

## COMPREHENSIVE ASSESSMENT OF TREATMENT AND PREVENTION OF ARTERIAL PERMEABILITY DISORDERS OF THE LEGS

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### ABSTRACT

In the article is submitted information about chronic venous insufficiency, the main reasons of the disease. Described the main symptomatology, classification chronic venous insufficiency, discoursed methods of objective investigation venous system by the ultrasound examination for reasons of diagnosis chronicle venous insufficiency. Pay attention to complex conservative therapy that included elastic compression and phlebotonics, in particular Eskusan. 49 patients (female) with the initial displays of chronic venous insufficiency were under the supervision. All patients received Eskusan during long term period minimum 2 month. It was proved that Eskusan is able to increase tonus of venous wall and as a result could normalize function of veins valves because it has veinotonic, capillary protection, antiendemic, antiinflammatory, antiaggregating, antioxidant effects.

**Keywords:** chronic venous insufficiency, insufficiency of values, ultrasound diagnostic, complex therapy, elastic compression, Eskusan, effects of Eskusan treatment.

Chronic venous insufficiency (CVI) of the lower extremities is currently the most common pathology of the human vascular system. It occurs as a result of structural or functional disorders of the venous system associated with impaired venous outflow from the lower extremities, and is manifested by a number of clinical syndromes and symptoms, the severity of which depends on the stage of the disease. The main syndromes include varicose veins (in most patients), edematous syndrome, "heavy legs" syndrome, as well as various cosmetic skin defects. Progressive CVI of the lower extremities is characterized by the appearance and development of the "restless legs" syndrome, which can be accompanied by pain, cramps, itching, paresthesia [1, 6].

Epidemiological studies show that the incidence of CVI of all classes in the population ranges from 7 to 51.4%; and in women – 62.3%, in men – 21.8%. Such a high prevalence allows us to safely call CVI a "disease of civilization". Moreover, if earlier the disease was attributed to the problems of the older age group (over 50 years old), now 10-15% of schoolchildren aged 12-13 years show the first signs of venous reflux. It is obvious that the development of CVI is a time-consuming process, that is, if the disease is detected and treated at an early stage, it is possible to really reduce the number of cases or prolong the development of severe forms of the disease in time.

The pathogenesis of CVI is based on valvular insufficiency of various parts of the venous bed of the lower extremities, leading to the appearance of pathological, retrograde blood flow – the

main factor of damage to the microcirculatory bed. This is confirmed by examinations of the venous system of the lower extremities using ultrasound methods. The worst conditions for normal blood flow occur in the vertical position of the body in the absence of active muscle contractions. Thus, blood stagnation occurs, the pressure in the vein system increases, the insufficiency of the valve apparatus is formed. The valve flaps do not close completely and there is an abnormal blood flow from top to bottom.

In addition, pathological changes in the venous wall contribute to the development of CVI. In the presence of various risk factors (genetically determined connective tissue defects, hormonal changes, prolonged static loads, overheating, insufficient physical activity, etc.), under the influence of gravity, pressure increases in the venous knee of the capillary, reducing the arteriovenular gradient necessary for normal perfusion of the microcirculatory bed [4]. The consequence of these processes is at first periodic, and then permanent tissue hypoxia.

The blood flow through the venous part of the microcirculatory bed also undergoes certain changes. Thus, red blood cells, having a more stable and ergonomic shape, push white blood cells to the periphery and, literally, force them to roll over the endothelial layer with already activated adhesion receptors. As a result, leukocytes stick to the endothelium of venules and become activated, begin to infiltrate the venous wall first, and then soft tissues.

Aseptic inflammation and constant restructuring of the connective tissue matrix lead to macroscopic changes in the venous bed and damage to venous valves through leukocyte aggression. This position is confirmed by microscopic studies of the valves of insufficient venous valves, in which their infiltration by leukocytes is often detected.

Consequently, the pathogenesis of CVI is based on damage to the venous wall as a result of exposure to physical factors that lead to the synthesis of cell adhesion molecules and activation of leukocytes, as well as developing valvular failure.

All of the above opens up prospects for the preventive therapy of CVI with the help of venous wall protectors.

The symptoms of the initial manifestations of CVI are diverse and nonspecific. The most frequent complaints of patients with venous pathology:

- the presence of telangiectasia and convoluted intradermal veins;
- swelling of the shins and feet, increasing in the evening;
- pain, cramps and crawling sensation in the calf muscles;
- pigmented spots on the skin of the shins;
- constant feeling of discomfort and fatigue.

Therefore, it is possible to distinguish several syndromes characteristic of CVI: edematous, painful, convulsive, trophic disorders, secondary skin lesions. Common symptoms of the disease are a feeling of heaviness, pain in the legs ("heavy legs" syndrome), a feeling of warmth, burning, itching. The intensity of the pain does not always correspond to the degree of expansion of the superficial veins. Pain also appears when, due to the insufficiency of the valves in the perforating (perforating) veins, blood begins to flow from the deep veins to the superficial ones. The pressure in the veins of the legs increases, the pain gradually increases (especially in the standing position), there are swelling of the feet, trophic disorders such as dryness and hyperpigmentation of the skin, hair loss, muscle spasms are observed at night. Over time ,

HVNit may be complicated by the appearance of long-term non-healing trophic ulcers. Acute thrombophlebitis of superficial veins often develops. There is a risk of deep vein thrombosis.

At the initial stages, even in the absence of varicose transformation, a careful examination of the lower extremities allows you to detect an increase in the subcutaneous venous pattern, indicating a decrease in the tone of the venous wall. The urgency of identifying the early (preclinical) stages of the disease, when it is possible to carry out adequate preventive measures, is obvious.

Ultrasound Dopplerography is an important method that contributes to the diagnosis of CVI in the early stages [2, 6]. The following classification of Doppler methods is possible depending on the methods of obtaining and displaying information:

1. A method for estimating changes in blood flow velocity over time in a vessel section.
2. Spectral Doppler echography, or spectral Doppler, or D-mode – estimation of the spectrum of blood flow velocities in vessels in the process of its change over time.
3. Methods of color Dopplerography, which primarily include color Doppler mapping of blood flow is a two-dimensional image of biological structures in which the speed of movement of individual elements is displayed using colors of various shades.

The venous system of the lower extremities can be divided into three parts:

- a) deep veins of the lower leg and thigh (tibial, fibular, popliteal, femoral and iliac veins);
- b) superficial: large (BPV) and small (MPV) subcutaneous veins;
- c) perforating veins.

The direction of the venous blood flow in the lower extremities is from the periphery to the heart and from the superficial system of BPV and MPV to the deep veins through the mouths of the BPV and MPV and through the veins are perforants.

The superficial and deep venous systems are also connected by communicating veins. The mechanism of blood outflow through the veins of the extremities is complex and peculiar. There is no constant blood pressure here, as in the arteries, it rises and falls. However, despite this, the venous system is well balanced, adapted to various types of human activity and represents a harmonious mechanism [6].

A Doppler study is performed to clarify the cause diseases of the veins of the lower extremities; assessment of the condition of deep veins (patency and consistency of valves); detection of reflux through the saphenofemoral (SPS) and saphenopodpiteal anastomosis; determination of the state of the valvular apparatus of the trunks of large and small subcutaneous veins; identification of the presence and localization of insolvent perforating veins.

Compression tests are used to assess not only the patency of deep veins, but also the consistency of the valves of deep, subcutaneous and perforating veins. The hemodynamic basis of the samples is an artificial increase in pressure in the lumen of the vein proximal to the valve, which normally leads to closure of the valve flaps and cessation of blood flow. Forto assess the functional viability of the valve apparatus, a Valsalva test, a cough test, a respiratory test, a strained test are usedfor example, a proximal compression test. The Valsalva test consists in the patient taking a deep breath while straining and inflating the abdomen. The respiratory test consists in the patient taking a deep breath followed by a breath delay. During a cough test, the patient makes several coughing movements.

Depending on the presence or absence of reflux on the valves, you can talk about the viability of the latter, as well as the presence of venous insufficiency. In clinical practice, a simplified classification of CVI is often used, taking into account the severity of reflux on the valves [4, 6]. All of the above indicates the need for effective prevention at the earliest stages of the development of pathology and further careful treatment of CVI. There are many tasks facing the medical treatment of CVI, which are solved primarily based on the severity of clinical symptoms, but the main drug in the treatment of any forms of CVI should be a drug with a phlebotonizing effect. As the degree of CVI increases, additional effects on the lymphatic system are required, it is necessary to cope with edema, regulate microcirculation and blood rheology. The pharmacotherapy of CVI is based on the use of phleboprotectors (phlebotonics), which can be defined as drugs that normalize the structure and function of the venous wall. Phleboprotectors are the basis of drug therapy of CVI regardless of its origin (varicose veins, the consequences of deep vein thrombosis, congenital anomalies, phlebopathy, etc.) [1, 6].

The main indications for the use of phleboprotectors:

- specific syndromes and symptoms associated with CVI (swelling, feeling of heaviness in the calf muscles, pain along the varicose veins, etc.);
- specific symptoms associated with CVI (paresthesia, night cramps, decreased tolerance to static loads, etc.);
- prevention of edema during prolonged static loads (moving, flights).

When choosing a phlebotropic drug, it is important to remember that they have different pharmacological activity and clinical efficacy in relation to venous tone, effects on lymph flow, and also have different bioavailability.

Most phlebotropic drugs are poorly soluble in water and accordingly, are insufficiently absorbed in the gastrointestinal tract.

If the drug is selected correctly, depending on the initial severity of CVI, the therapeutic effect occurs within 3-4 weeks of regular administration. Most of the drugs in this group are aimed at increasing the tone of the veins, improving the nutrition of the surrounding tissues. The course of treatment is long: 6 months or more. Currently, Detralex, Cyclo-3-Fort, Ginkor-Fort, Troxevasin, Anavenol, Escuzan, Asclezan, Antistax, Phlebodia 600 are used [3]. The use of a particular drug, as well as the treatment regimen should be discussed with a specialist. Escuzan is made from horse chestnut seed extract *Aesculus hippocastanum*, the active substance of which is escin from the group of triterpene glycosides. It has the following effects: venotonic, capillaroprotective, decongestant, anti-inflammatory, antiplatelet, antioxidant, reduces the manifestations of venous congestion, helps to reduce reflux on venous valves [1].

The venotonizing effect is due to the stimulation of hormone production by the adrenal cortex and an increase in the amount of prostaglandins in the vascular wall. Escin helps to normalize the contractile activity of the smooth muscles of the vascular wall, thereby reducing the fragility of blood vessels, improving metabolism in tissues, normalizing the condition of capillaries.

The capillary-protective properties of escin are also manifested due to its ability to inhibit the activity of lysosomal enzymes, thus blocking the cleavage of mucopolysaccharides (in particular, proteoglycan) in the walls of blood vessels. The drug stimulates the release of the mediator norepinephrine into the synaptic cleft, improves the conduction of impulses in vascular wall; reduces the manifestations of venous congestion, which has a positive effect on the state of the

lumen of the vessels and venous valves. The drug has a decongestant effect due to the ability of escin to reduce the permeability of the plasmolymphatic barrier, reduce lymph flow (while increasing the dry residue of lymph). Taking the drug significantly reduces the output of electrolytes, low-molecular compounds and water into the intercellular space. Increased synthesis and increased release of prostaglandins has some antiexudative effect. Escuzan also has an anti-inflammatory effect, as it reduces the permeability of the vascular wall and reduces the migration of leukocytes, which helps to reduce the intensity of inflammatory reactions. Escin has antiaggregational activity and, with regular intake, contributes to a significant reduction in the frequency of blood clots and atherosclerotic plaques on the walls of blood vessels. The antioxidant effect is manifested due to the thiamine included in its composition, which prevents lipid peroxidation. In addition, quercetin (a component of horse chestnut extract) is able to inactivate the active oxygen form and hydroxyl groups, reducing their destructive effect on cell membranes. This in turn improves the nutrition of the ischemic vessel wall, preventing the death of its structural elements.

Another important element of complex treatment and prevention in the early stages of CVI is the use of first-class medical compression knitwear to create a pressure of 12-17 mm Hg [5]. Its undoubted advantages include the physiological distribution of pressure in the direction from the foot to the upper third of the thigh. In addition, when knitting products, the anatomical features of the limb are taken into account, which ensures the stability of the bandage and the necessary wearing comfort.

Another significant element of the complex treatment of CVI is local dayrelated medicines. Ease of use, lack of systemic action make them indispensable, especially in the early stages of pregnancy. More people use heparin-containing ointments and gels, which differ in functionality and content of heparin (from 100 to 1000 I of sodium heparin). Gels are somewhat more effective compared to ointments. The use of local remedies reduces the severity of symptoms of venous insufficiency, such as swelling, fatigue, heaviness and cramps in the calf muscles.

From 2011 to 2014, 46 patients aged 18 to 54 years were under our supervision at the 2nd State Clinical Hospital of Minsk, who were referred by polyclinic surgeons for ultrasound of the veins of the lower extremities.

The selection of women was carried out according to the following criteria: complaints of pain, itching, a feeling of heaviness and fatigue in the legs at the end of the day, swelling of the lower extremities, cramps of the calf muscles at night (these symptoms regress after a night's rest), the presence of telangiectasia and reticular varicose veins (a type of simple varicose veins, in which there is an expansion of thin intradermal veins). Ultrasound Dopplerography (UZDG) of the valvular apparatus and veins of the lower extremities revealed the absence of valvular insufficiency (34 patients) or a slight reflux in the saphenofemoral anastomosis (SPS) lasting no more than 2 seconds (12 patients). Clinically, the phenomena of reticular varicose veins and telangiectasia were observed in 42 patients.

There were no violations of the patency of the venous vessels of the lower extremities on the ultrasound Dopplerogram. All patients were recommended to take Escuzan for two months, as well as wear compression knitwear with significant physical exertion, flights, etc. After 2 months, a repeated ultrasound of the venous vessels of the lower extremities was performed

with the advice of a surgeon in the conditions of the consultative reception of the ultrasound "2nd GKB of Minsk". During the clinical examination, according to the results of the evaluation of clinical functional tests, the ultrasound of the vessels of the lower extremities showed no negative dynamics (transition to a more severe stage) of CVI in any patient. Regression of clinical symptoms (disappearance of pain, edema, decrease in the number of telangiectasias and a decrease in the "venous pattern") was noted in all patients receiving Escuzan (Table 2, Figure). So, pain, itching, heaviness in the legs significantly decreased and remained in 5.06% of the treated women. Puffiness remained only in 4.6% of cases. Cramps of the calf muscles and reflux on the valve in the SPS after the use of Escuzan were recorded only in 1.38 cases, which indicates a strong venotonic effect of Escuzan

### CONCLUSIONS

1. Escuzan can be considered an effective remedy for the treatment and prevention of CVI. The drug is able to significantly improve the condition of the venous wall and indirectly normalize the condition of the valvular apparatus of the veins due to venotonizing, capillaroprotective, decongestant, anti-inflammatory, antiplatelet, antioxidant effects.
2. Treatment of CVI should be comprehensive and begin at the earliest stages, it is then that the maximum effect can be achieved.
3. An important element in the diagnosis and evaluation of the quality of treatment of CVI is the method of ultrasound Dopplerography.

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