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Significance of Morphofunctional Liver Indicators in Disseminated Liver

Echinococcosis and Abdominal Organs

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ABSTRACT

To improve the morphological and functional state of the liver in patients with disseminated echinococcosis after surgical treatment. Material and methods: the treatment results of 58 patients with disseminated echinococcosis of the liver and abdominal organs, operated at the clinic of Andijan State Medical Institute, have been analyzed. Results: detoxification, antioxidant, hepatoprotective preparations in combination with other drugs and decompression interventions appear to be the leading links in the complex of treatment of these patients. Unsatisfactory results in patients of the comparison group confirmed the opinion of researchers that with infected and, moreover, internal organ dissemination of echinococcosis, the contamination of microorganisms is supported by secondary infection of the biliary tree, which necessitates another, more effective method of antibiotic prophylaxis. The developed set of measures in patients with disseminated echinococcosis of the liver before, during surgery and in the postoperative period allowed to reduce the number of unsatisfactory results.

Introduction

Echinococcosis, which is a serious parasitic disease, continues to be a serious socio-medical problem in many countries of the world.

The spread of the parasite occurs not only among people involved in animal husbandry, but also among the urban population, which is largely associated with the sanitary condition and sanitary culture of the population [2,3,4,6,12]. The peculiar features of the structure of the biliary apparatus, its relationship with the echinococcal cyst during its growth predispose to the frequent development of complications, which can be divided into hepatic-biliary, intraperitoneal and intrathoracic [2,3,4,9,11].

It should be noted here that the disseminated form of echinococcosis (DE) is a lesion of the liver and organs of the abdominal cavity by more than three and four cysts, including total damage to the organs of the abdominal cavity.

The primary disseminated form of echinococcosis is a common lesion of echinococcosis of the abdominal organs identified primarily during prophylactic examination of outpatients in hospital.

In most cases, it develops due to rupture of a parasitic cyst of the liver or other abdominal organ and contamination of the abdominal cavity.

Secondary disseminated echinococcosis is a lesion of the liver and abdominal organs after an echinococectomy operation.

Currently, the surgical treatment of echinococcosis of the liver and abdominal organs, in the vast majority of cases, has no alternative. The results of the operation in many cases are affected by serious complications associated with the presence of a residual cavity after removal of the parasitic cyst (suppuration, bleeding, the formation of external bile and purulent fistulas) [5,6,10,12]. It is known that the functional state of the liver plays a huge role in the formation of the body's response (adaptation) to severe trauma [4,8,10,11].

Stress rearrangement of metabolism, exo- and endogenous intoxication, premorbid pathology cause a suppression of the functional activity of the liver. Moreover, exact knowledge of the morphological and functional state of the liver with disseminated echinococcosis (DE) is necessary to develop a pathogenetically substantiated method of preoperative preparation and intensive care in the early postoperative period.

Aim. Find the ways to improve the morphological and functional state of the liver in patients after surgery with disseminated echinococcosis.

Materials and methods.

We analyzed the results of treatment of 58 patients with disseminated echinococcosis of the liver and abdominal organs operated at the clinic of Andijan State Medical Institute.

For a comparative assessment of the results of treatment and its complications, patients were conditionally divided into two groups. The first group (comparison group) included 27 patients with disseminated echinococcosis of the liver and abdominal organs, of which 24 (88.8%) had a secondary disseminated form, primary - disseminated - in 3 (11.1%), the second group 31 patient, of which the secondary disseminated form was observed in 24 patients, the primary disseminated form was noted in 8 (11.2%) patients.

The age of patients ranged from 16 to 76 years. The vast majority of patients were people of working age from 17 to 50 years old - 91.7%, which emphasizes the socio-economic significance of the problem. Among them, men were 28 (48.2%), women - 33 (56.8%). Local citizens were 67%, rural - 32.4%.

All patients during the observation period were in severe or moderate severity. The clinical assessment was based on the identification of complaints, clinical examination data, the results of additional research methods, including clinical blood and urine analyses, biochemical combined fluoroscopy, ultrasound investigation (ultrasound), magnetic resonance imaging (MRI).

It should be noted that, with large and giant echinococcal cysts, a significant volume of the organ parenchyma is affected by the pathological process, which is accompanied by a deficiency of hepatocytes and impaired liver function. In this regard, biochemical studies included the determination of the functional readings of the liver.

The most common combination lesion of two to three segments. A significant prevalence of echinococcal lesions of the right lobe of the liver was noted. Moreover, the most common echinococcal cysts (EC) were located in VIII, combinations of VII-VIII and V-VI-VII segments of the right lobe of the liver.

The comparison group was dominated by patients with two EC - 9 (70.3%), and in the main group - 23 (74.1%) patients with four EC or more. In 25 (92.5%) patients of the control and in 24 (77.4%) patients of the main group, EC along with the liver were diagnosed in various organs of the abdominal cavity. Complicated EP was noted in

33.8% (10 patients) in the comparison group and 38.7% (12 patients) in the main group, respectively.

All patients admitted underwent various surgical interventions comparable in severity, volume and duration.

The choice of the timing of the operation, surgical access and type of surgical intervention was determined by the nature of the previously transferred operation, localization, number and size of cysts in the liver and other organs, physique, and the complications of the disease.

To ensure the parasitism of the interventions, rational approaches were used taking into account the localization of echinococcal cysts (upper median, median laparotomy using the Segal retractor, lower middle laparotomy, separate access), as well as the methods of isolation of the surgical wound proposed in our clinic (AIS RU No. DGU 02461).

Antibiotic prophylaxis was equally carried out both among patients of the main group and the control. A distinctive moment in the main group was the method of introducing the antibiotic (Klaforan 1 gr.), which was introduced 1 hour before the operation, during the operation and immediately after its completion. It was not equally performed among patients in the control group. The volume of intravenous infusions ranged from 1.5 to 3.0 liters and included various saline and energy solutions. In the comparison group, Hemodesis, 5% Glucose, 0.9% Sodium Chlorine (for the period 2000-2005) were used as the main detoxifying solution, and such preparations as Gepamerts, Heptral, Tivortin, and Rheosorbilact were used in the main group.

Results and discussions

Based on a deep morphological, biochemical and clinical-instrumental study, it was found out that with the increase in cyst volume and complications, hepatodepression, which is one of the factors in the development of acute liver failure, is observed.

A clear knowledge of the morphological and functional state of the liver in DE is necessary for the development of pathogenetically substantiated method of preoperative preparation and intensive care in the early postoperative period. To assess the depth of functional disorders of the liver, we determined the content of indicator enzymes (AsAT and AlAT) in the blood serum and directly in the liver tissue. To do this, blood tests were taken before the operation and during the operation, pieces of the liver were taken by the puncture method near the fibrous capsule of the parasite and from a site distant from the cyst (Table 1).

In biochemical blood tests, in particular, an increase in AST and ALT, indicators of bilirubin were revealed in 22 (81.4%) patients of the 1st group and in 18 (58%) of the 2nd group. A higher bilirubin content was observed in 19 (%) patients with hepatitis (group 1) ($128.1 \mu\text{mol} \setminus \text{l}$), and the direct fraction was $42.8 \mu\text{mol} \setminus \text{l}$, which indicated mainly the presence of functional liver disorders in patients with a widespread lesion or complicated course. Total blood bilirubin was also increased in 14 patients with disseminated echinococcosis of the liver $32.2 \mu\text{mol} / \text{L}$.

The concentration of AST and ALT in the blood made it possible to think that functional disorders of the liver with echinococcosis develop from the very onset of the disease, regardless of the long process. Hyperproteinemia with dysproteinemia in 8 patients was explained, apparently, by the toxic effect of the parasite on the liver parenchyma and the active protein catabolism due to sensitization of the body (Table 1).

Table 1.

The level of AST and ALT in pericystic tissue of the liver with complicated echinococcosis.

Enzyme mg	µm /	Main group		Comparison Group (n=10)
		Pericystic tissue (n=7)	Tissue from the distal area (n=5)	
AsAT		0,06±0,003	0,07±0,008	0,11±0,02
AlAT		0,10±0,01	0,13±0,01 °	0,31±0,02

Note - $p < 0,05$ - reliability of differences in indicators depending on the tissue site.

As can be seen from table 1, near the fibrous capsule of complicated echinococcus, a statistically significant decrease in the concentration of AST and ALT is observed compared to their content in a zone distant from the cyst, where this indicator is also significantly lower than the control.

These data, taking into account morphological changes, indicate a global negative effect of the parasite on the liver. The structural changes occurring in the liver tissue in the form of atrophy of hepatocytes, their hydropic dystrophy, cytolysis, that is, accelerated development of apoptosis, decrease in the mass of the hepatic parenchyma, probably lead to a violation of the function of hepatocytes, leading to the decrease in the content of indicator enzymes in the liver.

Changes in biochemical parameters, in particular, increase in AST and ALT, bilirubin were revealed in 14.8% of patients, which indicated the functional impairment of the liver and correlation with the size of the parasitic cyst. So, in the presence of cysts with a diameter of more than 11 mm, higher level of ALT, AST values were noted. However, these changes were unreliable ($P > 0.05$). When comparing the data on the content of AST and ALT in blood serum, it can be noted that the concentration of these enzymes in the blood is significantly higher, which is apparently explained by the "leaching out" of AST and ALT into the blood when liver cells are damaged.

In this regard, for pathogenetically substantiated preoperative preparation and postoperative therapy, additional therapy was carried out aimed at metabolic support of the organ: Hepa-Merz 10 g per 400 ml of infusion solution, ascorbic acid 5% -6.0, thiotriozoline 4 ml, ascorbic acid 5% -6.0 intravenously, enzymes, vitamins, etc.

Hepa-Merz may be of undoubted interest, the pharmacological action of which is based on the ornithine-aspartate complex, which stimulates the neutralization of ammonia, which has antihypoxic, hepatoprotective effect, giving a positive effect on biochemical processes in the cell, reducing the production of free radicals and restoring the energy reserve of the liver. To absorb toxic substances in the blood, the drug Reosorbilact 250 ml was used intravenously as well as antiparasitic chemotherapy with albendazole in order to reduce intracystic pressure as a result of suppressing the growth of scolexes.

To increase the energy reserves of the hepatic parenchyma, as well as in the treatment of hypoxia and hypoproteinemia, intravenous plasma and albumin were administered. On average, preoperative preparation lasted 3 ± 1.3 days.

Intensive treatment with Hepa-Merz in combination with detoxification and antioxidant therapy allowed patients to lower the level of fermentemia, bilirubinemia due to both its fractions and reduce the severity of endogenous intoxication compared to the initial values (Table 2).

Table 2.

Biochemical parameters of liver tissue in the early postoperative period

Indicies	Before operation		After operation	
	Comparison group (n=27)	Main group (n=31)	Comparison group (n=27)	Main group (n=31)
Total bilirubin (µmol / L)	15,9±2,2	15,6±1,7	30,6±6,2*	16,2±2,1
Direct bilirubin (µmol / L)	3,6±0,4	3,2±0,4	9,0±1,6"	5,1±1,2
AsAt µmol / ml	0,45±0,03	0,46±0,01	1,3±0,02***	0,80±0,06
AlAt µmol / ml	0,68±0,06	0,69±0,04	1,1±0,02~*	0,64±0,04

Note - P <0,05; - P <0,01; - P <0,001 - the significance of differences before and after operation, indices of the main and control groups after operation. - P <0,05; -P <0,01; - P <0,001- significance of differences in indices after operation in the main and control groups.

Thus, in the patients of the main group who received Hepa-Merz preparation in the period of preoperative preparation for the correction of functional liver disorders, a clear positive dynamics was observed, comparable to that in patients of the comparison group. The positive dynamics of intracellular liver enzymes (AST, ALT and the most indicative of obstructive jaundice - alkaline phosphatase), more pronounced in the main group, indicates an improvement in liver function, a decrease in damage to the hepatocyte membranes, which is associated with hepatoprotective and antihypoxic properties of the Hepamerz drug (Table 3).

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Table 3.

Dynamics of biochemical blood parameters before surgery and in the early postoperative period (7 days)

Indicators	Before operation		After operation	
	Control group (p=27)	Main group (p=31)	Comparative group (p=27)	Main group (p=31)
Total bilirubin (µmol / L)	17,1±1,7	16,8±1,4	33,7±6,9*	17,3*2,9
Direct bilirubin	3,9±0,1	3,5±0,3	9,2±1,3***	5,7±1,5
AsAt µmol / ml	0,39±0,03	0,41±0,01	1,2±0,012***	0,79±0,07
AlAt µmol / ml	0,69±0,07	0,71±0,03	1,1±0,01*	0,66±0,04 °

Note. -P<0,05; -P<0,01; - P <0,001 - significance of differences before and after operation, indicators of the main and control groups after operation. - P <0,05; - P <0,01; - P <0,001- the significance of differences in indicators after operation in the main and control groups.

Intensive therapy in the postoperative period included: antibiotic therapy, infusion-transfusion therapy aimed at correcting anemia, hypoproteinemia, electrolyte imbalance and maintaining the functions of vital organs and systems, correction of coagulation and anticoagulation system, detoxification using forced diuresis.

The progression of the disease, severe and traumatic interventions also contributed to a significant increase in lipid peroxidation processes in the liver tissue by 2 - 2.5 times compared with the norm and a decrease in the level of enzymes. The above changes created real prerequisites for the emergence in patients of the 1st group of postoperative acute liver insufficiency. The latter led to the death of 1 (3.7%) patient in the comparison group with a complicated (purelence) form of liver echinococcosis.

In the main group, the number of complications in the immediate postoperative period (7th day) was less than in the comparison group by almost 2.6 times - 11.3% and 27.3%, respectively. Complications such as purulence of OP were much less common - in 2.8% and 9.1%, respectively, and general complications after surgery - 7.0 and 14.3%. In the comparison group, the number of patients with early complications was 15 (19.5%); in the main group, this indicator was 6 (8.5%).

Conclusions

1. Surgery for disseminated forms of echinococcosis of the liver and abdominal organs should be performed after a comprehensive, pathogenetically substantiated preoperative preparation, instrumental diagnosis and include removal of the parasite, resolution of the residual cavity.

2. Carrying out a complex of measures in patients with disseminated echinococcosis of the liver and abdominal organs before, during and in the postoperative period, reduces the number of immediate and long-term postoperative complications.

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