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FEATURES OF HEART DAMAGE IN PATIENTS WITH VIRAL CIRRHOSIS OF THE LIVER

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ABSTRACT

Goal. To study the structural and functional parameters of the heart, as well as the effect of antiviral therapy on some cardiohemodynamic parameters in patients with viral cirrhosis of the liver (VCP).

Material and methods. 96 patients with cerebral palsy were examined (median age 42.1 [36;44] years, duration of the disease – 3.5 [2.8;6.7]years). Patients without ascites (n=59) made up the 1st group, and patients with ascites (n=37) - the 2nd group. The control group included 21 healthy volunteers. Standard and tissue Doppler echocardiography, Holter electrocardiogram monitoring were performed.

Results. Ventricular extrasystoles (from class I to IVB according to the Laun-Wolf classification) were detected in 8 (13%) patients of group 1 and 12 (33%) patients of the 2nd group. The corrected QT interval in group 1 patients was 457.9[442;468] msec, in group 2 – 478 [433;502] msec, in the control – 427.9[406;438] msec ($p<0.001$). Supraventricular arrhythmias were represented by supraventricular extrasystoles in 15 (25%) patients of group 1 and in 18 (50%) of group 2; paroxysmal form of atrial fibrillation in 2 (3%) and in 7 (19%) patients, respectively. In patients with ascites, the systolic Sm velocity of the lateral wall (segments 3, 9) was lower by 23% and 25%, respectively, compared to group 1, and the Tei index was higher compared to the control and 1st groups ($p<0.001$). In patients with cerebral palsy without ascites, the indicators characterizing the mass of the myocardium of the left ventricle increased, the left atrium expanded, the pulmonary artery, these disorders increased in patients with ascites, systolic pressure in the pulmonary artery increased, segmental and global systolic function of the left ventricle decreased. Antiviral therapy was accompanied by a decrease in left ventricular myocardial mass, left atrium volume index and systolic pressure in the pulmonary artery.

Conclusion. Thus, in patients with cerebral palsy without ascites, an increase in the mass of the myocardium of the left ventricle, the cavity of the left atrium, the pulmonary artery was found, there is a violation of the heart rhythm and an elongation of the corrected QT interval. These changes are more pronounced in patients with ascites, in addition, their pulmonary artery pressure increased and the systolic function of the ventricles of the heart decreased. Antiviral therapy has a positive effect on some cardiohemodynamic parameters.

Keywords: left ventricle, viral cirrhosis of the liver, antiviral therapy.

INTRODUCTION

Cirrhosis of the liver (CP) is one of the urgent problems of medicine of the last decade. This is due to a large increase in viral liver diseases, in particular caused by hepatitis B and C viruses. Portal circulation disorders trigger a cascade of autonomic, neurohumoral and metabolic reactions that cause changes in central hemodynamics, which exacerbates not only disorders of intrahepatic blood flow, but also and leads to multiple organ extrahepatic disorders, including cirrhotic cardiomyopathy. Currently, heart damage in patients with viral cirrhosis of the liver is being actively studied mechanisms of development of the main symptoms of cirrhotic cardiomyopathy, biochemical and electrophysiological changes of the heart, conditions of occurrence of diastolic and systolic dysfunction, features of structural and functional changes in the myocardium. Meanwhile, the syndrome of cirrhotic cardiomyopathy has not yet been definitively classified, and many mechanisms of development myocardial dysfunction in patients with CP is unknown. The absence of these data indicates a lack of awareness of practitioners about changes in the cardiovascular system. Reports of deaths due to heart failure during liver transplantation, transjugular intrahepatic portosystemic bypass surgery and surgical portocaval shunts in patients with cirrhosis suggest that myocardial dysfunction may progress with an increase in circulating blood volume. It is known that conducting antiviral therapy in patients with chronic viral hepatitis and cirrhosis of the liver serves as a prevention of the development of liver failure and hepatic cell carcinoma. Currently, to assess the effectiveness of the therapy, endpoints that are more convenient for measurement are used, which include suppression of virus replication, disappearance of the virus antigen, normalization of alanine aminotransferase activity, improvement of the histological picture of the liver, prevention of infection reactivation after transplantation liver, as well as improving the quality of life of patients. The only drug with proven efficacy in the treatment of viral hepatitis and compensated viral cirrhosis of the liver is interferon, used in combination with nucleoside analogues. The literature describes studies, as a result of which antiviral therapy leveled most of the structural and functional abnormalities of the cardiovascular system, improved the parameters of the functional state of the endothelium, and also contributed to the normalization of the number and frequency of increased the level of antimiocardial antibodies, except for patients with mixed infection. The aim of our study was to study the structural and functional parameters of the heart, as well as the effect of antiviral therapy on some cardiohemodynamic parameters in patients with cerebral palsy.

MATERIALS AND METHODS

The paper analyzes the results of examination of 96 patients (51% men, 49% women) with viral cirrhosis of the liver of class A, B, C according to the Child-Pugh criteria, who were treated at the Chita City Infectious Diseases Hospital. The median age of the patients was 42.1 [36;44] years, the duration of the disease was 3.5 [2.8;6.7] years. The diagnosis of CP was confirmed morphologically (laparoscopy with targeted biopsy) in 9 people, the rest are exposed on the basis of clinical, laboratory and instrumental data. The viral genesis of liver damage was confirmed by the presence of blood in the serum markers of viral hepatitis B [HBsAg, antibodies (AT) of classes M and G to HbcorAg, HBV DNA), C (AT of classes M and G to

HCV, HCV RNA]. Depending on the presence of ascites, patients were divided into 2 groups: 59 (61%) patients had no ascites (group 1), 37 (38%) patients were diagnosed with ascites of varying severity (group 2), the control group consisted of 21 healthy volunteers of the appropriate age without signs of liver pathology. The study did not include: patients over 52 years of age with essential and symptomatic arterial hypertension, heart and lung diseases, with chronic alcoholism and severe concomitant pathology. There were no pronounced signs of heart failure in the groups of examined patients. Standard and tissue myocardial Doppler echocardiography was performed according to the standard procedure on the device "VIVID E 95" (General Electric).

Tissue Doppler echocardiography was performed from apical access at the level of two, four chambers, the Doppler spectrum was recorded from the fibrous rings of the mitral, tricuspid valves and ventricular segments, indices were calculated: Sm – systolic myocardial contraction, the maximum speed of the first negative peak Em, the maximum speed of the second negative peak Am, the ratio Em/Am, time before myocardial contraction Ivs, relaxation time Ivr. Systolic pressure in the pulmonary artery was measured by the rate of tricuspid regurgitation. Regional longitudinal deformation and the rate of deformation of the left ventricular myocardium (LV) were studied by the method of the non-Doppler mode of two-dimensional seroscale deformation. The study was carried out from the apical access to the position along the long axis, the LV myocardium was recorded with optimal visualization of all segments, with a frame rate from 50 to 80 per second, with stable ECG registration. The endocardium was clearly traced, the epicardial surface was traced automatically. The program calculated the displacement of the pattern of spots within the zone of interest from frame to frame throughout the entire cardiac cycle. After optimizing the area of interest, the software generated strain curves for each of the 6 segments. Regional and global amplitude and time indicators were obtained from these curves (by averaging the values of all segments). Holter ECG monitoring (XM) was performed using the Astrocard complex. Variance The QT interval was calculated as the difference between the average maximum and minimum values of the QT interval in six precordial ECG leads.

To correct the variance of the QT interval depending on the heart rate (variance of the corrected interval QTc) used a modified H. Bazett formula:where dQTc is the variance of the corrected QT interval; dQT is the variance of the QT interval; RR is the duration of the cardiac cycle. The coefficient of variability of the QT interval (QTvar) was calculated by the formula: QTvar=(QTc)/(QTsp)x100%, where QTsp is the average value of the QT interval.

Statistical data processing was carried out using the Statistica 6.0 statistical software package (Statsoft Inc., USA). The distribution of almost all variation series did not comply with the criteria of normality, therefore, methods of nonparametric statistics were used in the analysis. To

assess the differences between the groups, the nonparametric Mann-Whitney test was used. The correlation analysis was performed using Spearman's rank correlation coefficient.

RESULTS

According to the XM ECG data, ventricular extrasystoles of various gradations were detected in patients with cerebral palsy – from I up to class IVB according to the Laun-Wolf classification, occurring in 8 (13%) patients of group 1 and in 12 (33%) patients of group 2. When comparing the corrected QT interval in patients with viral cirrhosis of the liver, its lengthening was noted, this indicator in patients of group 1 was 457.9 [442;468], in the 2nd – 478[433;502] in the control – 427.9 [406;438] ($p<0.001$). Supraventricular arrhythmias were represented by supraventricular extrasystoles in 15 (25%) patients of group 1 and in 18 (50%) – group 2; paroxysmal form of atrial fibrillation in 2 (3%) and 7 (19%) patients, respectively. twenno.

When comparing the average values of the tissue Doppler spectrum in patients with viral CP, it was found that the peak systolic velocity (Sm) of the side wall (segments 3, 9) in patients with ascites was 23% and 25% lower, respectively, compared with group 1 ($p<0.001$).

It can be assumed that the global longitudinal systolic LV function in patients with ascites, in contrast to patients without ascites, was reduced. The myocardial productivity index increased Thei in the 2nd group at the level of the tricuspid ring, characterizing a decrease in global function right ventricle in patients with ascites in comparison with the control and 1st groups ($p<0.001$;).

The conducted echocardiographic analysis showed that in patients with CP without ascites there is an increase in indicators characterizing the mass left ventricular myocardium (interventricular septum, LV posterior wall, LV myocardial mass and LV myocardial mass index), left atrium dilates, pulmonary artery ($p<0.001$). These disorders increased in patients with ascites, where

systolic pressure in the pulmonary artery also increased ($p<0.001$;).

When assessing myocardial deformity in patients with CP the index of the maximum systolic strain for the anterior septum segment in patients with ascites was statistically significantly different from that in the control group ($p=0.004$;). The parameters of the lower lateral, lower, and lower septum segments of the LV were lower in patients with ascites compared with patients of the control group and patients without ascites ($p<0.001$). The global systolic strain (in the position on the 2nd and 4th chambers, and along the long axis from the apical access) in patients with CP in the presence of ascites was statistically significantly different from those in patients without ascites and in the control group ($p<0.001$;). Thus, in patients with ascites, a decrease in segmental and global LV systolic function was found.

Antiviral therapy in patients with viral cirrhosis of the liver is known to prevent the development of liver failure and hepatic cell carcinoma. 16 patients with viral CP received antiviral therapy with interferon drugs in combination with ribavirin with the formation of a persistent virological response for 11.8 months. Carrying out specific treatment had a positive effect on some morpho-functional parameters of the heart: there was a decrease in the mass of the left ventricular myocardium by 7%, the left atrium volume index by 10% and systolic pressure in the pulmonary artery by 12% .

DISCUSSION

The study confirms the data on the presence of myocardial dysfunction in patients with viral CPU. In compensated patients, remodeling of the left ventricle occurs with an increase in its mass, volume of the left atrium, diameter of the pulmonary artery, a decrease in the maximum systolic velocity of the mitral valve fibrous ring is noted. In addition, a violation of the heart rhythm by the type of extrasystole, paroxysmal form of atrial fibrillation, as well as prolongation of the corrected QT interval. In patients with ascites, there is a more pronounced remodeling of the left ventricle with an increase in its mass, the left atrium and pulmonary artery expand even more, the systolic function of the ventricles decreases, cardiac arrhythmias are more common, the QT interval is even longer. The leading role in the development of changes in the architectonics of the heart in In patients with viral CP, it belongs not only to mechanical (an increase in the volume of circulating blood, its viscosity, total peripheral resistance, systolic tension of the walls of the left ventricle, etc.) and neurohumoral (the influence of the renin-angiotensin and sympathetic systems) factors, but probably the effect of damaging effects on cardiomyocytes of inflammatory factors and procoagulants circulating in the blood. There is evidence of a direct effect on the myocardium of the core protein of the virus, and there is a possibility of settling of circulating immune complexes both in the myocardium and in the wall

vessels with the formation of vasculitis. It is also known about the cardiotoxic effect of endotoxins, in particular, bile acids, due to their ability to inhibit the automatism of the sinus node, which is one of the factors of vagal dysfunction of reduced reactivity of the sympathetic nervous system. Hypokalimia, developed due to the increased activity of aldosterone, inhibits the processes of depolarization in the myocardium. A clear marker of these dielectrolyte disorders is the extended QT interval, which can form electrical instability of the myocardium with the development of disorders intraventricular conduction and life-threatening arrhythmias [3]. In response to overload, the structure and functions of the heart change, the left atrium expands, the mass of the myocardium increases, due to compression of the intramural coronary arteries, the coronary reserve decreases, which contributes to the development of cardiac arrhythmias. In turn, a decrease in coronary blood flow worsens the pumping function of the ventricles. As a result of morphological changes in the myocardium, shortening the interval between contractions leads to a decrease in LV filling. The deterioration of its filling is compensated increased pressure in a small circle. A decrease in extensibility also contributes to a decrease in contractile function. Insufficiency of one half of the heart causes the other to overstrain, and increased preload leads to an increase in the residual volume of blood, pressure increases in the right parts and veins of the large circulatory circle, splanchnic fullness is formed, which contributes to an increase in pressure in the LA.

Antiviral therapy in patients with viral CP had a positive effect cardiohemodynamic parameters and was accompanied by a decrease in left ventricular myocardial mass, left atrium volume index and systolic pressure in the pulmonary artery. It is possible that the phase of virus integration due to antiviral therapy is accompanied by a decrease in portal hypertension, resulting in a decrease in LV mass and LP volume, which play an important role in the formation

of cardiac arrhythmias. In all patients with CP, a study of the relationship between the global maximum deformation (Avg) and the parameters of the hepatoportal hemodynamics, structural and functional parameters of the heart. A strong correlation was revealed between Avg and increased viral load ($r=0.87$; $p<0.05$), portal vein diameter ($r=0.65$; $p<0.001$). From this it can be concluded that a possible cause of myocardial damage may be direct exposure to hepatitis viruses.

CONCLUSION

Thus, in patients with CP of viral etiology without ascites, an increase in the mass of the myocardium of the left ventricle, the cavity of the left atrium, the pulmonary artery was found, there is a violation of the heart rhythm and an elongation of the corrected QT interval. These changes are more pronounced in patients with ascites, in addition, their pulmonary artery pressure increased and the systolic function of the ventricles of the heart decreased. Antiviral therapy has a positive effect on some cardiohemodynamic parameters.

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