THE EFFECT OF LASER REVASCULARIZATION OF THE LIVER ON PORTAL HEMODYNAMICS IN CIRRHOTIC PATIENTS

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Preventive treatment of esophageal variceal bleeding in cirrhotic patients is still a pressing challenge of internal medicine. The cause of such bleeding is portal hypertension that, in its turn, is conditioned by microcirculation disorder and increased vascular resistance in the cirrhotic liver as a result of the organ's structural alteration. Therefore, it is reasonable to suppose that one of the methods of correction of portal hemodynamics caused by hepatic cirrhosis can be stimulation of intrahepatic angiogenesis, in particular, using a high-intensity laser beam.

The aim of this research was to study the influence of stimulating intrahepatic angiogenesis, using high-intensity laser radiation, on portal hemodynamics in cirrhotic patients.

The laser revascularization of the liver (Russian Federation invention patent № 2186545 dated 10 August, 2002) developed in our clinic was carried out on 20 cirrhotic patients as preventive treatment of esophageal variceal bleeding. All patients underwent esophagogastroduodenoscopy for assessment of esophageal varices. All patients underwent ultrasonography and the following details were recorded: maximum vertical span of the liver, nodularity of liver surface; spleen size (length of its longest axis); diameter

of the portal and splenic veins; occurrence of portal-systemic collaterals and of ascites. Observation of portal hemodynamics prior to and following surgical intervention was carried out in real time by means of colored scanner “Acuson-ASPEN” (USA) by 3.5 mHz convex sensor using impulse Doppler, with the patients lying supine. The diameter of the portal (ØPV) and splenic veins (ØSV) was determined as well as their linear blood flow velocity (V) and volumetric blood flow rate (W). Based on this data the congestion index of the portal vein velocity (CI) was calculated.

A diode laser SHARPLAN–6020 (Israel) was used as a source of radiation. The videolaparoscopic surgery was performed under general anesthesia with the patient lying supine. The abdominal cavity puncture to create pneumoperitoneum (10-12 mm of mercury) and insertion of the first trocar was done along the center line between the navel and the midway point from the navel to the xiphoid cartilage taking into account the physique of patient. This point is definitive for 90° □laparoscopy of the entire diaphragmal surface of the liver. When necessary, partial mobilization of the liver with the intersection of the falciform, coronary and triangular ligaments was performed. The inspection of its visceral surface was carried out after raising the right and/or left lobe and moving the epiploon to the Fowler position. The insertion point of trocars for positioning the flexifiber quartz light guide of Ø0.6 mm was chosen individually in the right and left hypochondriums based on the size of the liver and the nature of the pathologic process. A laser beam of λ - 810 nm, P = 5-10 W (the power was adjusted individually depending on the liver tissue density) was supplied through the light guide, the mode used was pulse with impulse duration of

0.1 sec, pause - 0.25 sec, exposure time - 10-14 sec), to create 10-20 channels up to 2-3 cm deep (one segment after another) on the diaphragmal surface of each liver lobe based on the size and structure of the organ. The laser was also used to coagulate separate bleeding parts of the parenchyma. The duration of the surgery was under 20-30 min. There were no intraoperative complications.

In the first 10 days after the laser revascularization of the liver there was a considerable increase in VPV ($p<0.05$), and while WPV practically did not change because of a certain decrease in ØPV ($p>0.05$), this contributed to a marked reduction in CI ($p<0.05$). There was a subsequent decline in VPV and by the end of the year it was at initial values.

Other indices of portal blood flow ØPV, WPV and CI) showed a downward trend and a year later they were positively lower than the initial values ($p<0.05$). Thus, ØPV fell by 19.8%, WPV by 38.5%, and CI by 36.4%, which indicates lower congestion in the portal venous system. As a consequence, the attributes of splenic venous blood flow were also improved. Starting from the 10th day after the operation, ØPV, VSV and WSV showed a downward trend ($p>0.05$). Despite the fact that a year later ØSV was somewhat increased ($p>0.05$), the VSV ($p>0.05$) and WSV ($p<0.05$) indices were below the initial values. For example, the VSV values fell by 13.4%, and WSV by 38.5%.

Thus, the stimulation of intrahepatic angiogenesis may be a promising method of treating both hepatic cirrhosis and its complications. Further validation of the results will be achieved through long-term follow-up of the patients and a larger number of studied subjects.