POSSIBILITIES OF DOPPLER RESEARCHES IN DIAGNOSIS OF CHRONIC VIRAL HEPATITISES IN CHILDREN

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Summary: The data of 270 children after ultrasound examination are given in the article. Those were clinical laboratory results that not always reflect the real pathologic picture of hepatic processes with the divergence of 14%-37%. Additional doppler test in the combination with echography is shown to enable not only increase in diagnosing effectiveness up to 35,3%, but also in having in idea of the condition of parenchyma and spleen, collateral dysfunction of blood circulations and marked portal hypertension. Similar direction of structural functional impairments of hepatic vessels was determined. Direct and indirect criteria in diagnosing of portal hypertensions were worked out.

Keywords: chronic viral hepatitis, diagnostics, ultrasound, Doppler ultrasound, children.

Relevance. Chronic viral hepatitis (ChVH) presents severe problems for health services in most countries in the world and also in Uzbekistan. Due to its wide spread and the variety of forms as mild, severe, progressive and even cirrhosis [3;5;6;7], the problem attracts particular attention in pediatrics and one of the causes is irregular sometimes wrong diagnostics of pathologic process in the liver. It is due to variety of clinical manifestations, similarity of symptoms of other gastrointestinal tract diseases, “scantiness” of objective signs, insufficient interpretation in literature on pediatrics matters of screening diagnostics, absence of conformity between pathology change in the liver and its manifestation [5; 8; 10; 11].The main point of the development of chronic liver diseases is the development of the successive stages of fibrosis of the liver with cirrhosis at the end. The best standard diagnosing method in liver fibrosis is biopsy. However, the invasive method, possible errors in evaluation of the results with sampling error (incompatibility of local tissue area to the total process in the liver) and practical limits in biopsy in children give rise to the study of other, more available methods in diagnostics.

The experience in pediatrics certifies the necessity of popularization and in all area inculcation of USI. The preferences given to ultrasound echography in the combination with dopplerography of the vessels in various systems. It is not only supplement to two dimension USI but enables to reveal delicate mechanism of hemodynamics disturbances in the cases not diagnosed by using the standard

echography [1; 2; 9; 12]. At this point of view, the role of Doppler in complex evaluations of the conditions of the liver the ChVH in children is of great significance.

Purpose of the investigation: comparative evaluation of informatively of echography and hemodynamic disturbances in the hepatic vessels and spleen in children with ChVH.

Materials and methods. 270 children with ChVH and 61 healthy children at the age of 3-18 years old were under the investigation: 3-7 years old –32,6% 8-10 years old - 22,2%, 11-13 years old - 22,6%, 14-18 years old - 22,6%, with minimal activity - 25% (1st group), mild activity – 43% (2nd group), marked activity –32% (3rd group). Among them boys constituted 68%, girls -32%.

The diagnosing was made on the basis of clinical, biochemical, serologic, and instrumental data with the recommendation of B.F.Uchaykin and coauthors [5] and F.I.Inoyatova and coauthors [4]. Clinical tests of children included detailed collection of history data, clinical examination with totality of signs. Biochemical , blood test included determination of ALAT, ASAT activity, protein content and its fractions, general and direct bilirubin, alkaline phosphatase, Hama-GTP, thymol test, fibrinogen, prothrombin unified methods with the help of commercial set of "Optima" on biochemical analyzer ΦП-901 with the use of "HUMEN" (Germany).Virology Verification HBV, HCV,HDV were carried out by ELISAandPCRwith the use of sets "BCM" (Moscow).

Instrumental examination included through – skin echography of the liver, gall bladder and spleen and the vessels by standard methods [2], on Inter SCAN-250 (Germany). With electronic transducer working at 3,5-5Mhz. Dopplerography was done on scanners working in real time scale with grey shades of SSD-630 "Aloka" (Japan) and "Sterling" Phillips (Holland) with convex sensors frequency from 2,55.0Mhz in impulsive regimen. Hemodynamic indications of celiac trunk, general hepatic artery, splenic artery were taken into account.

Maximal or systolic rate (Vmax in m/sec), minimal and final diastolic rate (Vmax in m/sec), moderate value of maximal rate (TAMX in m/see) which was determined by manual tracing of the curve of blood flow rate during three cardiac cycles, pulse, index(PI) equal to Vmax-Vmin/TAMX, résistance index (RI) equal to Vmax-Vmin/ Vmax were measured.

Mathematical processing was done by statistics program "Statgraff" with determination M±m, t, statistic and graphic system "Diasta" to carry out variable statistics.

Results and discussions. The results of investigations proved the idea of insufficient and various informatively of clinical biochemical data in diagnosing of pathological process in the liver with ChVH.

Severity of clinical syndromes as well as the level of hyperenzymemia , viral load not always correlated with pathologic process in the liver. The data of USI and DG of the liver enable to evaluate the conditions of the liver and spleen and appeared to be of big interest.

According to USI results in children with minimal activity of ChVH it was revealed that changes in most echographic sign of the liver/spleen were normal, but the walls of the gall bladder were found to be thickened (70,0%), echo heterogeneous content (34,0%), inflections in the bottom, body and/or neck (62,0%).

Echography of the liver and spleen and its comparison between the moderate and marked activity revealed similar direction of the changes with expressiveness in children with high activity of pathologic process. So, hepatomegaly with not smooth borders, density of the capsule and high echogenicity of parenchyma was mostly noted in children of 3^d group ($p<0.05$). Changes in parenchyma varied from moderate focal to large focal with different density structure in most patients (64%, $p < 0.01$). In that type of patients not clear vascular picture was noted two times more often, and in some cases (24%) were not visualized at all ($p < 0.01$). Most patients were noted to have increased portal vein diameter (62% and 74% correspondingly in 2^{nd} x 3^d groups), where big sizes (>12 m/m) prevailed in children with marked activity (40% against 18%, $p<0.01$). The signs of portal hypertension were accompanied by the disturbance in the walls as density, thickening winding with areas of deformity of vessel cavity. Echo picture of the gallbladder didn't differ, thickening of the walls with "doubled outline", heterogeneous content, inflections in the area of the body bottom and or the neck were the characteristic changes. Also they were noted in ultrasound data of the spleen, where marked active form of the spleen acquired spherical shapes by rounded edges (56%) with increased echogenicity and dense parenchyma (100%), and also by large (>7m/m) diameter of splenic vein (66,6%, $p< 0,01$). Disturbances of the splenic vein wall were visualized by the density and winding of the vessel at gate of a spleen of and gleam thinning of the vessels in the parenchyma of the organ.

The analyzing of the hemodynamic disturbances in the hepatic vessels and the spleen in children showed the sensitivity of the method in severity evaluation of pathologic process in the liver to be higher than in other clinical laboratory methods, including USI. Mean, while all parameters differed from the those in healthy children ($p < 0.01$).

In children of pre-school age with minimal activity of ChVH reliable hemodynamic disturbances were observed in celiac trunk in parameters Vmax in decrease of linear rate of blood flow ($1,75 \pm 0,08$ m/sek), PI and RI – increase of resistance indexes (to $1,15 \pm 0,02$ and $0,61 \pm 0,01$ correspondingly) and Vvol decrease of the volume blood flow (to $118,1 \pm 0,11$ $p < 0,05$). In the group of moderate activity some tendency ($p < 0,05$) was seen.

In severe activity deviations in celiac trunk data were more intensive; deviations in TAMX and Vmin ($p < 0.01$) parameters were revealed additionally. The analysis of blood flow in general hepatic artery revealed some direction in deviations; the difference was in earlier changes with minimal activity of moderate value of maximal rate (decrease of TAMX) as well as final diastolic rate (decrease of Vmin) in narrowing of the diameter of the vessel (to 0,36 m/m).

As for splenic artery, the some patterns with more intensive shifts covering all the parameters were noted children with severe activity of ChVH ($p < 0.01$). The picture certifies the severity of the vascular pathologic changes in blood flow, the intensity of which rose by the pathologic development in the liver.

Similar deviations in hemodynamics were revealed in school children. Only RI increase and Vmin decrease in splenic artery at minimal activity of ChVH ($p > 0.05$) can be noted. This, evidently, proved compensatory possibility of liver hemodynamics.

Thus, the changes in the resistance and blood flow rate testified the increase of vascular tone, the possibility of vascular spasm as a result of vascular wall damages, early or acute signs of syndrome of portal hypertension.

On individual evaluation, the disturbances revealed in vascular flow enabled early stages of portal hypertension diagnosing. According to the data of gray scaleUSI the portal hypertension was observed in 58% of patients but the doppler test presents it in 93,3% of cases ($p < 0.01$).

On the basis of dopplerography a number of patients were transformed to the related group and it was significant for further doctor's tactics: 14% with minimal activity were referred to the group of moderate activity; 26% with moderate activity were transferred to severe one, and 37,0% of children with severe deviations composed a group with a risk of cirrhosis of the liver.

Results of the research enabled to detect the direct and indirect ultrasound signs to observe latent and clear changes in the liver spleen also, to determine the signs of portal hypertension.

Chief symptoms are: splenomegaly, dilatation of vein in portal system (more than 9 m/m) and splenic artery (more than 7 m/m), decrease in linear rates of blood flow (Vmin, Vmax, TAMX), increase resistance indexes. (PI and RI), decrease of Vvol in all arteries seen in the research. Totality of three or more signs certifies the development of portal hypertension and possible cirrhosis.

Indirect signs: density of the hepatic capsule, unevenness of the borders, winding direction of intrahepatic vessels, presence of numerous with different density foci of the density.

These signs showed highly specific features – 66% and reflected the processes of fib rousing and regeneration of parenchyma of the liver.

Conclusion. Ultrasound examination of the children and clinical laboratory findings not always reflect the real picture of pathologic process in the liver, where the divergence may vary in the ranges of 14%-37%. Additional apply of dopplerography in the combination of echography makes possible not only to increase the effectiveness of diagnostics to 32,3% but also to see clearer the condition, collateral disturbances in blood circulation and severity of portal hypertension direct and indirect criteria of pathology changes in the liver should be taken into account. No matter the age is the direction of the disturbances in hemodynamics has some tendency in deviations at all parameters: and resistant index (PI) in general hepatic artery, PI and RI indexes of resistance in splenic artery could be noted. Rise in indexes data with decrease of blood flow volume rate in the arteries proves the presence of deep structural functional disturbances in the hepatic vessels which are caused by savereness of morphologic changes in the affected organ. Thus, dopplerography is a valuable method of examination of children with ChVH, which gives the possibility in diagnostic and prognosing ways of clinical specialists as addition to diagnostic complex thattimely reveals latent and marked form of portal hypertension, assess the activity of pathologic process in the liver based on hemodynamic disturbances in visceral vessels, administrate specialized medical help.

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