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Yusupalieva Gulnora Akmalovna,
M. D., docent, candidate of medical sciences,
Head of Clinical Radiology Department of
Tashkent Pediatric Medical Institute,
E-mail: ygulnora@mail.ru

Studying the role of complex echographic researches in diagnosis of chronic viral hepatitis in children

Abstract: Application of complex echography gives the chance to track change of size and structure of liver in children with CVH during its course, to define existence of fibrosis, to specify localization and depth of an arrangement of fibrous sites, to receive the image volume in real time and to distinguish possible complications and symptoms of portal hypertension at early stages.

Keywords: echography, elastography, liver, chronic hepatitis.

Actuality. The high level of morbidity with chronic viral hepatitis (CVH) presents the serious problem for public health in many countries of the world, because of their everywhere prevalence as symptomless severe and progressing from till to cirrhosis of liver (from 30 to 70%) and hepatocellular carcinoma (from 5 to 30% [3; 4].

The CVH's particular actuality is presented in pediatrics, where one of its causes is considered the inopportune, and, in some cases, as mistaken diagnosis of pathologic process in the liver.

It is caused with various clinical course of disease, similarity of symptoms with other diseases of digestive organs " scarcity" of objective features, insufficient coverage in literature on the question of pediatrics for screening methods of diagnosis, quite often absence of parallel between pathologic changes in the liver and disease's manifestation [4; 5; 7] Experience acquired in pediatric practice witnesses on necessity of wide popularity and general introduction of ultrasound diagnosis (USD).

The preference is given to ultrasound echography in combination with dopplerography (DG) of vessels of different system, that is not only successfully complements the two — dimensioned USI but gives possibility to reveal the delicate mechanisms of hemodynamic disorders in the cases not being diagnosed at use standard echography [1; 2; 6; 8]. From this point of view the determination of DG' role in complex evaluation of liver state at CVH in children is the most significant.

The questions of optimum combined noninvasive, ionizing, complex, echo graphic diagnosis of chronic diffuse diseases of liver in children, study the part of complex echography remain actual problem in chronic viral hepatitis in children.

Materials and methods. We examined 184 children with chronic viral hepatitis (CVH), among 150 (81%) children were with CHD. Boys were 102, girls were 82. 40 children were researched normal complex echo graphic anatomy of liver and spleen (control groups). All patients were in RSRPMC of pediatrics in Hepatology department and in clinic of TashPMI in planning surgical department.

For making diagnosis of chronic viral hepatitis in children together with general clinical laboratory ways the complex echo graphic studies were carried out, they include multi- slice seroscale echohepatography, dopplerography (impulse-wave, colour Doppler maping), 3D/4D echography of liver and spleen in children with chronic hepatitis on ultrasound diagnosis apparatus SSD-630" Aloka (Japan, Sterling Philips (Holland) " ISTYL-Toshiba (Japan), " Sonoscape 5000" (China) in clinic of TashPMI with use multifrequency convex and liner sensors.

Results. 184 children with chronic viral hepatitis (CVH) were in research group, among those were children with CVH and minimum level of activity 61 patients (32%), moderate were 64 (35%) and expressed were 62 (33%) level of process activity, their diagnosis was based on data of clinical, laboratory and complex ultrasound studies.

By the results of serocale echograpy of children with minimum activity of CVG it was revealed, that many echographic signs of liver and spleen were in norm limits, only on the side of gallbladder the thickness of bladder's walls (70,0%), echoheterogenous content (34,0%), kinkings in bottom, body and or neck (62,0%)

The clear vascular picture was kept, but at individual evaluation the changes of vascular architectonics were marked

as enlargement or thinning the vessels in 15% children. The diameter of portal vein from 5 mm to 8 mm was revealed in all children, the dilation of v.lienalis diameter and disorder of vascular wall's clearness in patient of this activity group was not revealed i. e. by the date of USI the signs of portal hypertension were absent in children with CVH of minimum activity. We observed true changes from the side of gallbladder. The level of expressiveness for these deviations was not in accordance with level of CVH's activity.

The findings show, that at revealed clinical laboratory deviation by the results of echography in children, suffering from CVH of minimum activity, we observed true deviations only by the parameters of gallbladder: thickening of walls, echoheterogenous contents, kinkings in bottom area, body and neck, that witnessed on less sensitiveness of USI in comparison with clinical laboratory data.

At multislice ultrasound echohepathography the sizes of liver were not changed in the limits of age norm and, moderate increase of parenchyma's echogenity with heterogeneous echostructure were marked. At US- slices the microgranular hyperechogenic inclusions were determined, beginning from the depth 12,9–13,1 mm.

At volume three- dimensions (3D) reconstruction US-images of liver in children with CH of minimum activity even and smooth liver surface was marked.

At elastography of child with CVH the minimum level of activity at the moment of maximum compression the liver had three-colour staining (red, green, blue) by that the middle index of tissue's elasticity for liver was 6,4 kPa, that was according to minimum level of fibrosis by Melavir scale (F 0–1).

Echography data on liver and spleen at CVH of moderate level activity were remarkably differed from indices of patients with minimum activity. At CVH of moderate level the liver parenchyma had small focal structure in 44% patients, and, 40% children had middle focal structure.

16% patients were revealed the presence of large focal structure, that is typical for connective tissue elements, i.e, it is obviously according to morphological picture, when infiltration of portal tracts with different cellular elements, and, simultaneously increase of collagen fibers, thickening, neoformations and collagenization of reticuline fibers, occur. Echogenity of liver was slightly increased in 22% children, moderate parenchyma's echogenity was registered in 46% patients, and, in 44% the high echogenity of liver parenchyma was determined. The disorders from the side of vascular picture were true differed from changes at CVH of moderate activity. The clearness of liver vessels was kept in 70% patients, 30% patients had images with different; changes of vascular architectonics: clearness less vessels' thinking, enhance of vascular picture and thickening vascular walls. The diameter of portal vein more than 9 mm was referred to indirect signs of portal hypertension. In echography of liver vessels the signs of portal hypertension were accompanied with disorder of walls state as induration, thickening, tortuosity, with the deformity parts of vascular cavity.

The changes of gallbladder as thickening of walls were revealed in 82% patients with CVH of moderate, activity, 24% patients revealed periofocal reaction: wall thickening more than 3 mm and presence " double contour" of the wall. Echoheterogenous content was in 70%, the kinkings in bottom area, body and neck were in 70% patients. Changes of spleen's echo structure as increase of echogenity were revealed in 70%, as induration of parenchyma in 68% patients. Spleen vein in 24% the diameter increased to 7 mm. the disorder of walls V. lienalis has the image as induration and tortuosity of vessel in parenchyma of organ.

In multislice ultrasound echohepatography at CVH of moderate activity the sizes of liver were not changed in 25% cases, and, in 75% cases hepatomegaly was revealed, it was marked the moderate echogenity of parenchyma with heterogeneous echo structure. At US- slices the microgranular — and middle granular including were determined, beginning from the depth 12,1–12,9 mm.

At volume three- dimensions (3D/4D) reconstruction US- images of liver in children with CVH of moderate activity didn't mark expressed tuberosity of liver surface.

In elastography in children with CVH moderate activity at the moment of maximum compression the liver had three-coloring (red, green, and blue), middle index of liver tissue elastic was

7,7 kPa, that was according to moderate level of fibrosis by Melavir scale (F2).

In expressed activity of CVH thickening of walls and congestion in gallbladder were typical.

In CVH expressed activity the hepatic vessels were kept clear in 12% patients and they were not visualized distinctly in 64% patients, which were revealed as disorders of integrity for vessels picture, thickening of their walls, tortuosity of contours. In 24 children vessels were not visualized. The portal vein with diameter more than 9mm was revealed in 34%, more than 12mm in 40%, in 26 children the diameter of vessels was not more than 5–8 mm.

From the side of spleen it was revealed that the form of organ in CVH of marked activity in 44% was semilunar, in 56% patients due to large size it has biconvex form with round borders, apparently, it was connected with increase of thickness and width of spleen.

In 100% cases there were marked increase of echogenity and induration of spleen parenchyma on the account of presence of connective tissue structures.

In multislice ultrasound echopatography in CVH of expressed activity the liver sizes were not changed in 11% cases, and, in 89% cases hepatomegaly was revealed, it was marked the increase echogenity of parenchyma with heterogenous ecostructure. At US — slices micro granular-and middle granular hyperechogenic including on the depth of 1,9–4,9mm were determined.

In three dimensioned volume (3D) reconstruction US-images of lever in children with CVH expressed activity the tuberosity and unevenness of hepatic contours were revealed.

In elastography at the moment of maximum compression the liver had three- coloring (red, green, blue), middle index of tissue elasticity was 9,5 kPa, that was according to expressed fibrosis by Metavir (F3).

Thus, we determined that dynamics of changes for echo graphic signs liver, gallbladder and spleen was determined with the level of activity of pathological process in liver, and, it was not always in accordance with clinical laboratory data.

For more early and exact diagnosis of forming portal hypertension and its consequences the children with CVH were included in the diagnostic complex of ultrasound dopplerography for liver and spleen.

The analysis of hemodynamic disorders in vessels of liver and spleen in children showed that sensitivity of given method in evaluation of severity of pathological process in liver was higher than in other clinical laboratory methods, including seroscale USI-data. Here, practically all studying parameters were differed from the indices of healthy children ($p< 0,001$).

Conclusion. The using of complex echography methods gives opportunity to control changes of size and structure of liver in children with CVH during its course, to determine the presence of fibrosis, to specify localization and depth of fibrosis parts, to get volume image in real time, and to recognize possible complications and signs of portal hypertension in early stages.

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