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ATHEROSCLEROSIS AND ITS IMPACT ON HEALTH, EARLY DIAGNOSIS, PREVENTIVE MEASURES

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Abstract
Atherosclerosis is one of the most common chronic arterial diseases. It causes an atherosclerotic plaque of cholesterol to form in the vessel wall. These plaques narrow the lumen of the vessel, which affects blood flow, and in extreme cases, plaques can completely block the blood flow. If something like this happens in a large artery, the situation is fraught with serious complications, even death: cardiovascular diseases have been one of the main causes of death for many years. The cause of atherosclerosis is a disorder in fat metabolism - the accumulation of cholesterol (namely low-density lipoproteins) in excess.

Keywords: Atherosclerosis, prevalence, shortness of breath, healthy lifestyle, prevention.

INTRODUCTION

Atherosclerosis is the most common chronic disease of elastic and muscular-elastic arteries, with the formation of single and multiple foci of lipid, mainly cholesterol deposits - atheromatous plaques - in the inner lining of the arteries. Subsequent growth of connective tissue (sclerosis) and calcification of the vessel wall lead to slowly progressive deformation and narrowing of its lumen up to complete desolation (obliteration) of the artery and thereby cause chronic, slowly increasing insufficiency of blood supply to the organ fed through the affected artery. In addition, acute blockage (occlusion) of the lumen of the artery is possible either by a thrombus or (much less frequently) by the contents of a disintegrated atheromatous plaque, or both simultaneously, which leads to the formation of foci of necrosis (infarction) or gangrene in the organ (body part) supplied by the artery. The leading role in the development of atherosclerosis belongs to lipid metabolism disorders. In blood plasma, lipids are combined with proteins and represent complex protein-lipid complexes (lipoproteins), which penetrate the arterial wall and cause the development of lipoidosis in it – the initial stage of atherosclerosis [1]. The term "atherosclerosis" was first proposed in 1904 by F. Marchand. The disease is characterized by a complex of changes in the walls of blood vessels, in which plaques are formed, consisting of lipids (cholesterol, etc.), proteins, carbohydrates, calcium salts. Arteries, naturally, lose elasticity, the ability to stretch, become fragile and brittle. The amount of blood flowing through such arteries decreases, the blood supply to organs and tissues worsens. The probability of thrombus formation increases. As a result, dystrophic, necrotic and sclerotic changes develop in the organs supplied by the affected arteries. All this, together with other factors, leads to the development of cardiovascular and other diseases

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[2]. As is known, most cardiovascular diseases caused by atherosclerosis clinically manifest themselves in old and elderly age. However, in recent years, lethal outcomes from complications of atherosclerosis have begun to be noted among young people as well. Moreover, if in the USA and European countries, a decrease in mortality from CVD is objectively registered among young people, then in Russia, an increase in this indicator is observed. Thus, mortality from CVD in the working age population in our country was 137 in 1990, and 206 cases per 100 thousand population in 2000 [3]. In recent years, there has been a high increase in the frequency of acute cardiovascular conditions, such as myocardial infarction and stroke. And at the root of these formidable conditions lies atherosclerotic vascular disease. This disease is a chronic focal lesion of the arteries, characterized by the deposition and accumulation in the inner lining of the vessel of apoprotein B-containing lipoproteins (ABL) and the cholesterol (CH) they deliver, and accompanied by both structural and cellular changes and reactive proliferation of connective tissue with the formation of fibrous plaques in the arterial wall. Epidemiological studies have shown that AS is a multifactorial disease. Many risk factors (RF) for AS have been described, which can be divided into 2 large groups: modifiable and non-modifiable. Among the modifiable risk factors of AS, dyslipoproteinemia, homocystenemia, arterial hypertension, smoking, excess body weight, physical inactivity, and psychoemotional stress are of great importance. Non-modifiable risk factors include male gender and hereditary predisposition [3,5]. The leading cause of death in ischemic heart disease is atherosclerotic cardiosclerosis, which accounts for 78% of the total population and half of the working population. With the current increase in mortality rates from cardiovascular pathology among European countries, hypercholesterolemia, together with smoking, obesity, arterial hypertension, diabetes mellitus and age, is determined to be the main predictor of the development of atherosclerosis and its complications [5,7]. The development of atherosclerosis is a typical pathological process. Lipids enter the duodenum, where they are hydrolyzed to fatty acids and monoglycerides under the action of digestive enzymes. Then, in the intestinal epithelium, resynthesis of triglycerides occurs, which subsequently enter the lymph as part of lipoproteins. Inside the mitochondria, β-oxidation of free fatty acids occurs.

The combination of excess cholesterol intake with decreased levels of lipoprotein lipase causes hyperlipoproteinemia, which, along with damage to the vascular wall, leads to the formation of lipid streaks containing macrophages, low-density lipoproteins (LDL). S techeniyem vremeni struktura blyashki izmenyayetsya: v ney nakaplivayutsya lipoproteidy. Voznikayet immunnoye vospaleniye, kotoroye sluzhit dlya gladkomyshechnykh kletok i biologicheski aktivnykh veshchestv [4,9]. Over time, the plaque structure changes: lipoproteins accumulate in it. Immune inflammation occurs, which serves for smooth muscle cells and biologically active substances [4,9]. Until now, there have been different views on the pathogenesis of atherosclerosis. The authors of the recently published book “Pathogenesis of atherosclerosis and dysfunction of microvessels” (2019) Haverich A and Boyle EC believe that atherosclerosis primarily originates in the tissues of microvessels (vasa vasorum, lymphatic vessels) and only later the process is transferred to the intima of the coronary and other arteries [6]. This path of atherosclerosis development for the first time draws the attention of doctors to what is happening in the arterial wall not only in the intima, but in the medial layer and adventitia. The authors support their concept of the development of atherosclerosis with a huge list of literature (the list consists of 886 articles),

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including works from the 19th, 20th and 21st centuries. The main idea of these authors is that atherosclerosis is not a consequence of hypercholesterolemia. They continue: "… and although most studies have focused on the endothelium of the main vessel, we substantiate the hypothesis that it is the endothelium of the vasa vasorum that is more susceptible to dysfunction at all stages of the disease" [11].

Objective:

To study the dynamics of atherosclerosis prevalence. To determine the importance of prevention and the impact of atherosclerosis on health.

According to WHO, there is currently an increase in mortality from atherosclerosis. This disease occurs not only as an independent process, but in a significant number of cases it is added to hypertension, diabetes, and hypothyroidism. Atherosclerosis is currently one of the most acute and important problems associated with human health [2,7,10]. R.G. Oganov divides the risk factors for atherosclerosis into two groups: some that can be modified, and others that play a major role in the development of the disease, but unfortunately which we cannot modify. Genetic risk factors include: gender, age, diabetes, gout, "personality type". Metabolic factors include hypercholesterolemia, hyperlipidemia (in men), hyperglycemia, and increased uric acid levels. Exogenous influences and habits can directly or indirectly contribute to the development of atherosclerosis: smoking, dietary habits (consumption of fat, refined carbohydrates, decreased physical activity, neuropsychic stress, certain types of professions. Others include a number of socio-cultural factors: physical inactivity, modern living conditions, conflict situations, the nature of food, including national nutritional characteristics, smoking [5,6,9]. Particularly unfavorable is the combination of such factors as poor nutrition, hypokinesia, aggravated heredity and nervous system overstrain.

I.A. Vlasova, G.I. Gubin claim that a number of risk factors are related to age: the older a person is, the more pronounced the consequences of their impact. An increase in the number of risk factors sharply increases the risk of developing atherosclerosis, and in particular, coronary heart disease. One of the main modifiable risk factors is physical activity. Due to the growth of industrialization, the expansion of transport use, the increasing role of "sedentary" professions and the popularity of various types of intellectual (without physical exertion) types of leisure, a sedentary lifestyle, especially in developed countries, has become one of the characteristic features of society in our time. The interest in the significance of this factor in the prevention of atherosclerosis, ways of its correction and the effectiveness of efforts in this direction is now understandable [7,12]. The development of atherosclerosis contributes to the development of cardiovascular diseases over a certain period of time. As is known, the risk of developing cardiovascular diseases remains consistently high in developed countries [9,11].

Materials and methods of the study: The study was carried out by means of parallel, independent recruitment of the main group and the comparison group and comparison of the obtained results. The main group: 59 patients with the most important risk factors for the development of CVD. Women predominated (66%). Comparison group: 52 patients. Priority groups for atherosclerosis prevention. Women also predominated in this group (69%). Initially, all patients underwent a

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physical examination with anthropometric parameters measured, the body mass index was determined, and the functional work of the heart was also examined using an ECG. A traditional clinical examination of patients was carried out, including collection of complaints, anamnesis, examination of the patient, and measurement of blood pressure (BP). Thus, the criterion for inclusion of patients in the main group was the presence of: the course of CVD without clinical manifestations. Depending on the degree of vascular lumen occlusion and the severity of symptoms, two stages of atherosclerosis are distinguished: subclinical: pathological processes in the vascular wall are already underway, but there are no obvious signs of the disease; clinical (symptomatic): there are certain symptoms of the disease; as a rule, it develops when the lumen of the vessel is blocked by 50% or more.

Results:

According to the results of the study, the median age of patients was: 36.4 (25.9; 49.1) years. At the time of the examination, there was no clinical data on exacerbation of CVD. However, complete control over the disease was recorded in only 15 patients (24%). In 14 patients (24%), CVD was of mild severity; all patients had previously been diagnosed with hypertension at the outpatient stage, which in 18 (24%) cases was of grade I severity. In the comparison group, the average age of patients was 43.6 [35.0-52.3] years Behavioral (modifiable) factors: age, gender, heredity, genetic factors, early development of CVD in relatives, obesity, eating habits, smoking, physical activity, alcohol consumption, exposure to stress. Behavioral (modifiable) factors age, gender, heredity genetic factors the presence of even one of the risk factors increases mortality in men aged 50-69 by 3.5 times, and the combined effect of several factors by 5-7 times. early development of CVD in relatives, obesity, eating habits, smoking, physical activity, alcohol consumption, exposure to stress. A full analysis of the information was carried out taking into account age characteristics, gender, and social status. Thus, the groups were comparable with each other in terms of gender and age. The results of the studies showed that the most significant or major risk factors are hypercholesterolemia, arterial hypertension and smoking. The combination of the above factors increases the likelihood of developing heart disease by 3-10 times. During the observation period, the incidence of the main symptoms of atherosclerosis (dizziness, tachycardia, shortness of breath, general weakness) tended to decrease, while the prevalence of cardiovascular diseases increased statistically significantly. The main causes of atherosclerosis formation remain high blood pressure, diabetes, excess weight, stress, smoking, alcohol, age over 46. There is an increase in the role of arterial hypertension and diabetes as causes of atherosclerosis. The main reasons for the decline in the general level of health are external and internal environmental factors that negatively affect health and also influence the development of various diseases. Physical education alone cannot improve the level of physical development and health of the population. It is also necessary to lead a healthy lifestyle to maintain the body in normal condition. As the study showed, in men with hypertension and more than 50% of symptoms, mainly shortness of breath and fatigue, are closely associated with the presence of signs of diastolic dysfunction. In women, this association was significantly weaker due to the fact that non-cardiac causes of symptoms, primarily excess body weight, were of great importance. becomes the most common cause of complications in elderly patients.

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Conclusions:

The development of atherosclerosis is based on a violation of lipid metabolism. From this point of view, the modern concept of the essence of atherosclerosis is based on the theory of cholesterol infiltration. In atherosclerosis, the leading process is primary lipid infiltration of the arterial wall. In recent years, the primary process is considered to be a change in the vascular wall, and the deposition of lipids in it is considered a subsequent process. It is also believed that the main importance should be given to endogenous cholesterol. According to modern data, other metabolic disorders also play a major role. The importance of general metabolic disorders in the development of atherosclerosis can be confirmed by the frequent combination of atherosclerosis with other metabolic diseases: diabetes mellitus, obesity, gout [2,6]. The obtained results confirm the data of earlier studies on the insufficient effectiveness of the measures taken for primary and secondary prevention of CVD of atherosclerotic origin, which requires closer and more fruitful cooperation between the doctor and the patient. Thus, the atherosclerotic process accompanies a person throughout life - from the stage of lipid stripes in childhood to the formation of various complications in old age. The pathogenesis of this condition is multifactorial [9]. To influence the risk factors of CVD, it is necessary to motivate each individual to form a healthy lifestyle. There are various risk factors for the development of the disease - irremovable, removable and partially removable. Irremovable: age, gender, heredity. Removable: arterial hypertension, alimentary obesity, smoking, insufficient physical activity, excessive emotional stress, poor nutrition. Partially removable: diabetes. Everyone knows that any disease is easier to prevent than to treat [8,13]. Atherosclerosis is no exception. Of course, one cannot ignore those causes of the disease that a person cannot influence. These include age, male gender, genetic diseases and heredity. If there is a heredity for the development of atherosclerosis and your close relatives are familiar with this disease, it is worth seriously thinking about the prevention of atherosclerosis at a young age.

"People mistakenly think that atherosclerosis is a disease of the elderly. But in reality, this is not so," explains Doctor of Medical Sciences, Professor A.N. Voitsitsky. "Atherosclerosis also occurs in young people, and there are also old people who do not have atherosclerosis. Prevention of the disease is a healthy lifestyle" [9,12]. Scientists have proven that the concentration of triglycerides, cholesterol and LDL in blood plasma directly depends on the physical activity of the body. And lipidemia can cause the development of atherosclerosis. Regular physical activity also has a beneficial effect on the heart and blood vessels, and serves as a preventive measure against coronary heart disease. To maintain good health, it is necessary to keep your weight under control. Overeating leads to excess weight, excess weight contributes to the development of diabetes and hypertension, and these diseases are factors in the development of atherosclerosis, as they lead to vascular disorders and dyslipidemia. To maintain normal weight, proper nutrition and sufficient physical activity are necessary. To avoid atherosclerosis catching you off guard at the stage of complications, starting from the age of 30, doctors recommend that everyone monitor their cholesterol, triglyceride, LDL and sugar levels [10,14]. Only a complete examination of outwardly asymptomatic patients and timely prevention of complications will help keep the nation healthy and significantly reduce the incidence and mortality rate from cardiovascular diseases.

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