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EXPERT-REHABILITATION DIAGNOSTICS OF PATIENTS WITH VERTEBRO–BASILAR INSUFFICIENCY IN OSTEOCHONDROSIS OF THE CERVICAL SPINE

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Resume

Blood circulation in the major arteries of head, including through the vessels of the vertebrobasilar system is one of the main causes cerebrovascular insufficiency. 93 patients (23.2 %) arrived at the sanatorium rehabilitation with osteochondrosis of the cervical spine in our investigation revealed the vertebro-basilar insufficiency. On etiopathogenetic factors, the patient is divided into two main groups: I gr. – extravasal; II gr. – vascular pathology.

Restorative treatment was differentiated use of curative climatic physiotherapy complexes depending on the source data degenerative-dystrophic lesions of cervical vertebrae and circulation in the vertebral artery.

The relevance and importance of study of cerebrovascular diseases as osteochondrosis of the cervical spine (OCS) is one of the main areas of neurology, vertebrology, sanatorial rehabilitation, because it is the most widespread, frequent morbidity of patients, high mortality, and often, persons of young age.

More than third of ischemic strokes is caused by defeat of the extracranial segments of main arteries of the head (MAH). Recent research of neurologists and angiosurgeries allowed to assign ischemic stroke of extracranial genesis, which has its pathogenetic, clinical, diagnostic, treatment and rehabilitation features [3,4].

Blood circulation in MAH, including through the vessels of the vertebrobasilar system (VBS) – one of the main causes of cerebrovascular insufficiency (CVS). In most cases (up to 50 % and more) defeat the MAH is the cause of all of cerebrovascular disorders, including stroke [1,8,12]. In 25% of cases defeat of MAH is asymptomatic and is detected by chance, according to ultrasound dopplerography

(USDG) or carotid angiography, that is, pre-clinical form of atherosclerosis in MAH. [7,9,10]

93 patients (23.2 %) received sanatorium rehabilitation with OCS in our research revealed vertebro-basilar insufficiency (VBI). In a population-based sample most commonly in women – 72 %, for men this number amounted to 28 %.

In 25 patients (24.4%) VBN, manifested vertebral artery syndrome (VAS) was accompanied by a transient ischemic attacks. The analysis showed that in most cases (80 %) osteochondrosis preceded syndrome vertebral artery, less evolved along with it.

The reasons for discirculation in MAH are not only atherosclerotic stenosis and occlusion of precerebral and cerebral arteries, but their tortuous, bends and hypoplastic and irritation of periarterial sympathetic plexus and extravasal compression of spastic muscles, exostosis, subluxation of intervertebral joints, fixation of the arteries in cervical osteochondrosis and anomalies of craniovertebral transition.

These data indicate that patients coming to sanatorium rehabilitation with OCS are at high risk of vertebral-basilar insufficiency.

Risk factors of VBI were identified : early OCS – 14%; congenital anomalies of development of the vertebral artery (VA) – 21%; OCS and long-term forced or awkward position of head and neck – 63%; congenital anomalies of cervical spine – 2%.

Conducted diagnostic study showed that 79 % of patients with VBI leading place in the pathogenesis occupied degenerative-dystrophic processes of the cervical spine, abnormal processes of vertebrae (C3-C5), abnormal changes in the form of hypoplastic vertebral artery (21 %), which led to the disruption of blood flow in vertebrates arteries, causing violations of cerebral circulation.

These changes were attributed to the group of compression narrowing of the vertebral arteries, which occurs under the influence of various extravascular reasons encompassed by the term «vertebral artery syndrome» (VAS). In ICD-10 vertebral artery syndrome is considered under the code of 99.2 G and includes clinic of posterior cervical sympathetic syndrome, recurring episodes of vertebrobasilar insufficiency, drop attack.

Among etiopathogenetic factors of VAS in persons arrived at the health-resort rehabilitation divided into two main groups:
I gr. extravasal pathogenetic factors causing compression of VA, caused by degenerative-dystrophic lesions of cervical spine, i.e. vertebrogenic character of the process, in the future – spondylogenic VBI.

II gr. vascular pathology of VA, which took deformation of vertebral arteries, anomaly patterns, stroke, kinks, tortuosity, atherosclerotic changes, in the future – atherosclerotic VBI.

Pathogenetic factors of extravasal vertebrogenic nature of VAS were:

- pathological mobility of vertebral-motor segment (VMS) – 28 %;
- compression by osteophytes – 58 %;
- violation of static functions – 75,3 %;

- the narrowing of intervertebral space (chondrosis) – 98 %;
- flattening, reduced height of the vertebrae, mainly C5-C6 – 25 %;
- uncovertebral arthrosis – 12 %;
- arthrosis of facet joint – 20%;
- vertebral abnormalities – 2 %;
- hernia of intervertebral disks at the level of C4-C7 – 11,2 %;
- disease Forestier – 1,5 %.

Narrowing of intervertebral space at chondrosis (discosis), flattening and wedge-deformation of vertebral bodies with equal overall reduction in the level established during the planimetric examination, causes shortening the height of the cervical spine ($p > 0.001$).

All this, along with the change of lordosis (hypolordosis – straightening of the cervical spine, kyphosis), helped to transform VA and hemodynamic disorders in VA and zones of its vascularization at OCS by reducing of lumen, changing of direction of vertebral arteries and compression factor.

Ultrasound duplex scanning of VA in patients hospitalized with OCS on sanatorium rehabilitation course carotid arteries in all examined was natural. However, 47 % of patients identified elongation, loop formation, tortuous, kinks, anomaly patterns and direction of VA, asymmetry diameters of PA. These patients using scan step shaped, C- and 8-shaped bends were visualized (table 1).

Table № 1 Violation of vertebral artery

% patients	21,00 %	22,00 %	29,00 %	25,00 %	34,00 %
Type of violation	Hypoplasia of VA	Vascular tortuosity	Atherosclerosis of VA	Compression of VA in V2 segment	No changes

The analysis of data obtained by ultrasonic examination of cerebral arteries in all patients with spondylogenic VBI – I gr., was found that the mean values of indexes of blood flow in the carotid arteries in the whole, do not materially differ from the reference values and indicators obtained in the control group, except for the trend of slight increase of blood flow velocity in the extracranial carotid arteries (table. 2).

Table № 2 Indicators of duplex scanning of extracranial cerebral arteries

Artery	Patients with SVBI	Patients with AVBI	P
d OCA	0,60 ± 0,04	0,63 ± 0,05**	0,02
d BCA	0,49 ± 0,02	0,41 ± 0,10***	0,0001
Causal IIA	0,29 ± 0,03***	0,24 ± 0,04***	0,0001
Contralateral CCA	0,59 ± 0,04	0,63 ± 0,05**	0,004
Contralateral ICA	0,49 ± 0,02	0,42 ± 0,09***	0,0001
Contralateral VA	0,35 ± 0,03*	0,32 ± 0,04	>0,05
CIM (mm)	0,81 ± 0,11	1,29 ± 0,27***	0,0001

Notes:

* – reliability of differences from controls, $p < 0.05$; ** – reliability of differences with the control, $p < 0.01$; *** – reliability of differences with the control, $p < 0.001$

Comparative analysis of patients with spondylogenic VBI (I gr.) and atherosclerotic VBI (II gr.) was made during study

Carotid hemodynamics in patients with spondylogenic VBI was not violated: indicators TAMX and Vps in all examined arteries did not differ from the control values. Indicators TAMX in V2 segment of causal VA were reduced to $14,15 \pm 3,7$ cm/s ($p < 0.001$). At the same time significant increase of TAMX in contralateral VA to $24,9 \pm 7,0$ cm/s was determined ($p < 0.001$), which is estimated as a compensatory response.

Logically decrease of Vps in causal VA to $51,3 \pm 16,9$ ml/min ($p < 0.001$) and the increase in Vps in the contralateral PA to $114,2 \pm 32,69$ ml/min ($p < 0.001$) was observed. Asymmetry of Vps on VA amounted $46,40 \pm 15,13$ % and asymmetry of Vps $61,25 \pm 16,31$ %, which is significantly higher than control parameters ($p = 0.001$). Good level of compensatory abilities of arteries in the brain of patients with spondylogenic VBI was confirmed by total Vps on both VA close to that in the control group, respectively $165,2 \pm 48,70$ ml/min and $181,95 \pm 48,55$ ($p > 0.05$).

Table № 3 Main indexes of hemodynamics of vertebral arteries in V2 (M \pm m)

Artery	Patients with SVBI	Patients with AVBI	p
TAMX of affected VA	14,15 \pm 3,7	10,4 \pm 2,4	0,0002
RI of contralat. VA	0,56 \pm 0,08	0,58 \pm 0,06	> 0,05
TAMX of contralat. VA	24,9 \pm 6,8	20,9 \pm 5,2	0,005
RI of contralat. VA	0,58 \pm 0,06	0,68 \pm 0,06	< 0,05
Vps of affected VA	51,3 \pm 16,9	37,4 \pm 12,2	< 0,05
Vps of contralat. VA	114,2 \pm 32,6	109,4 \pm 39,4	< 0,05
CIM of contralat. VA, mm	0,83 \pm 0,01	1,18 \pm 0,01	< 0,05
CIM of contralat. VA, mm	0,74 \pm 0,02	0,94 \pm 0,02	< 0,05

Thus, with the help of ultrasound examination of extracranial arteries of brain in patients with spondylogenic VBI registered quantitative indicators in both VA were changed. One VA by type of reducing of velocity of blood flow, rarely with a violation of form of dopplerography, the other – by type of increase. An important feature is the detection of pathological tortuosity of VA in channel of transverse processes of the cervical vertebrae, reducing of diameter of causal VA at indicators of CIM not different from those in the control group. The study of correlation dependence of degree of hemodynamic disturbances in extracranial departments of vertebrobasilar system in patients with different duration of disease was made. In first subgroup correlation coefficient by Pearson between linear blood flow velocity (LBFV) in causal VA (V2) in patients with disease duration less than 4 months amounted to 0,27, reflecting good adaptive capacity and reserves of circulatory compensation in vertebrobasilar system.

With increasing of duration from 4 to 12 months diseases correlation becomes somewhat clearer, accounting for 0,42 and 0,35 between LBFV in causal VA. A similar trend of increasing of dependence could not be clearly marked for indicators BFV in contralateral VA (0,33 and 0,5 in the first and second segments).

The increase of correlation of LBFV in V3 segment VA and asymmetry of TBFV in spine arteries with increasing duration of the disease reflects exhaustion of adaptive mechanisms in vertebrobasilar system, lost compensatory increase the speed of blood flow in contralateral VA.

The similarity of clinical manifestations in both groups can be explained by the commonality of some parameters of functional characteristics of different pathogenetic variants of VBI.

All patients with atherosclerotic and spondylogenic VBI there was a decrease in velocity of blood flow predominantly in one of vertebral arteries (causal). On the affected side decrease of diameter of causal VA ("reduction of lumen") is followed by the decrease of blood flow regardless of their causes. Accordingly, increase of diameter of contralateral VA should be considered compensatory. These settings are most often assessed by ultrasound dopplerography of MAH. Naturally there is decreasing in the speed of blood flow in causal VA in patients of both groups.

These results are sufficient to confirm the presence of circulatory failure in vertebrobasilar system. However, for differential diagnosis of reduction of speed of blood flow can not be used as specific characteristics. The decisive importance in study of extracranial vertebrobasilar system has significant increase of speed of blood flow in contralateral VA in patients with atherosclerotic VBI.

In patients with spondylogenic VBI blood flow rate remains within the normal or slightly increased. While the severity of adaptive reactions vertebrobasilar system mostly represented in patients with spondylogenic VBI, with duration of disease before 4 months. In chronic course reduction of compensatory increasing of linear data of blood flow in contralateral VA is registered, indicating exhaustion of adaptive mechanisms. It should be noted that similar hemodynamic characteristics in patients with atherosclerotic lesion is obtained along with the increase RI indicate the change of elastic-tonic properties of vascular wall.

Thickening of complex intima-media in carotid and vertebral arteries and the presence of atherosclerotic plaques in extracranial arteries are additional signs of intravasal stenotic process.

Thus, the main pathogenetic factors affecting morpho-functional changes of the vertebral artery in OCS was degenerative-dystrophic lesions of intervertebral disk, and subsequently, bone structures of spine. To them in the first place are included: extravasal compression; intravasal pathology, among which the leading place have atherosclerotic lesions of VA, anomalies, tortuous, kinks of vessel.

Ultrasound duplex scanning showed a violation of hemodynamic parameters in vertebral arteries, which were:

I. Violation of vertebral arteries depending on static changes of cervical spine:

- a) normolordosis;
- b) hypolordosis (straightening);
- c) kyphosis.

II. Causes of functional and morphological disorders of VA were degenerative-dystrophic changes in discs and vertebrae, which are deformed, narrowed, flattened, which leads to a decrease in the height of the spine, often C4-C6 and in general

shortening of length of VA, and its further deformation, the kinks, twisting, loop formation (Fig.1), followed hemodynamic disturbances.



Figure № 1. X-ray of the patient M., 60 years. OCS.

Marked narrowing of intervertebral space C5-C6, C6-C7 and reduced of height of vertebral bodies C5-C6.

Violations of lumen of the VA and hemodynamic function in OCS well identified by color duplex scanning (Fig. 2).

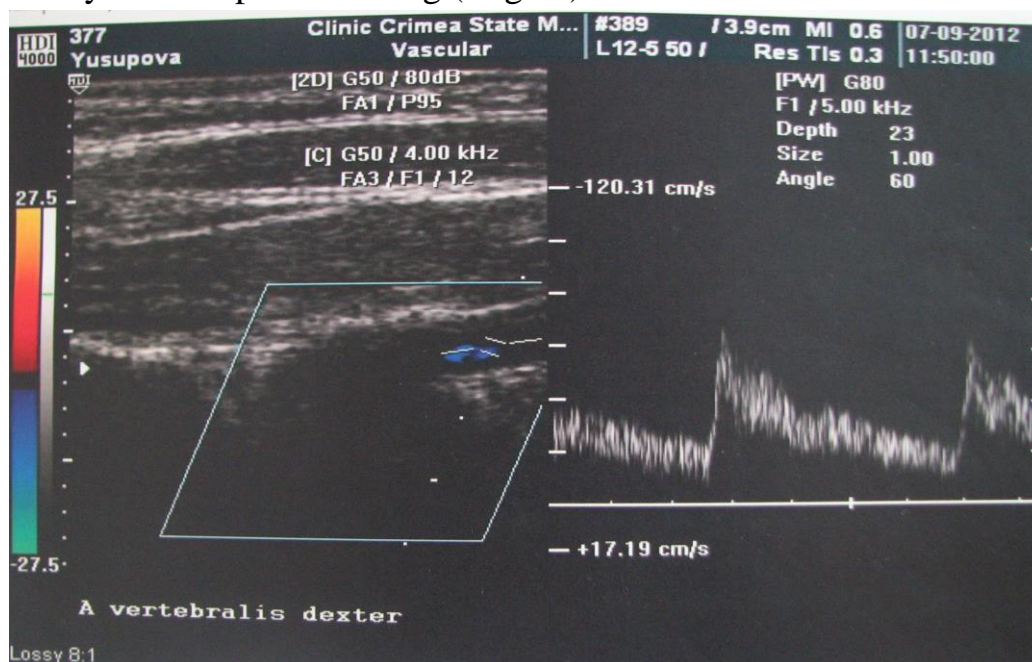


Figure № 2. USDG of patient Yu. Compression of the vertebral artery

A distinctive feature of the clinical picture in patients with spondylogenic VBI is a combination of specific manifestations of cervical vertebral level (muscle-tonic,

miodystrophic, compression syndromes of neck and shoulder area) with cerebrovascular symptoms, peculiar to defeat of vertebrobasilar basin.

Typical signs detected on ultrasound in patients with spondylogenic defeat of the VA, are reduction of blood flow velocity in the VA and asymmetry speed of blood flow in VA on extracranial level ($p < 0.001$).

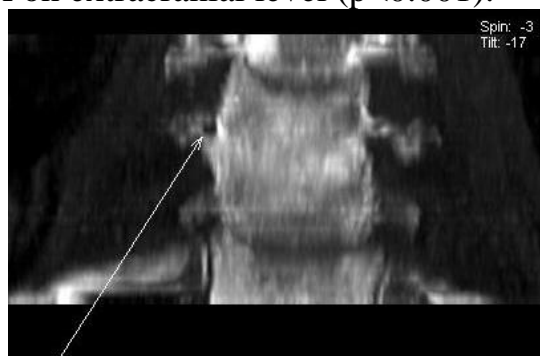


Figure 3. CT of the cervical spine of patient P. In axial and front projections are determined degenerative changes, the narrowing of the right lateral aperture C5, C6.

CT clearly revealed degenerative-dystrophic lesions of the vertebrae, intervertebral spaces, thorn formations, which causes narrowing and tortuosity, bilateral deformation of vertebral arteries due facet rough arthrosis at the C5-C6, C6-C7 vertebrae (Fig. 3).

When analyzing the shape and structure of the vertebral bodies were determined more often their wedge-shaped deformation, flattening of the joint surfaces, subchondral sclerosis, marginal osteophytes in the area of the lower cervical and upper thoracic vertebrae. In 74 % of cases the changes were visualized on the C4-C5, C5-C6.

In the first period of OCS these violations in 30 % was noted as monosegmental, in the II-III-IV period – polysegmental. The intervertebral discs was characterized by decrease in height, presence of protrusions and prolapse (tab. 4). When MRI signal of reduced intensity in T2 weighted images from intervertebral discs C5 C6 C6-C7, C7-Th1 was received.

Reduced height of disk noted in most cases, when VBI in the lower segments of the cervical spine, predominantly C5-C6. In these segments was noted in a greater percentage of cases protrusions, prolapses in the II-III-IV periods of OCS. Changes of physiological lordosis in the cervical spine in patients with VBI observed in 72 % of cases. While in 24 % of cases occurred deformation with kyphosis with the top of the deformation on the C5-C6.

Therefore, the combination of vertebrogenic insufficiency of cerebral circulation (VICC), due to a cervical osteochondrosis with pathology of the MAH, significantly reduces compensatory possibilities to maintain optimal blood supply to the brain. This necessitates a pathogenetic effect on each link of comorbidity. [2,11,13].

Table № 4 Type of violations of the intervertebral discs of the cervical spine in patients with OCS when VBI

Disc	State of intervertebral disc	Amount n=93	
		Abs.	%
C2-C3	Reduced height	28	30,1 %
	Protrusion	1	1,1 %
C3-C4	Reduced height	36	38,7 %
	Protrusion	2	2,2 %
C4-C5	Reduced height	53	57,0 %
	Protrusion	10	10,7 %
	Prolaps	0	-
C5-C6	Reduced height	53	57,0 %
	Protrusion	28	30,1 %
	Prolaps	14	15,1 %
C6-C7	Reduced height	52	55,9 %
	Protrusion	20	21,5 %
	Prolaps	19	20,4 %

Revealed violations of the vertebral artery depending on statical changes of lordosis of cervical spine, degenerative-dystrophic lesions of the disk and vertebrae of cervical spine, require an individual with consideration of hemodynamic changes of the vertebral artery, planning of sanatorium medical treatment.

The most frequent clinical manifestations of VBI are feeling of dizziness, headache, noise in the head and ears, staggering when walking, insomnia, decreased ability to work, disorders in psycho-emotional sphere, emotional lability, fatigue, irritability, mood swings, and sometimes depression, memory impairment [4,10,6,7,5]. Due to the variety of clinical and neurological syndromes, there are considerable difficulties in choice of therapeutic tactics, which requires taking into account the main pathogenetic mechanisms of the disease, peculiarities of leading clinical syndrome. Therefore, the question of pathogenesis and clinical picture of VBI, forming a chronic insufficiency of cerebral circulation (CICC) remain topical problem until now.

Appropriate diagnostics, complex treatment and rehabilitation of the vertebral artery syndrome in persons with OCS allow to prevent progression of vertebrobasilar insufficiency, are an effective preventive measure of vertebrobasilar stroke.

The problem of drug therapy of vascular lesions of the brain is far from being resolved, as the medicine is not always have the desired effect, as often occurs in patients deterioration during cerebrovascular pathology. Drug treatment of patients with this pathology is not always possible to get positive results, not only due to the possible effects of the drugs, including allergic reactions, the prevalence of side effects on the medical effects, but also due to their high cost.

With the purpose of complex impact on the etiopathogenetic factors and differentiated use of curative climatic physiotherapy complexes analysis of the effectiveness of restorative treatment was carried out depending on the source data of degenerative-dystrophic lesions of cervical vertebrae and circulation in vertebrates

arteries. 93 patients with VBI were included in group: 1-A gr. – with extravasal compression when VBI; 1-B gr. – intravasal compression when VBI.

In addition to the basic complex patients received: pine baths, the SMC for collar zone, medical gymnastics (differentiated).

Methodology: pine baths, t 34-35°, 10-12 minutes, in a day, № 10-12. Sinusoidal modulated currents (SMC) of the device «Amplipuls-5» on the collar area. The influence parameters – III-IV kind of works, modulation frequency of 100 Hz, the modulation depth of 75 %, total current strength of not more than 4 mA, the current density 0,04 mA/cm², for 5-7 minutes each PP. The total treatment time of 10-15 minutes, the course of treatment is 10 procedures, one procedure daily.

Therapeutic gymnastics applied differentiated: in case of pain syndrome was first applied exercises for stretching of the spine, and after the reduction or elimination of pain exercises to strengthen the muscles that support the spine. Instability at the stage of progression was used isometric exercises nature, hereinafter exercises aimed at strengthening the muscular corset.

Originality of used complex, is an exercise in isometric mode during the unloading of a spine (sitting on a large ball). Gymnastics on inflatable rubber balls promotes physical coordination and endurance, improved posture and prevention of disorders, harmonious training major muscle groups, creates optimal conditions for the correct positioning of the body.

Physical exercises performed in isometric mode, contributed to the correction of the disturbed relationship between segments of the spine, the active release of the nerve roots and reduce of bulging discs, elimination of muscle contractures and low mobility of joints, increased mobility of the spine, the correction of deformities and defects posture. They guarantee the unloading of the spine and stimulate the regeneration of nerves.

The analysis of indicators of ultrasonic dopplerography in patients with VBI were made (tabl. № 5).

Table № 5 Dynamic of indicators of blood flow in VA

Researched groups		Indicators of blood flow					
		Vps		RI		Diameter	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
1A	V1	34,2 ± 0,4	36,4 ± 0,3	0,6 ± 0,05	0,6 ± 0,04	3,2 ± 0,2	3,2 ± 0,2
	V2	13,1 ± 0,3	25,1 ± 0,4	0,8 ± 0,06	0,6 ± 0,03	2,3 ± 0,3	3,0 ± 0,3
	V4	26,6 ± 0,4	42,1 ± 0,3	0,6 ± 0,06	0,5 ± 0,04	-	-
1B	V1	25,2 ± 0,3	28,3 ± 0,4	0,7 ± 0,04	0,7 ± 0,06	2,7 ± 0,4	2,7 ± 0,4
	V2	21,1 ± 0,2	23,2 ± 0,5	0,7 ± 0,03	0,7 ± 0,03	2,6 ± 0,3	2,6 ± 0,3
	V4	23,6 ± 0,4	26,1 ± 0,3	0,6 ± 0,02	0,6 ± 0,04	-	-
K	V1	37,4 ± 0,3		0,6 ± 0,04		3,2 ± 0,2	
	V2	35,2 ± 0,4		0,6 ± 0,03		3,2 ± 0,2	
	V4	47,6 ± 0,4		0,5 ± 0,05		-	

Notes: indicators of blood flow through the vertebral artery on the affected side were taken (extravasal or intravasal stenosis)

V1, V2, V4 – segments of the vertebral arteries

Vps – pulse blood velocity

RI – reographic index

S/D – systolic-diastolic ratio of blood flow velocity

According to USDG data in group 1-A blood flow velocity and the index in the segment V1 was comparable to healthy, reliable shortage of blood flow, the increase in the index and the reduced diameter were defined in the segment V2.

In group 1-B a significant reduction of blood flow in all segments were identified due to atherosclerotic plaques in the mouth, causing narrowing the diameter of the vessel (most often in VA plaques were determined in the mouth, in the place of departure of the subclavian artery).

Narrowing of intervertebral space when chondrosis, flattening and wedge-deformation of vertebral bodies with equal overall reduction in the level were established during the planimetric examination, caused shortening the height of the cervical spine ($P < 0.001$).

Reduced height of bodies of cervical vertebrae and «the loss of height» of neck, were observed in different age groups and was most pronounced in patients of the second stage of osteochondrosis of the cervical spine. Total loss of height of neck mainly due to the defeat of C3–C7 ranged from 0,1 to 2,0 cm. Research showed that the most frequently reduced height of the vertebral bodies were combined with abnormal development of the vertebral arteries (high joining of VA, hypoplasia of VA). In 80 % of cases general decline (flattening) of vertebral bodies and their deformation, degenerative changes belonged to bodies of C5-C6, i.e. the segments V1-V2. Most close relations between the VA and bone-cartilaginous structures of the neck are located on level V2. In this department the VA passes through the bone-fibrous and muscular canal (canalis transversalis) of the cervical vertebrae, which on the one hand, is a kind of protective «case» for her, on the other – close and depending on the type of movement in the cervical spine is constantly changing its configuration space. So Doppler studies of hemodynamics informative primarily in the segment of V2.

While in 1-A group defeat was only noted in the segment V2 and was manifested in 15 (40%) patients as narrowing of diameter of VA in the segment V2 on the affected side to $2,75 \pm 0,03$ mm (left), the rest (60 %) patients diameters of VA were moderately reduced, but did not extend beyond the control group, respectively the speed of blood flow: on the affected side corresponded $38,52 \pm 1,92$ cm/sec, Vend $10,11 \pm 0,15$ cm/sec, TAMX $17,7 \pm 0,41$ cm/sec. The resistance index increased to $0,8 \pm 0,01$ con. units due to the reduced final speed (Vend), and systolic-diastolic ratio (S/D) increased to $3,9 \pm 0,43$ units higher than in the carotid arteries.

The given data indicate that in 1-A group with vascular disease of VA clinical and functional changes associated with vascular changes, manifested by narrowing of diameter only due to spasm of VA in the bone channel, tortuosity, change of course by hypolordosis, kyphosis in case of normal anatomy of VA.

After treatment in 1-A group velocity of blood flow in V2 is increasing, but remains lower than that of healthy, diameter of VA after treatment increases, the index decreases, which can be considered as reduction of vasospasm. The speed of blood flow in V4 after treatment comparable to healthy. Significant improvement in blood flow when exposed to craniocervical articulation and reflexogenic zone C7-D2,

resulted in the improvement of parameters Vps and Ved in VA pool, respectively Vps in 18 cases (60 %), Ved in 22 cases (66.7 %).

In group 1-B after treatment reliable change of indicators of blood flow were not received.

Therefore, sanatorium-resort treatment with complex application of therapeutic exercise, sinusoidal modulated currents, balneotherapy improved the tone of vessels, mostly in the vertebrobasilar pool, the pool of the VA by reducing indicators of RI ($p<0,05$) and PI ($p<0,05$) in the left vertebral artery, increase Vps in vertebral-basilar pool. In group 1-B significant improvements in blood flow were not revealed.

Therefore rehabilitation treatment was differentiated use of curative climatic physiotherapy complexes depending on the source data of degenerative-dystrophic lesions of cervical vertebrae and circulation in the vertebral artery.

List of the used literature

1. Abelskaya I.S. Cervical osteochondrosis diagnostics and medical rehabilitation / I.S. Abelskaya, A.N. Mikhailov, V.B. Smychek // Minsk. – 2007. – 347 p.
2. Aivazov A.N. The state of the vegetative status of patients with vertebrogenic vertebral artery syndrome and its correction at the resort. / A.N. Aivazov, L.A. Cherevashenko, L.M. Saakova // Problems of balneology, physiotherapy and exercise therapy. – 2007. – №6. – P.16-18.
3. Dravert N.E. Clinical Doppler mapping in patients with vertebrogenic vertebral artery syndrome and vertebrobasilar insufficiency: Avtoref. dis. ... cand. med. sciences / N.E. Dravert. – Perm. – 2004. – 22 P.
4. Kamchatnov P.R. Clinical and pathogenetic features of the syndrome vertebrobasilar insufficiency / P.R. Kamchatnov, T.N. Gordeev, A.A. Kabanov [and others] // Ukr. neurol. and the psychiat. (see app. Stroke). – 2003. – № 1. – P. 55-57.
5. Korman H. Role of duplex scanning of extracranial carotid arteries in the identification of risk factors of the development of transient ischemic attacks / H. R. Korman // Modern approaches and implementation of new methods in diagnostics. – M, 2005. – P. 82-85.
6. Konova B.N. Ultrasonic Doppler study as proof of vasomotor mechanism of spinal disorders in patients with cervical myelopathy caused by abnormalities of segmental division of the autonomic nervous system / B.N. Konova, V.V. Moiseev // International neurology journal. – 2009. – №4(26). – P.92-96.
7. Kradinov A.I. Modern visualization capabilities of reasons of clinical manifestations of osteochondrosis of the cervical spine./ A.I. Kradinov, V.A. Chernorotov, E.A. Kradinova // Taurida biomedical journal. – 2012. – V.15. – № 1. – P. 129-135.
8. Skvortsova V.I. Secondary prevention of stroke./ V.I. Skvortsova, I.E. Chazova // M. LAGRI. – 2002. – 120 p.
9. Gudavalli M.R. A randomized clinical trial and subgroup analysis to compare flexion-distraction with active exercise for chronic low back pain / M.R. Gudavalli, J.A. Cambron, M. MacGregor // Eur Spine J. – 2006. – Vol.15, №7. – P.1070-1082.

10. Stoll M., Hamann G. Cerebrovascular reserve capacity//Nervenarz. – 2008; 73:711– 718.
11. Carr J. A randomised trial comparing a group exercise programme for back pain patients with individual physiotherapy in a severely deprived area / J. Carr, J. Klaber Moffett, E. Howarth [et al.]// Dis Rehabil 2005; 27:929– 37.
12. Jensen T.S. Natural course of disc morphology in patients with sciatica: an MRI study using a standardized qualitative classification system/ T.S.Jensen, H.B. Albert, Soerensen J.S. [et al.]//Spine. – 2006. – Vol.31. – №14. – P.1605– 1612.
13. Zhang W. Research advances in animal models of intervertebral disc degeneration/ W.Zhang, H.Liu, T.Li// Zhongguo Fu Chong Jian Wai Ke ZaZhi. – 2007. – Vol.21, №11. – P. 1254-1259.