

CHANGES OF PORTAL HAEMODYNAMICS WHILE CRONIC DIFFUSIVE DISEASES OF LIVER

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Portal hypertension (PH) of the sick people with chronic diffusive diseases of liver defines the quality of life and prognosis of bleeding development [5]. The main pathogenic part is the increase of resistibility in vessels of liver and the increase of volume of blood inflow into a portal system [2]. For the estimation of hemodynamic changes in liver there are used ultrasonography of liver, dopplerographic research of portal, splenic veins and liver arteries [5], this facts give an opportunity to define the extent of portal pressure while the chronic hepatitis (CH) at the early stages of disease [1]. While the ultrasonic Doppler sonography for the diagnostics of the syndrome of portal hypertension they measure diameter and square of cross section of portal and splenic vein with the defining of speed showings of blood flow in them [3]. But diameter and square of cross section of these veins and also showings of blood flow speed in them mainly change while the stably high portal pressure, which is observed more often while the cirrhosis of liver [4]. With our view, this indirect method of early diagnostic of portal hypertension can't be rather informative. To this task in full there can be responsible the measuring of pressure in v. port. Therefore the aim of this work is to explain the use of ultrasonic Doppler sonography for dynamic control of extent of CH of viral aetiology sick people's portal pressure.

Materials and methods of research

64 sick people with chronic hepatitis were researched. CH sick people were divided into 3 groups by the degree of activity of inflammatory process. The first group (with minimal activity) consisted of 22 sick people, their average age was $23,3 \pm 2,5$ years; the second group (with moderate activity) consisted of 23 patients, their average age was $35,7 \pm 2,7$ years; the third group (with high activity) was formed of 19 sick people, their average age was $49,3 \pm 2,6$ лет. At the group of CH patients the average duration of disease was $5,9 \pm 4,3$ years from the moment of formation of diagnose. At the groups of CH patients the markers HBV at the phase of replication were revealed of 16 (25%) sick people, at the phase of integration – of 11 (17,2%) sick men. Markers HCV at the phase of replication were revealed of 10 (15,6%) people, at the phase of integration – of 11 (17,2%) patients. Markers HBV+HCV were revealed of 13 (20,4%) patients. For the revelation of varicose veins of esophagus to all patients there was carried out fibrogastroduodenoscopy at the apparatus «Olimpus» (Japan). For the morphological verification of diagnosis of 45,3% ($n = 29$) patients with CH there was car-

ried out thick needle biopsy of the liver. While the histological research of hepato biopsies there was estimated the activity of the process by the morphological criterions Bianchi, were defined the index of histological activity by Knodelle and the degree of fibrosis. Ultrasonic research of organs and vessels of abdominal cavity was carried out by the methods of V.V. Mitkova and co-authors [5] at the ultrasonic apparatus «Aloka SSD-5000» (Japan) with multi frequent convex sensor 3,5 MHz at the regime of energetic and color mapping, there were estimated quantitative and qualitative parameters of liver and spleen. Haemodynamics at the vessel structures was defined by method of Doppler sonography. There were measured the diameter and square of cross section of portal and splenic veins with simultaneous examination of speed showings (maximal linear and volume speeds), blood flow in them, the level of pressure in portal vein. Received clinically-instrumental facts were treated by the classical for medically-biological works criteria of parametric and nonparametric statistic. The trustworthiness of abnormalities was estimated with the application of criteria of Student and Fisher with the use of packet Primer of Biostatics (Version 3,0).

Results and their discussion

The echographic characteristics of the liver's and spleen's condition of patients with chronicle hepatitis of different degree of activity of inflammatory process included quantitative and qualitative parameters of grey dial echography. The quantitative parameters of grey dial echography of liver and spleen of CH sick people were represented in the table 1. Received results of researches testify to that sizes of liver and spleen in considerable measure are connected with the activity of inflammatory process in liver. The analysis of results of researches of haemodynamics in portal and splenic veins, represented at the table 2, showed that patients with minimal activity had no observed essential widening of their diameter, and average extent of portal pressure was near to the norm. On the contrary, sick people with high activity had the diameter of portal and splenic veins, and also extent of portal pressure, which considerably increased ($p < 0,05$). The showings of portal haemodynamics of the patients with moderate activity occupied the intermediate position between two previous groups of patients. While the Doppler sonographic research of blood flow in the portal vein there was no observed considerable decrease of maximal speed of blood flow and increase of volume blood flow. In the splenic vein there were noticed signs of abnormality of haemodynamics, which by their direction coincided with the same in the portal vein, but quantitatively these changes were not so essential.

It's appropriate to mention that if patients with CH of minimal activity only had an observed tendency to the rise of portal pressure, that patients with CH of high activity had its registered high

level. It should be noticed that observed sick people had no clinic, morphological signs of cirrhotic changes at the tissue of liver. There were examined the peculiarities of portal haemodynamics of the patients with CH of moderate and high activity of pathological process in liver. For the patients with moderate activity there were character three types of blood flow in the portal vein: eukinetic ($19,5 \pm 0,3$ sm/sec), hypokinetic ($16,2 \pm 0,1$ sm/sec) and hyperkinetic ($23,0 \pm 0,2$ sm/sec). Patients with CH of high activity had two revealed types of blood flow in portal vein: eukinetic ($20,2 \pm 0,2$ sm/sec) and hypokinetic ($15,3 \pm 0,4$ sm/sec). The appearance

of hyperkinetic type of blood flow of the sick people with CH of moderate activity with an extent of pressure in the portal vein from 148,0 till 181,0 mm of water column was estimated as one of the compensatory mechanisms of portal blood circulation. Hypokinetic type of blood flow in the portal vein of the patients with CH of moderate and high activity was connected, apparently, with the morphological changes of liver parenchyma and stably raised intrasinusoidal pressure. Patients with CH of different activity had also an examined dependence of the blood flow speed in the portal vein, and also its diameter from the level of portal pressure.

Table 1

Sizes of liver and spleen of the patients with chronicle hepatitis

Parameters	Diagnosis			
	CH of minimal activity (n = 22)	CH of moderate activity (n = 23)	CH of high activity (n = 19)	Control group (n = 40)
<i>Liver</i>				
Slanting size of right lobe, mm	139,31 ± 3,59*	154,26 ± 7,54**	187,74 ± 7,32***	137,8 ± 1,79
Anteroposterior size of left lobe, mm	56,18 ± 1,31*	76,65 ± 8,62**	91,26 ± 9,78**	55,7 ± 1,87
Anteroposterior of Spiegelian lobe, mm	18,04 ± 1,09*	19,87 ± 2,11	24,16 ± 1,71**	17,6 ± 1,83
<i>Spleen</i>				
Square, sm ²	33,75 ± 1,01*	34,08 ± 0,79**	41,13 ± 1,61**	31,8 ± 1,49

Note: * – $p > 0,05$ in comparison with control, ** – $p < 0,05$ in comparison with control, *** – $p < 0,01$ in comparison with control.

Table 2

Parameters of hepatportal haemodynamics of the patients with CH

Parameters	Diagnose			
	CH of minimal activity (n = 22)	CH of moderate activity (n = 23)	CH of high activity (n = 19)	Control group (n = 40)
<i>Portal vein</i>				
1. Inside diameter, mm	10,7 ± 1,1*	12,9 ± 1,2*	13,9 ± 1,1**	10,2 ± 0,7
2. Maximal speed of blood flow, sm/sec	21,5 ± 1,8*	18,9 ± 2,1*	17,5 ± 1,5*	21,6 ± 2,7
3. Volume speed of blood flow, ml/min	1250,4 ± 334,1*	1233,2 ± 336,7*	1259,3 ± 159,8*	1075,0 ± 83,6
4. Level of portal pressure, mm of water column	120,1 ± 7,3*	167,1 ± 14,2**	193,3 ± 10,5**	113,0 ± 4,4
<i>Splenic vein</i>				
1. Inside diameter, mm	6,8 ± 0,7*	7,3 ± 0,7*	8,1 ± 0,9**	6,4 ± 0,6
2. Maximal speed of blood flow, sm/sec	18,6 ± 1,1*	17,3 ± 1,2*	16,5 ± 1,2*	19,2 ± 2,2
3. Volume speed of blood flow, ml/min	386,3 ± 78,9*	406,1 ± 84,1*	439,2 ± 73,4*	345,4 ± 34,6

Note: * – $p > 0,05$ in comparison with control, ** – $p < 0,05$ in comparison with control, *** – $p < 0,01$ in comparison with control.

Researches showed that while the rise of the level of portal pressure there lowered the speed of blood flow in the portal vein. Thus patients with CH of moderate activity while the level of portal activity 148,0 mm of water column had the speed of blood flow of 23,0 sm/sec, while the rise of portal pressure till 181,0 mm of water column there was observed the decrease of the blood flow's speed till 16,0 sm/sec. While the rise of the level of pressure in the portal vein from 188,0 till 204,0 mm of water column patients with CH of high activity had an observed lowering of the blood flow's speed in the portal vein from 20,0 sm/sec till 15,0 sm/sec, correspondingly. Received facts testify to that by the rising of portal pressure there is registered the lowering of the blood flow's speed in the portal vein. In the clinical practice about the degree of portal hypertension on judge by the extent of diameter of portal and splenic veins. In connection with this there were compared extents of portal pressure and diameter of portal vein. Researches were carried out of all observed patients with CH of different activity. It was found that while the rise of portal pressure there was observed the increase of the diameter of portal vein. Thus sick people with CH of moderate activity while the portal pressure 148,0 mm of water column the diameter of portal vein was $11,0 \pm 0,2$ mm, and while the rise of portal pressure till 181,0 mm of water column the diameter of portal vein increased till $14,0 \pm 0,3$ mm. While the rise of portal pressure from 188,0 till 204,0 mm of water column of the patients with CH of high activity there was observed the dilatation of portal vein from $12,0 \pm 0,2$ mm till $16,0 \pm 0,1$ mm, correspondingly. Received facts testify that in the majority of cases there was registered right parallelism between the level of portal pressure and extent of the diameter of portal vein. At the same time not infrequent were cases when this parallelism wasn't observed. From the received results it follows that parameters of liver haemodynamics are connected between each other while the main role of activity of inflammatory process. In connection with this we can't exclude the situation when with the degree of intensity of morphological changes between the level of portal pressure and extent of the diameter of portal vein there not always observed the interconnection.

Conclusion

Practically all healthy people by the facts of ultrasonic Doppler sonography with the use of empiric formula of calculation the average extent of portal pressure was $113,0 \pm 4,4$ mm of water column with rippling at the limits from 103 till 143 mm of water column. Portal hypertension, while the viral diseases of liver, develops at the stage of chronic hepatitis, the degree of its intensity depends on the activity of inflammatory process in the liver. Widening of the diameter of portal and splenic veins, and also increase of the square of their cross section not always correlate with the level of portal pressure.

References

1. Batskov S.S. Clinical meaning of Doppler sonography of portal vein of sick people with diffusive diseases of liver. Actual problems of gastroenterology and dietology. – St. Petersburg, 1997. – P. 71–72.
2. Loginov A.S. Toporkov A.S. Doppler sonography and the possibility of its use at hepatology // Archives. – 1994. – №2. – P. 72–75.
3. Mansurov H.H. Portal hypertension: pathophysiology, classification, diagnostics and tactics of conduction of sick men // Russian magazine of gastroenterology, hepatology, coroproctology. – 1997. – Vol. 3, №4. – P. 69–72.
4. Mitkov V.V., Mitkova M.D., Fedotov I.G., Serebryanikova V.A., Cheresheva U.N., Kranchenko N.A. The estimation of portal blood flow while the cirrhosis of liver // Ultrasonic diagnostics. – 2000. – №4. – P. 10–16.

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SOME PROBLEMS IN COMPUTER RECONSTRUCTION OF ORGANS, TISSUES AND CELLS IN HUMAN AND ANIMAL MORPHOLOGY

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Modern computer equipment allows us to create 3-D models of methodical – biological objects that find a wide implementation in typographic anatomy and surgery, as well as in computer tomography of diagnosis purposes (Maykaya, 2000; Blinov, 2005). Along with that another area of medical science exists, in which a work with visual images goes on that could make a breakthrough in our knowledge of human and animals organ, tissue, and cells structure. It is the morphology that includes anatomy, histology, and cytology. It could allow us to carry out a multi-level reconstruction of organs and their components. This knowledge was especially important for defining anatomic, histological, and cytological peculiarities of various knots and tracts distribution in heart, where significant blanks in topographic determination of all the organ's leading systems and its nervous and vascular components exist. It leads to the fermentation of our knowledge on the organ's function morphological substance in its normal and pathological condition. Classical heart leading systems and knot operative myocardium metastructure reconstruction methods are very rare to find in literature (Thaemert, 1978) because of their laboriousness and significant technical difficulties (a cutting of serial ultrathin cuts on numerous nets of one block takes years of work). We can try to make the researcher's problems easier if we use little animal organs enclosed in one block of epoxy gums and further its cutting into thick