objective, identified by a doctor during a clinical neurological examination. At the same time, not always certain subjective sensations of patients could be objectified during functional tests (for example, a patient complaining of dizziness or feeling unsteadiness, instability when walking, could stand satisfactorily in the complicated Romberg test and, conversely, was detected in the patient in the tests ataxia was not always associated with complaints of impaired coordination).

It was important for us to identify the widest and most complete list of both subjective and objective clinical manifestations of stroke in PBS that were present in the studied patients and to determine their dependence on COPD.

Paresis and paralysis of the extremities (hemiparesis and hemiplegia, tetraparesis, monoparesis) prevailed in the studied patients with IS in VBD in the structure of clinical manifestations; 68 patients had them, which was 54% of all cases, 55 patients (43.7%) had dysarthria. When conducting coordination tests, ataxia was detected in 61 patients (48.4%),

including hemiataxy - in 27 patients (22.2%). 45 people (35.7%) complained of a subjective feeling of unsteadiness, instability in an upright position, imbalance, 33 people (26.2%) - a sensation of rotational dizziness (vertigo), 2 people (1.6%) - a sensation non-rotational dizziness. Nystagmus was detected in 45 patients (35.7%), in 38 patients (30.2%) - depression of consciousness of one degree or another (from stunning to coma), in 31 patients (24.6%) - sensory disturbances (hypoesthesia, parenthesis, dysesthesia). There were 26 cases (20.6% each) of hemianopsia and paresis of the oculomotor muscles. 19 people (15.1%) complained of diplopia, 17 patients (13.5%) had autonomic disorders (nausea, vomiting, sweating, palpitations), 14 patients (11.1%) complained of headache. 12 cases (9.5% each) had confusion, dysphagia and visual agnosia in the structure, 7 cases (5.6% each) - aphasia, dysphonia and neglect syndrome (neglect), 4 cases (3.2% each)) - amnesia, respiratory disorders and episodes of syncope. There were also 2 cases (1.6% each) of epileptic seizures at the onset of the disease, visual hallucinations, nonspecific binocular visual impairment, positive visual phenomena (photopsy) and a feeling of pronounced generalized (general) weakness (Figure 3.9).

In patients of group I, among the clinical manifestations of IS in PBS, ataxia prevailed, which occurred in 35 patients (56.5%), including hemiataxia, which occurred in 20 patients (31.3%). Paresis and paralysis of the limbs were detected in 31 patients (50%). Complaints about a subjective feeling of unsteadiness, instability in an upright position, and imbalance occurred in 25 patients (40.3%). Dysarthria also occurred in 25 cases (40.3%). Nystagmus was detected in 22 cases (35.5%), rotational dizziness (vertigo) - in 20 cases (32.3%), depression of consciousness - in 21 cases (33.9%). Symptoms such as hemianopsia and ophthalmoparesis occurred each in 14 cases (22.6%). Sensory disorders were detected in 12 patients (19.4%), autonomic disorders - in 8 patients (12.9%), diplopia - in 8 patients (12.9%), dysphagia - in 7 patients (11.3%) , aphasia and headache - 6 patients each (9.7% each), dysphonia - 7 patients (11.3%), confusion and visual agnosia - 4 patients each (6.5% each), respiratory failure - 3 patients (4.8%). There were also 2 cases (3.2% each) of amnesia, ignorance syndrome and a feeling of generalized weakness (Figure 3.9).

Among the patients of group II, paresis and paralysis of the extremities prevailed; they were detected in 37 patients (57.9%). Dysarthria occurred in 30 cases (47%), nystagmus - in 23 cases (35.9%), sensory disorders - in 19 cases (29.6%). Ataxia was detected in 26 patients (40.6%), including hemiataxia in 7 patients (10.9%). Complaints about a subjective feeling of unsteadiness, instability in the upright position, imbalance occurred in 20 patients (31.2%). Consciousness suppression was also detected in 17 cases (26.6%). Rotational dizziness

(vertigo) was detected in 13 cases (20.3%), diplopia - in 11 patients (17.2%). Symptoms such as ophthalmoparesis and hemianopsia occurred each in 12 cases (18.7% each), confusion - in 8 cases (12.4% each), autonomic disorders - in 9 patients (14.1%), visual agnosia and headache - in 8 cases (12.5% each), neglect syndrome and dysphagia - in 5 patients (7.8% each). An episode of syncope, like amnesia, occurred in 2 patients (3.2% each), epileptic seizures at the onset of the disease occurred in 1 case (1.6%). And finally, symptoms such as dysphonia, non-rotational dizziness, positive visual phenomena, nonspecific binocular visual impairment, visual hallucinations and feelings of generalized weakness did not occur in this group of patients.

The Mann-Whitney test did not reveal significant differences in the clinical manifestations of IS in PBS in both groups ($p > 0.05$). According to the correlation analysis, the age of patients with IS in PBS does not have significant relationships with the frequency of occurrence of clinical manifestations ($-0.3 < r < 0.3$). ... Analysis of the comorbid background in patients of both groups revealed significant ($p < 0.05$) differences in the incidence of ischemic heart disease, left ventricular hypertrophy and obesity in patients of group I compared with patients in group II, which clearly prevailed in patients with COPD (Table 3.4). A more clear picture of the incidence of comorbid diseases is shown in Figure 3.13.

Table 3.4

The incidence of comorbid diseases in patients of groups I and II.

Comorbid diseases	I Group (n=62)		II Group (n=64)	
	Abc	%	Abc	%
Arterial hypertension	61	98,4	57	89,1
Atherosclerosis BCA	45	72,6	49	76,6
Ischemic heart disease	25*	40,3*	17	26,6
Obesity	24*	38,7*	15	23,4
LDC (FP / TP)	21	33,9	17	26,6
LVH	23*	37,1*	14	21,9
Diabetes	19	30,6	13	20,3
Atherosclerosis of the aorta, valve leaflets	18	29,0	12	18,8
Exertional angina	17	27,4	12	18,8
Diseases of the gastrointestinal tract	13	21,0	15	23,4
PMP infection	11	17,7	15	23,4

PEAKS	11	17,7	8	12,5
Enlarged atria	9	14,5	7	10,9
Dilation of the ascending aorta	6	9,7	4	6,3
Nephropathy, CKD	5	8,1	6	9,4
Malignant oncological diseases	5	8,1	4	6,3
Anemia	6	9,7	2	3,1

*Note: * significant difference in the incidence in patients of group I in relation to patients in group II (p = 0.01).*
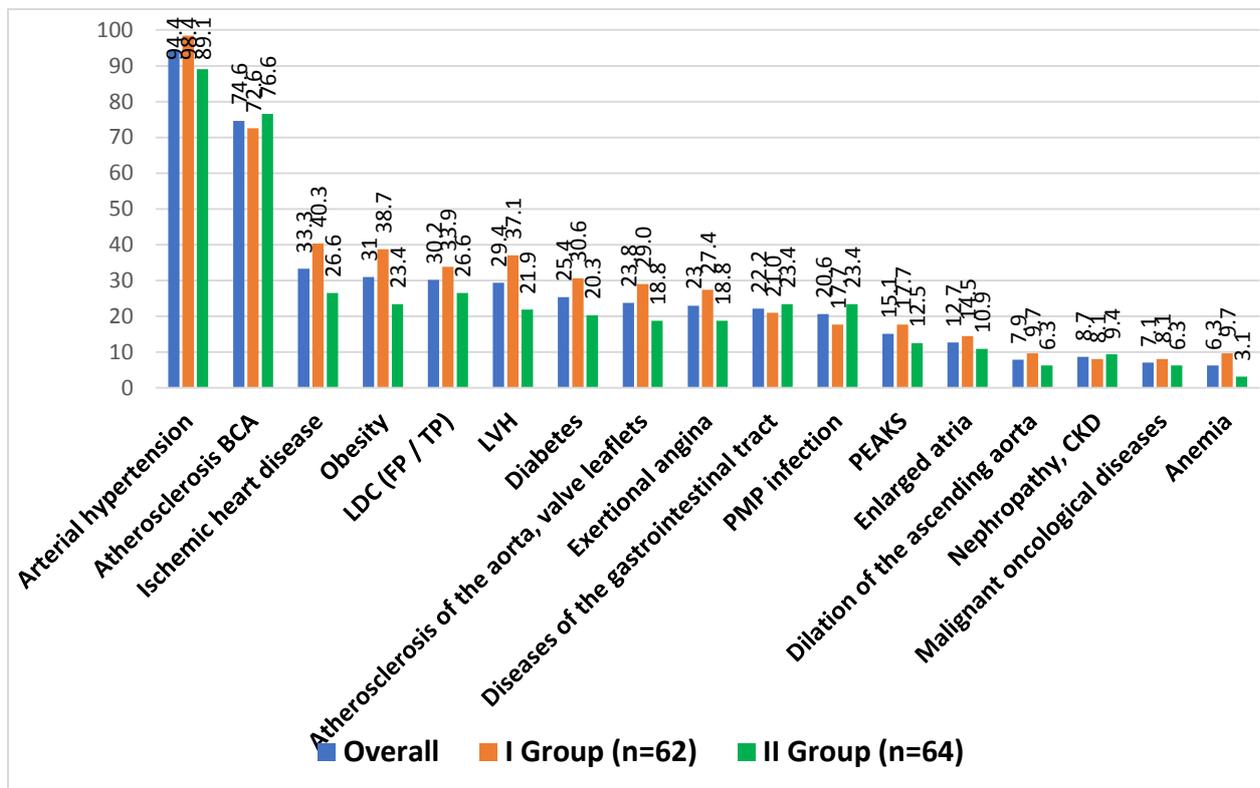

Figure 3.13. Comorbid background of patients with IS in VBD by groups (%)

Ischemic stroke is a serious medical and social problem due to deep and long-term disability. And even after intensive rehabilitation measures, moderate or severe disability remains in 25-50% of patients.

Analysis of the comorbid background in patients of both groups revealed significant (p <0.05) differences in the incidence of ischemic heart disease, left ventricular hypertrophy and obesity in patients of group I compared with patients in group II, which clearly prevailed in patients with COPD. According to BMI, patients of group I also had a more aggravated background, compared with patients of group II, we assume that COPD influenced the

increase in mean BMI in group I, as a limiter of dynamic load and a kind of provoking factor of hypodynamia.

A high level of such traditional IS risk factors as COPD, AH, smoking, diabetes mellitus leads to high mortality from cerebrovascular diseases and an increase in mortality dynamics is observed.

Therefore, it is extremely important to study the mechanisms of compensatory processes in the nervous system after injury in order to create new methods that will improve the effectiveness of neurorehabilitation measures in the early and late recovery periods.

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