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Etiology, Pathogenesis, Origin and Prevention of Ventricular Arrhythmia

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Abstract: The heart is an organ that ensures the continuous movement of blood through the veins in the desired direction. It occurs due to the occurrence of impulses that stimulate the excitation and contraction of the myocardium.
In a healthy person, different parts of the heart contract alternately, first the atria, and then the ventricles. The right atrium has a main source of rhythm called the sinus node.
In addition to the sinus node, other areas of the myocardium can generate impulses and create a rhythm. However, in a healthy person, they do not cause arrhythmias due to the normal functioning of the sinus node.
Key words: Arrhythmia diagnosis, Arrhythmia treatment, Drug therapy, Non-drug methods, Arrhythmia complications, Arrhythmia prevention

The heart has conduction, that is, the ability to spread impulses throughout the myocardial tissue. This allows his cells to work harmoniously.
Arrhythmia - any disturbance in the electrical conductivity, frequency or regularity of the heart rhythm. Sometimes it has no symptoms, other times it manifests as palpitations, freezing or interruptions in heart activity. The patient may feel dizzy and even faint.

Types of arrhythmia
Depending on the heart rate, pathology is divided into types:
Tachyarrhythmia is an increase in heart rate of ninety or more beats per minute. Such a pulse can be a normal variant (physiological), that is, occurring during sports, excitement or fear, and pathological (increased heart rate at rest).
Bradyarrhythmia is a slowing of the heart rate to sixty beats per minute. in adults who are not athletes (or in children and adolescents, depending on their age, the heart rate slows down to 60-100 beats / min).
Atrial fibrillation is the most common type of disease in which the synchronous work of muscle fibers is disturbed due to their twitching or atrial fibrillation. That is, their contraction disappears, which is accompanied by disturbances in the functioning of the ventricles.
Extrasystole is a heart rhythm disorder in which the whole heart or its individual parts contract prematurely under the influence of a pathological impulse.
Paroxysmal tachycardia is a type of pathology characterized by attacks of heartbeat (paroxysm) with a heart rate from 140 to 220 or more / min. Paroxysms are caused by ectopic impulses that trigger the replacement of adequate sinus rhythm.

Depending on the location of the myocardial region, which is the source of the rhythm disturbance, they are divided into:
Supraventricular arrhythmias (the source of rhythm disturbances is localized in the atria or atrioventricular node).
Ventricular arrhythmias (the source of rhythm disturbance is located in the ventricles of the heart).
Sinus arrhythmias (the rhythm is disturbed due to improper functioning of the sinus node).
Causes of arrhythmia
Heart rhythm can be disturbed due to cardiac reasons or due to external factors.
Arrhythmias caused by heart failure:
Heart defects that appear in utero or during life.
Consequences of myocardial infarction.
Inflammation of the heart tissue (carditis).
GDP.
Myocarditis.
Neoplasms of the heart muscle.
Cardiomyopathies.
Heart failure.
Cardiac injuries and complications of cardiac surgery.
Long-term metabolic diseases, hypertension, alcoholism cause abnormalities in the structure of the myocardium.
External causes of pathology are considered to be conditions that cause rhythm disturbances, but do not cause disturbances in the structure of the heart muscle, for example, deviations in the electrolyte balance in diseases of the kidneys and adrenal glands.
Arrhythmia can occur as a result of stress, heavy physical activity or mental work, smoking, alcoholism, consumption of caffeinated drinks, as well as thyrotoxicosis, poisoning, fever, blood diseases, intoxication, etc.

Mechanical arrhythmias develop during treatment with some drugs, for example, cardiac glycosides, iatrogenic rhythm disorders, chest injury or electric shock.

Symptoms of arrhythmia
Manifestations of arrhythmia are as follows:
strong weakness;
Headache;
shortness of breath;
dizziness;
fainting;
slow or increased heart rate;
a feeling of tightness and pain in the sternum;
swelling;
increased fatigue;
sleep disorder;
fear;
a feeling of palpitations or interruptions, "withering" of the heart.
Symptoms of pathology depend on various factors. There are "silent" arrhythmias that do not give a clinical picture. They are found incidentally on an EKG.

The main symptom of arrhythmia is the feeling of heartbeat or interruptions, "freezing" in the work of the heart. A person may experience shortness of breath, weakness, angina pectoris, as well as dizziness and fainting.
Cardiogenic shock rarely develops - it is expressed by an extreme degree of manifestation of acute heart failure, a sharp decrease in myocardial contractility, as well as tissue perfusion. Symptoms of this condition:

decrease in blood pressure;
shortness of breath;
tachyarrhythmia;
paleness;
decrease in skin temperature;
the appearance of persistent spots;
disorder of consciousness.
Palpitations with arrhythmia are often caused by sinus tachycardia, and fainting and dizziness are caused by sinus bradycardia or sick sinus syndrome.

Symptoms of bradycardia:
bad feeling;
discoloration of the skin and mucous membranes;
swelling;
dizziness;
convulsions;
carelessness;
the state before fainting or short-term loss of consciousness.
Heart beats less than 40 beats per minute. dangerous for the development of heart failure.

Symptoms of tachycardia:
shortness of breath;
dizziness;
increased sweating;
trembling;
dizziness;
fainting;
pulsation of neck veins;
increased fatigue;
insomnia;
deterioration of mood and appetite;
insomnia.
Sometimes tachycardia can seriously disrupt the heart and increase the risk of stroke.

Diagnosis of arrhythmia
As a rule, arrhythmia is first detected by a therapist (in adults) or a pediatrician (in children). If the heart rhythm is abnormal, the patient should consult a cardiologist to determine the type of pathology and conduct a comprehensive examination of the cardiovascular system.

If the arrhythmia is caused by disturbances in the functioning of other organs, the patient may need to be examined by a specialist, for example, a neurologist, endocrinologist or nephrologist. If there is a possibility of systemic rheumatic disease, it is necessary to consult a rheumatologist.

Arrhythmia diagnosis includes:
Electrocardiography (ECG) measures the electrical activity of the heart. The examination is very informative if it is carried out during a heart rhythm disorder. Then the doctor can determine the type of arrhythmia in the patient with 80% probability.
Daily ECG monitoring. If arrhythmia occurs almost every day, this study makes sense. It consists of a person wearing a small device on their body. It records three to twelve ECG tracks continuously for 1-3 days.
Event monitoring. The use of special tape recorders helps to understand whether the manifestations that disturb the patient are due to cardiac arrhythmias. The essence of the study is that the results are recorded only after the patient presses a certain button (when clinical manifestations appear).
EchoCG is prescribed as part of a comprehensive diagnosis of patients with arrhythmia to identify structural abnormalities of the heart, such as its defects, which caused the development of the disease.
EFI Some types of arrhythmia can be detected by electrical stimulation of the heart in a special mode. That is, EPI is performed by inducing pathology to determine its characteristics.
A treadmill test is a test on a treadmill or bicycle ergometer if cardiac dysfunction is suspected during physical activity.
A tilt test is performed on people with symptoms of syncope. With the help of a rotating table, the doctor moves the patient from a horizontal position to a partially vertical position. In this case, the specialist records the patient's blood pressure and heart rate and performs an EKG.
If atrial fibrillation is detected for the first time in a person, a blood test for thyroid hormones is indicated. If hormonal disorders are detected, an ultrasound examination of the thyroid gland may be necessary, because sometimes endocrine pathologies cause heart rhythm disorders.
Treatment of arrhythmia
Depending on its type and nature, arrhythmia can be relatively harmless or dangerous, so it is not always necessary to treat it. If the pathology has a negative impact on the quality of life, as well as can cause life-threatening complications, therapy is necessary. If the arrhythmia is asymptomatic, it usually does not need to be treated.

Drug therapy
The choice of drugs depends on various factors. Sometimes it is necessary to treat the underlying pathology to normalize the sinus rhythm.
Depending on the type of action, there are four categories of drugs for arrhythmia:
The first class is a membrane stabilizing, sodium channel blocker.
1A - increase the period of repolarization.
1B - shortening the period of repolarization.
1C - has no significant effect on repolarization.
The second class is β-blockers;
The third class is those that prolong repolarization and block potassium channels.
The fourth class is calcium channel blockers.

Arrhythmias caused by disturbances in the structure of the heart muscles are usually treated with drugs that help to normalize the sinus rhythm or slow down the heart rate. Anticoagulants are prescribed to maintain normal blood flow.
Arrhythmias caused by stress, excessive consumption of coffee or strong tea, smoking, lack of sleep, increased stress, and taking certain medications require lifestyle changes (elimination of triggers) .

Non-drug methods
Non-drug treatments include:
Electrocardioversion. Electrical cardioversion is the restoration of normal heart rhythm with the help of electric shock applied to the heart area. It is used when arrhythmia significantly worsens the patient's condition and is accompanied by a significant decrease in blood pressure. In some cases, electrocardioversion is routinely performed.
Implantation of an electronic pacemaker. If a person is diagnosed with bradycardia or atrioventricular block, this will allow you to maintain an adequate heart rhythm. For preventive purposes, an implanted cardioverter-defibrillator is installed in people at high risk of sudden ventricular tachyarrhythmia.
Radiofrequency ablation is a surgical procedure in which the doctor uses a catheter to burn the area of the heart that causes the arrhythmia through small punctures.
Open operations on the heart muscle. They are performed for cardiac arrhythmias and other indications.
Complications of arrhythmia
Pathology is dangerous because it can lead to ventricular fibrillation. It is characterized by chaotic and very rapid contraction of myocardial fibers, as well as the absence of coordinated contraction of the ventricles. Ventricular fibrillation usually results from extensive transmural myocardial infarction. As a rule, it ends with cardiac arrest, further shutting down the most important functions of the body.

In patients with chronic circulatory failure, shortness of breath occurs during tachyarrhythmia attacks and pulmonary edema may occur.
It is impossible to exclude the occurrence of syncope, which is characterized by complete atrioventricular blockade or fainting during asystole. Thromboembolic complications caused by atrial fibrillation cause a stroke in every sixth patient.

Arrhythmia prevention
In order to prevent arrhythmia, it is necessary to treat heart pathology in time and correctly, because it is almost always complicated by heart rhythm and conduction disorders. In addition, external causes of the disease (intoxication, fever, thyrotoxicosis, electrolyte imbalance, stress) should be excluded. It is recommended to limit the consumption of smoking, caffeine-containing drinks and alcohol.

What not to do if there is an arrhythmia
If you have an arrhythmia, you:
Take medicines without a doctor's prescription.
Engage in vigorous physical activity.
Drink alcohol, strong tea and coffee.
There are many spicy foods and animal products.
Eat before going to bed.
Be nervous.

Do not follow the schedule.

Arrhythmia can be a dangerous disease that leads to complications. Doctors of the rehabilitation clinic in Khamovniki will advise on the type of your pathology, make a comprehensive diagnosis and prescribe treatment.

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