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# ETIOLOGY OF ANGIOSARCOMA DISEASE AND THE ANATOMICAL DISORDERS THAT OCCUR IN IT

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**Annotation:** Angiosarcoma of the heart is a primary malignant tumor that develops from endothelial cells, mainly affecting the right atrium and pericardium. It is assumed that the disease is associated with a hereditary predisposition, but the exact causes have not yet been established. Depending on the location of angiosarcoma, it is manifested as a typical clinical picture of right-ventricular or left-ventricular heart failure. For diagnostics, transesophageal echocardiography, MRI and PET-CT of the heart, histological examination are used. Treatment of the tumor involves the most radical surgery in combination with chemotherapy and targeted therapy.

**Key words:** diagnostics, transesophageal echocardiography.

Primary malignant neoplasms of the heart are a rare disease in clinical cardiology, which is 40 times less common than organ damage by metastatic tumors. Angiosarcomas account for about 35% of all primary tumors. The disease is 2 times more common in men than in women. It can occur in any period of life, but the peak of diagnosis is observed at the age of 40-50 years. The disease does not lose its relevance due to the lack of clear therapeutic schemes and the need to develop more effective treatment protocols.

Reasons

The etiological structure of cardiac angiosarcoma is insufficiently studied. One of the most likely provoking factors is called genetic mutations that cause family cases of the disease. The development of neoplasms is associated with abnormalities of the POT1 gene, which contribute to the instability of chromosomes and damage to their terminal regions (telomeres). In addition to angiosarcoma, a POT1 defect is one of the causes of melanoma, glioma, and chronic lymphocytic leukemia.

A number of authors discuss the relationship between a heart tumor and the presence of Lee-Fraumeni syndrome in a patient. The disease occurs with an autosomal dominant TP53 gene mutation and is manifested by an increased risk of developing cancer during the patient's lifetime. To date, there is no clear evidence of a correlation between the syndrome and cases of angiosarcoma, so the hypothesis requires further study.

Pathogenesis

Scientists can not yet accurately determine the features of the formation of the tumor. Risk factors for carcinogenesis include chronic lymphostasis, radiation exposure, and exposure to chemical hazards. Tumor damage to the heart structures causes a decrease in its contractility and a variety of hemodynamic disorders. In the mechanism of development of symptoms, an important role is assigned to violations of blood flow to the heart due to obstruction of the vena cava.

Angiosarcoma of the heart is most characterized by damage to the right atrium, which is observed in 90% of cases. This localization is often accompanied by an invasive growth of the

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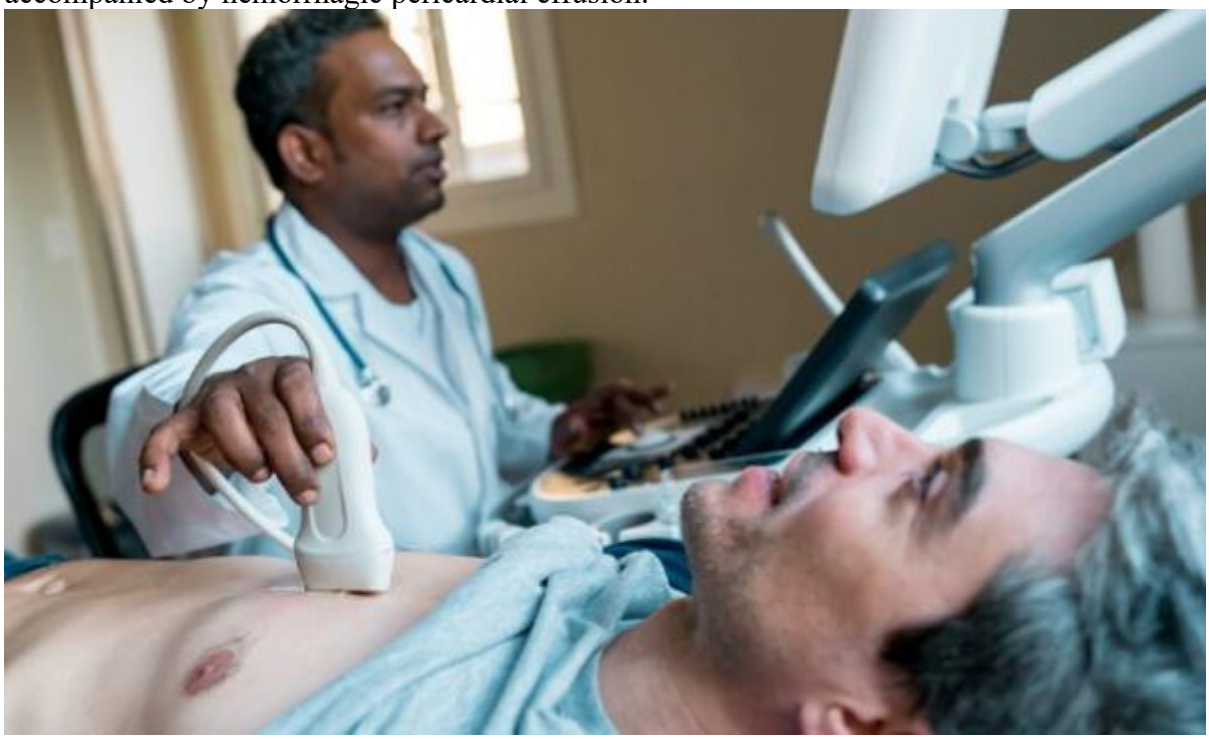
neoplasm in the pericardium. Isolated involvement of the left heart makes up no more than 5% of all cases of the disease. Morphologically, the tumor is a pathological vascular plexus of different sizes, which are supplemented by areas of hemorrhage and necrosis.

According to the anatomical structure, angiosarcomas are divided into 2 types. In the first type, a rounded formation with clear contours is visualized, which has an exophytic growth into the right atrium or other cardiac chamber. The second type of tumor is characterized by infiltrative growth in the thickness of the myocardium of the ventricles and pericardium, which is often accompanied by hemorrhagic pericardial effusion.



Ultrasound of the heart

Symptoms of angiosarcoma of the heart

An important feature of the disease is the absence of a specific clinical picture. Small tumors are asymptomatic for a long time, given their small diameter, and they are also not detected by transthoracic elective echocardiography. The appearance of signs of angiosarcoma of the heart indicates its rapid increase in size and/or germination into the thickness of the organ.

Since most cases of neoplasms are localized in the right parts, the progression of the disease causes a typical picture of right ventricular failure. Patients notice swelling of the legs, which increases in the evening, an increase in the circumference of the abdomen and expansion of the subcutaneous veins of the abdominal wall. Most people complain of shortness of breath, constant weakness, difficulty performing normal physical activities.

Another characteristic sign of angiosarcoma is an effusion into the pericardial cavity. In this case, the contractile function of the heart is disrupted, which causes the patient to experience shortness of breath, swelling of the cervical veins, rapid heartbeat and low blood pressure. It is characterized by pressing and bursting pains in the chest, which increase with

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breathing. Hemodynamic disorders are manifested by cyanotic staining of the skin around the mouth and on the distal parts of the limbs.

If the angiosarcoma of the heart is located in the left parts of the organ, symptoms occur already in the initial stages, which contributes to an earlier diagnosis of the tumor. In this case, patients suffer from the classic signs of left ventricular failure. The clinical picture is dominated by constant shortness of breath, heart pain, cough and wheezing in the lungs. Often there are attacks of dizziness and short-term fainting.

Complications

Most patients with angiosarcoma develop decompensated heart failure, severe rhythm and conduction disorders, including complete atrioventricular block. Rarely encountered, but one of the most dangerous complications is myocardial necrosis, which causes a rupture of the heart wall and, without emergency surgical assistance, ends in the patient's death.

Angiosarcoma of the heart is characterized by aggressive and rapid growth. More than 80% of patients with this type of tumor have metastases to the lungs, bones, liver and brain. Given the high frequency of metastasis, complications may be associated with the involvement of other internal organs in the process. The most unfavorable course is observed in brain damage, which is clinically manifested by stroke-like symptoms.

Diagnostics

Patients with characteristic complaints are referred for consultation to a cardiologist, after which a cardiac surgeon and oncologist can be involved in the examination. Physical examination reveals dilation of the heart, abnormal heart murmurs, and signs of superior vena cava syndrome. To diagnose angiosarcoma, a comprehensive examination program is prescribed, which includes the following methods::

- Echocardiography. Standard ultrasound of the heart is performed as a basic diagnosis, but for informative visualization, transesophageal echocardiography is required, the accuracy of which exceeds 97%. Typical signs of angiosarcoma include immobile formation on the endocardial surface, extensive myocardial infiltration, and heterogeneous tumor echostructure.
- MRI of the heart. A non-invasive and highly informative diagnostic method is preferred for suspected heart tumors. On the images, it is possible to accurately determine the size, internal structure, and localization of the neoplasm. Pathognomonic symptoms of angiosarcoma: the presence of areas of different signal intensity (sign of "cauliflower"), pericardial infiltration (sign of"sun rays").
- PET-CT scan. Positron emission tomography plays a crucial role in differentiating benign and malignant tumor processes. Diagnostic results are also important for early detection of distant metastases and monitoring the effectiveness of treatment.
- Histological analysis. When examining tumor biopsies, differentiated endothelial cells are identified, which form randomly located vascular channels. To clarify the diagnosis, an immunohistochemical study is performed with the help of which specific markers are isolated: CD34, vWE, D2-40 and LYVE-1.

Differential diagnosis

Due to the rare occurrence of angiosarcoma of the heart, when making a diagnosis, it is necessary to exclude more common cardiac diseases. Oncopathology is differentiated with benign formations: myxoma, rhabdomyoma, fibroma and hamartoma. Differential diagnosis is

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also performed with angina pectoris, cardiomyopathy, and arrhythmias. With a comprehensive examination, myocarditis and pericarditis, acquired heart defects are excluded.

Surgical treatment

Surgical intervention is recommended for patients for the maximum possible resection of the tumor. The more radical the operation, the more favorable the prognosis. However, complete removal of angiosarcoma is not always performed, which is due to the technical complexity of the operation and the inability to remove heart structures without critical organ function disorders. The best results of treatment are achieved with a malignant lesion of the left half of the heart.

In addition to standard resection of the tumor, autotransplantation of the heart with ex vivo removal of the neoplasm or transplantation of a donor heart can be used to treat complex cases of the disease. The possibility of carrying out such complex and expensive methods is determined individually after a complete diagnosis of the cancer patient's condition and an assessment of his life expectancy.

Chemotherapy

The use of cytostatics is required in the preoperative period to reduce the tumor mass, and after surgery as part of adjuvant therapy. In angiosarcoma, chemotherapy drugs from different pharmacological groups are used. Treatment protocols are selected individually, since there are no standardized chemotherapy programs. With a rational choice of drugs in combination with surgical treatment, the one-year survival rate of patients reaches 65%.

Experimental treatment

Targeted therapy – monoclonal antibodies that slow down tumor growth-is actively discussed in oncocardiology. The most studied drug blocks the activity of endothelial growth factor A (VEGF-A). Its use in combination with chemotherapy shows better results compared to monotherapy with cytostatics. The possibility of taking non-selective beta-blockers, which reduce the viability of tumor cells, is also being considered.

Prognosis and prevention

Angiosarcoma of the heart has an unfavorable course, which is associated with its late diagnosis and high aggressiveness. The average life expectancy of patients after diagnosis is from 10 to 36 months, which depends on the size of the tumor and its response to treatment. Effective prevention measures have not been developed, so cardiological check-ups, which are recommended for all people over 40 years of age, come to the fore.

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