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**CARDIAC DISORDERS IN PATIENTS  
CHRONIC VIRAL HEPATITIS AND CIRRHOSIS OF THE LIVER**

**Resume.** Currently, the parameters of myocardial deformity (strain and strain rate) are widely studied for the analysis of left ventricular contractility and the detection of subclinical changes in the myocardium in LV hypertrophy, as well as for the differential diagnosis of physiological and pathological LV hypertrophy. Meanwhile, there are practically no studies of the parameters of myocardial deformity to assess the contractility of the left ventricle in patients with chronic viral hepatitis (CVI) and viral cirrhosis of the liver (VCP) in the literature.

**Key words:** viral hepatitis, cirrhosis of the liver, cirrhotic cardiomyopathy, hypertension, CVH and VCP.

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## **НАРУШЕНИЯ СЕРДЦА У БОЛЬНЫХ ХРОНИЧЕСКИМ ВИРУСНЫМ ГЕПАТИТОМ И ЦИРРОЗОМ ПЕЧЕНИ**

**Резюме.** В настоящее время широко изучаются параметры деформации миокарда (режим strain и strain rate) для анализа сократимости левого желудочка и выявления субклинических изменений миокарда при гипертрофии ЛЖ, а также для дифференциальной диагностики физиологической и патологической гипертрофии ЛЖ. Между тем исследований параметров деформации миокарда для оценки сократимости левого желудочка у больных хроническим вирусным гепатитом (ХВГ) и вирусным циррозом печени (ВЦП) в литературе практически нет.

**Ключевые слова:** вирусным гепатитом, циррозом печени, цирротической кардиомиопатии, гипертензии, ХВГ и ВЦП.

**Relevance of the study.** In recent decades, there has been a significant increase in viral hepatitis with rapid progression and the development of cirrhosis of the liver. The direct cause of death in patients with cirrhosis of the liver is most often gastrointestinal bleeding and pneumonia, as well as cardiovascular failure. It is known that viral hepatitis is considered as a systemic disease, in which the cardiovascular system is often affected with the formation of cirrhotic cardiomyopathy (CCMP).

**The degree of development of the research topic.** Specific disorders in the myocardium in cirrhotic cardiomyopathy include hypertrophy and enlargement of the left ventricular cavity associated with diastolic dysfunction, systolic incompetence

during exercise, and prolongation of the QT interval. In the literature, there are isolated reports of violations of segmental diastolic and systolic functions of the myocardium in patients with diffuse liver diseases and the mechanisms of their development remain unexplored. From a prognostic point of view, it is important to assess the severity of liver parenchyma damage in patients with CVH and VCP, and its impact on the likelihood of developing and severity of pulmonary hypertension (Kalacheva T. P., 2013). The underlying prevalence of pulmonary hypertension in this category of patients is also unknown, since there are no unified screening methods for this pathology. There is information concerning a comprehensive study of advanced portal and pulmonary hypertension (portopulmonary hypertension) and their effect on the myocardium. However, studies of independent predictors of the development of pulmonary hypertension in patients with CVH and VCP have not been conducted.

Endothelial dysfunction is an important pathogenetic mechanism for the development and progression of cardiovascular diseases, including non-coronary myocardial lesions. The role of violations of the vasodilating function of the endothelium and in the pathogenesis of hemodynamic disorders in patients with diffuse liver diseases is shown. However, the patterns of endothelial function disorders in patients with CVH and VCP are not fully disclosed.

An important manifestation of heart damage is the development of arrhythmias. Meanwhile, there is no information in the literature about their frequency and nature in patients with CVH and VCP, about the relationship with the main parameters of heart rate variability, QT interval variance, morphofunctional heart disorders, hepatitis activity and the presence of portal hypertension. Of the diagnostic tools used in the assessment of hepatic hemodynamics, radiation diagnostic methods play a significant role, however, these disorders in patients with diffuse liver diseases are usually diagnosed only at late stages using the main B-mode. Modern ultrasound equipment of the expert class combines in its arsenal and Doppler techniques, with which you can

study the hemodynamics of the liver. There is enough information in the literature on hepatolienal blood flow in patients with CVH and VCP. However, there is no data on the relationship of portal circulatory disorders with cardiohemodynamic, vegetative and endothelial disorders.

In the treatment of viral hepatitis and cirrhosis of the liver in recent years, some progress has been made. Etiotropic antiviral therapy (HTP) is still expensive and not readily available for most patients. It is known that HTP largely determines the prognosis of the disease in patients with CVH and VCP. Meanwhile, the effect of antiviral therapy on structural and functional disorders of the myocardium, hepatolienal blood flow in this category of patients has not been practically studied.

In this regard, it seems relevant to conduct a comprehensive study of cardiohemodynamic and electrophysiological heart disorders in Solo CVH and VCP in order to develop early instrumental methods.

criteria for the diagnosis of cardiovascular disorders in this category of patients.

**Objective:** to identify cardiohemodynamic and electrophysiological disorders of cardiac activity in patients with chronic viral hepatitis and cirrhosis of the liver and to assess the effect of antiviral therapy on these indicators.

Material and methods of research. A total of 97 patients with CVI B, C, B+C (56 men and 41 women) were examined. The median age was 35.2 (29.5;40) years. The duration of the disease is 5.2 (2.7;7.9) years. 76 patients with NSU-infection, 14-with NVU-infection, 1-e mixed infection (PSU + NVU). Of these, 14 patients received a full course of PVT (peg-NN-terference and analogues nucleosides). In addition, 95 patients with HCV in the outcome of CVH B, CVH C, CVH B+C (49 men and 46 women) were examined. The average age of patients with VCP was 36.7 (25.5;45) years. The duration of the disease is 5.3 (2;5.9) years. 69 patients - with NSU-infection, 18-with NVU-infection, 8-with mixed infection (NSU + IVU). Of these, 16 patients received a full course of HTP.

**The results of our own research.** Structural and functional parameters of the myocardium in patients with CVH and VCP. In patients with moderate CVH activity, in contrast to the indicators of healthy individuals and patients with minimal CVH activity, there was an increase in the size of the left, right atria, right ventricle, LV end diastolic volume index and LV myocardial mass index ( $P<0.001$ ). In patients with minimal and moderate activity of CVH, a violation of the longitudinal diastolic function of the right ventricle and a decrease in its systolic function were found. ( $P<0.001$ ). With minimal activity of CVH, in contrast to the control indicators, the LV BWW index increased, as well as the time of LV isovolumetric stress, ( $P<0.001$ ). That is, an increase in the activity of the inflammatory process in the liver was accompanied by more pronounced violations of the structural and functional parameters of the heart. Patients with CVH and VCP did not differ in the duration of the disease, anthropometric indicators, and the presence of concomitant diseases in the anamnesis. In patients with VCP, there was an increase in the size of the left atrium by 8%, the LV mass index by 23%, and the rate in the descending aorta increased by 8% compared to the group of patients with CVI ( $P<0.05$ ). Thus, in viral cirrhosis of the liver, more pronounced structural and functional changes of the myocardium were found than in CVI. Diastolic and ventricular function and LV remodeling in patients with CVH and VCP. In all patients, the parameters of the transmitral and transtricuspid flows were studied during the echocardiographic study, on the basis of which the type of spectrum was determined for each patient: normal and pathological type of diastolic dysfunction (DD). The pathological type included the pseudonormal and hypertrophic type of DD. In patients with CVH without impaired ventricular diastolic function, the left atrium increased by 7% and the thickness of the interventricular septum increased by 12% ( $P<0.001$ ). The addition of LV DD was accompanied by an increase in LV myocardial mass by 15%, end-diastolic LV volume by 14%, an increase in LV sphericity index in systole by 24% and diastole by 28%, LV shock volume by 19.6%,

and LV cardiac index by 10% ( $P < 0.001$ ). At the same time, the maximum LV systolic rate decreased by 30% ( $P < 0.001$ ). The addition of RV DD in patients with CVH was accompanied by an even greater increase in the atria, pulmonary artery trunk, LV mass, LV end diastolic pressure by 23%, with an acceleration of the transaortic blood flow rate by 12%, a decrease in the longitudinal segmental systolic LV rate by 24%, and an increase in the pressure of jamming in the pulmonary artery ( $P < 0.001$ ). In patients with VCP without impaired ventricular diastolic function, the LP cavity expanded by 11%, the left ventricular myocardial mass increased by 18%, and the pulmonary artery fibrous ring dilated ( $P < 0.001$ ). The addition of LV DD was accompanied by LV remodeling with a 14% increase in LV IMML, dilagation of the heart cavities, and a 30% decrease in the maximum segmental systolic LV rate. The addition of DD of the pancreas was accompanied by an increase in LVML by 23%, left atrium by 11%, pancreas by 19%, increased minute volume of pa by N%, decreased index of Ten of the pancreas, increased pressure in the pulmonary artery by 21%.

### **Conclusions.**

1. Patients with chronic viral hepatitis and cirrhosis of the liver have significant cardiohemodynamic disorders characterized by structural disorders of the myocardium and impaired systolic and diastolic functions of the left and right ventricles; the revealed changes are most pronounced in patients with active CVH and VCP in the presence of ascites.
2. Changes in the structural parameters of the myocardium in patients with CVH and VCP occur even before the violation diastolic function of the left ventricle, and its addition is accompanied by more pronounced morphofunctional changes in the heart. In ICP with impaired diastolic function of the left and right ventricles, more significant changes in the structural and functional parameters of the myocardium were found than in CVI.

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