Section 3. The latest medical technologies, progressive means and methods of treatment and rehabilitation

Kondratenko O.K., *Student of the second educational level, 3rd year;*
Mazur R.M., *Student of the second educational level, 3rd year;*
Supervisor: ***Petiunin O.H.,*** *Ph.D., Associate Professor, Department of Surgery No4, Kharkiv National Medical University, Kharkiv, Ukraine*

RELATIONSHIP BETWEEN MORPHOLOGICAL AND ULTRASOUND CRITERIA IN ASSESSING LIVER FUNCTION IN CIRRHOTIC PATIENTS

Background. The liver biopsy is traditionally used for the evaluation and follow up of liver fibrosis and cirrhosis, but because of its limits, alternative tools have been developed to substitute it when assessing liver cirrhosis (LC), like ultrasound (US), US Doppler, contrast enhanced US and Elastography [1-4].

The aim of our research is to define relationship between morphological liver changes and US Doppler results in order to improve assessment of the liver function in the cirrhotic patients.

Methods and results. In our research we include 141 liver cirrhotic patients, at whom surgical treatment was done. Distal splenorenal shunt by Warren was done in 83 (58.9%), in 58 (41.1%) – devascularization surgery. Morphological examination with morphometry intraoperative liver biopsy and US Doppler of the portal system blood vessels were done. Statistical analysis done using " Microsoft Office Excel 2000" and " Statistical Package for the Social Sciences 10.0 for Windows."

Based on the liver morphometry results, 3 types (A, B, C) of cirrhosis with statistically significant differences in unchanged hepatocytes area (UHA), volume of dividing hepatocytes (VDH), connective tissue area (CTA), stroma to parenchyma ratio (SPR), volume of hepatocytes in the state of necrosis/necrobiosis (VHSNN) were determined. It was found, that UHA at transition from A- to C-type cirrhosis decreases from 234.13±11.5μm² up to 178.69±18.7μm²; CTA increases from 66.73±1.71μm² up to 240.16±13.4μm²; SPR increases from 0.285±0.019% up to 1.344±0.089%; VHSNN increases from 11.21±0.74% up to 23.97±0.75%; VDH increases from 10.23±0.57% up to 15.43±0.48% at transition of A- to B-type cirrhosis, but at transition of B- to A-type cirrhosis it decreases to 11.07±0.58%. Thus, it has been established, that at transition from A- to C-type cirrhosis the severity of fibrosis increases.

US Doppler results were also different for each selected morphological type of cirrhosis. It was found, that PVD at transition from A- to C-type cirrhosis increases from 1.13 ± 0.014cm up to 1.5 ± 0.026cm; SVD increases from 0.85 ± 0.073cm up to 1.32 ± 0.035cm; PCI increases from 0.05 ± 0.001cm/sec up to 0.08 ± 0.005cm/sec;

LPBV decreases from 17.35 ± 0.41cm/sec up to 10.8 ± 0.48cm/sec. Thus, it has been established, that at transition from A- to C-type cirrhosis the severity of portal hypertension increases.

Such pathological changes of portal blood vessels status and portal blood circulation are intercommunicated with the results of liver morphometry – at transition of A- to C-morphological type of cirrhosis the indicators characterizing the severity of fibrosis in the liver increases, while indicators characterizing severity of portal hypertension, became to be most pronounced.

Conclusions

1. Pathological abnormalities in the morphological structure of the liver in patients with LC are intercommunicated with disturbances of portal blood circulation.
2. The degree of morphologic changes in the liver of patients with cirrhosis is different in UHA, VDH, CTA, SPR, and VHSNN. According to these differences, cirrhosis can be categorized into 3 types: A, B, and C.
3. At transition from A- to C-type cirrhosis the severity of fibrosis increases - UHA decreases, while VDH, CTA, SPR, and VHSNN increases.
4. At transition from A- to C-type cirrhosis the severity of portal hypertension increases - PVD, SVD and PCI increases, while LPBV decreases.

REFERENCES

1. Lurie Y, Webb M, Cytter-Kuint R, Shteingart S, Lederkremer GZ. Non-invasive diagnosis of liver fibrosis and cirrhosis. World J Gastroenterol. 2015 Nov 7;21(41):11567-83. doi: 10.3748/wjg.v21.i41.11567. PMID: 26556987; PMCID: PMC4631961.

2. Soresi M, Giannitrapani L, Cervello M, Licata A, Montalto G. Non invasive tools for the diagnosis of liver cirrhosis. World J Gastroenterol. 2014 Dec 28;20(48):18131-50. doi: 10.3748/wjg.v20.i48.18131. PMID: 25561782; PMCID: PMC4277952.

3.Hidaka H, Uojima H. Ultrasonography in the diagnosis of complications in patients with portal hypertension. J Med Ultrason (2001). 2022 Jul;49(3):347-358. doi: 10.1007/s10396-021-01158-3. Epub 2021 Nov 17. PMID: 34787743.

4.Squires JH, Fetzer DT, Dillman JR. Practical Contrast Enhanced Liver Ultrasound. Radiol Clin North Am. 2022 Sep;60(5):717-730. Do
i: 10.1016/j.rcl.2022.04.006. Epub 2022 Jul 8. PMID: 35989040.