

## **Clinical Significance of Hypotension Situations in Patients with Arterial Hypertension**

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Despite the efforts of doctors in many countries of the world aimed at controlling blood pressure (BP), the prevalence of arterial hypertension (AH) in populations of different countries continues to grow and by 2025 the total number of patients with this nosology will reach 1.5 billion [1]. The most urgent task of medical care for patients with hypertension is considered to be the reduction of cardiovascular risk [2]. This makes it necessary to develop new, more effective approaches to the diagnosis and treatment of hypertension. In order to treat patients with hypertension, two methods of therapy have been developed by the efforts of many scientists for decades: a) hypotensive and b) antihypertensive. The priorities of the appointment of basic therapy are due to complex clinical mechanisms of the formation and stabilization of hypertension, when it is necessary to use drugs that have a pathogenetic orientation (depending on which they are divided into different groups of pharmacological influence). In some clinical situations, it is possible to supplement basic therapy with drugs acting on the mechanisms of hypotension. However, episodes of arterial hypotension are possible in the AH clinic, which the doctor is obliged to explain accurately, and the AH patient must be prepared in absentia for such situations. For effective antihypertensive therapy, seven groups of drugs are used, of which five are considered the main ones: 1) angiotensin converting enzyme inhibitors; 2) saluretics; 3) beta-blockers; 4) slow calcium channel blockers; 5) angiotensin 1 receptor antagonists and two additional: 6) imidazole receptor agonists; 7) alpha-blockers. In addition, modern fixed combinations have entered clinical practice to simplify the administration of drugs of different pharmacological groups. For all of these drugs, clear indications and contraindications have been developed, depending on clinical situations, which attending physicians are required to strictly adhere to. But, in addition to these recommendations, it is necessary to ensure conditions for clear compliance, patients following prescribed medical recommendations. The priorities of the appointment of basic therapy are due to complex clinical mechanisms of the formation and stabilization of hypertension, which patients should also be informed about. In some clinical situations, it is possible to supplement basic therapy with drugs acting on the mechanisms of hypotension. And this approach is also taught to patients. The most important requirement of the attending physician is the patient's literacy in relation to the type of drugs used. Perhaps it is necessary to apply the term habilitation of the patient in relation to his disease (AH), as well as to all medical recommendations both on the normalization of lifestyle and in relation to drugs (antihypertensive and hypotensive). In addition to regular (at least twice a day) measurement of their own blood pressure, patients should follow the rules of rational nutrition and physical activity. It is necessary to limit the use of table salt, coffee and ethanol, adhere to the normalization of the "sleep-wake" regime with minimizing episodes of mental and nervous overstrain. However, episodes of hypotension are possible in the AH clinic, which the doctor is obliged to explain, and the AH patient is prepared in absentia for such situations.

Possible fluctuations in the activity of the renin-angiotensin-aldosterone system and hypotensive effects due to changes in kallikrein-kinin interactions remain in the structure of blood pressure stabilization in patients with hypertension against the background of constant

antihypertensive therapy. In the mechanisms of hypotensive conditions, there are possible leading mechanisms for reducing the minute and shock volumes of the heart, reducing the volume of circulating blood, reducing the resistance of resistive vessels and reducing venous blood flow to the heart. Types of situations of arterial hypotension according to the initial link of pathogenesis can be divided into neurogenic, metabolic (organo-ischemic) and endocrine. The primary pathogenetic influences may be based on a lack of vitamins (B, C, E), adherence to a mono diet, maladaptation with a sharp change in weather or climatic phenomena and muscle load. The leading clinical signs in patients may be dizziness or a feeling of nausea when getting up, semi-fainting, weakness, respiratory discomfort, blurred vision and cardialgia.

It is necessary to list the most frequent situations in which the development of arterial hypotension in patients with hypertension is possible. This is postprandial hypotension. Its criteria are considered to be a decrease in systolic blood pressure by 20 mm Hg within two hours after eating against the background of weakness or malaise. Postprandial hypotension can be a frequent occurrence in patients with hypertension with the same manifestations on the background of physical activity. Features of lowering blood pressure after physical exertion (by 20 mmHg) may be in people with severe left ventricular myocardial hypertrophy. In patients with hypertension with subnormal or slightly elevated left ventricular myocardial mass indices, episodes of a smaller (12 - 10 mm Hg) decrease in systolic blood pressure are also possible after physical exertion. In elderly people, the decrease in these indicators against the background of physical activity is due to relative chronotropic insufficiency.

Various endocrinopathies can also have clinical manifestations in the form of episodes of hypotension. Insufficient secretion of glucocorticoids and mineralocorticoids leads to a decrease in intercellular fluid, including the volume of circulating plasma. The blood pressure level may occasionally be reduced to a greater extent with hypothyroidism or adrenal insufficiency than with hypofunction of the pituitary gland.

Systemic metabolic arterial hypotension is associated with the development of dystrophic changes in organs and tissues (with infections, intoxication, starvation). This is due to a decrease in the production and/or effects of metabolites with a hypertensive effect (for example, endothelin, prostaglandin F, thromboxane A<sub>2</sub>, angiotensinogen, and others), a decrease in the tone of the myocyte walls of arterioles, a decrease in the contractile function of the myocardium, hypohydration of the body. In 12% of patients of different ages with hypertension, postcovid arterial hypotension may be detected. This is due to two mechanisms of hemodynamic instability. Firstly, an increase in airway pressure leads to a decrease in venous return and preload of the right ventricle. The second effect was revealed by the Euler-Liljestrandt mechanism due to an increase in pulmonary vascular resistance and post-loading of the right ventricle of the heart in response to an increase in intraalveolar pressure. Desaturation (99%) and barotrauma have an auxiliary effect [3]. It should also be taken into account, especially in elderly patients with hypertension, the frequent possibility of episodes of arterial hypotension due to pulmonary microthromboembolism in the clinical course of SARS-Cov19 infection. According to the diagnosis, in such cases it is possible to use oral anticoagulants on the principle of empirical therapy. According to modern ideas, according to the predictable bioavailability and pharmacokinetics of a group of new anticoagulants, they can be used for thromboembolism in a fixed dosage without routine laboratory control [4]. In particular, rivaroxaban (xarelto) should be prescribed 15 mg 2 times a day from 1 to 21 days and then in smaller doses indefinitely. A small number of drug interactions of antihypertensive agents with these drugs, in contrast to vitamin K antagonists, have been described.

Cardiac arrhythmias lead to episodes of arterial hypotension: ventricular tachycardia, atrial fibrillation/flutter with a high frequency of ventricular response, a high degree of atrioventricular blockade, especially in anterior myocardial infarction. A prerequisite in such cases is to ensure an acceptable frequency of ventricular contractions. Also, episodes of hypotension may manifest decompensation of chronic heart failure with mitral malformations or progression of aortic stenosis.

High variability of blood pressure (from high values to low and vice versa) may be an important pathogenetic link in the development of acute cerebral strokes. High plasma renin levels, fluctuations in blood pressure in the early morning hours, and damage to target organs

are considered contributing mechanisms. Therefore, the diagnosis of arterial hypotension in a patient with hypertension provides for a comprehensive examination of the cardiovascular, respiratory, endocrine and nervous systems. It is necessary to measure blood pressure three times with an interval of 3 to 5 minutes, daily monitoring of ECG and pressure level. It is also necessary to conduct a medical examination of the patient as part of a multidisciplinary team: a cardiologist, a neurologist, an oculist, an endocrinologist with a responsible conclusion and the appointment of an appropriate program of medical care.

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