



## **Functional State of a Liver at Various Purulent - Septic Diseases and Way of Their Correction of Treatment**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

### **Article Information**

#### Editor(s):

(1) Dr. Nermeen Mohamed Bahi El-Deen El-Shaffie, Professor, Department of Pathology, National Research Center, Cairo, Egypt.

#### Reviewers:

(1) Senthil Kumar Raju, Swamy Vivekanandha College of Pharmacy, India.  
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Complete Peer review History: <http://www.sdiarticle4.com/review-history/51989>

**Review Article**

**Received 02 August 2019**  
**Accepted 08 October 2019**  
**Published 22 October 2019**

### **ABSTRACT**

**Background:** Recently, the quantity of acute purulent - septic diseases and it related complications are one of urgent problems of clinical medicine (6). Especially, patients having purulent - septic complications are aggravated by acute hepatic-renal insufficiency (AHRI), which is caused by serious disturbance of liver and kidneys organs.

**Objectives:** With the purpose of study of a liver functional state and optimization of treatment of hepatic encephalopathy we carried out the research.

**Materials/Patients and Methods:** 34 patients with sugar diabetes complicated various purulent-septic diseases are studied: Based on classification of severity and prevalence of purulent process all patients were divided into 3 groups. The first group consist of 9 patients with a satisfactory general state and easy degree of endogenic intoxication. Second group included 14 patients with a general state of average severity and average degree of endogenic intoxication, the inflammation process was distributed on 2 - 3 topographical areas for them. The third group included 11 patients with high severity, inflammatory process on a background expressed intoxication syndrome (serious degree of endogenic intoxication), the purulent process was distributed on superficial and deep fascial-cellular tissue for them.

**Results and Conclusions:** Thus, the data, received by us, testify that the degree of change of the majority of parameters of a liver functional state for patients with purulent-septic complications depends on severity of suppurative inflammation. In this connection taking into account a state of a liver, we regard necessary to include hepatoprotectors in particular Hepa-Merz (L-ornitine-L-aspartate) in treatment besides desintoxication therapy.

*Keywords: Intensive therapy; endotoxycosis; liver damage; purulent-septic diseases; acute hepatic insufficiency; Hepa-Merz.*

## 1. INTRODUCTION

Now the quantity of acute purulent - septic diseases and the attendant complications as usual are one of urgent problems of clinical medicine [1]. Especially a state of the patients having purulent - septic complications is aggravated by acute hepatic-renal insufficiency (AHR), which is caused by serious disturbance of liver and kidneys - organs ensuring the active detoxication and correction of broken homeostasis.

There are significant accumulation in blood and tissues the toxic substances resulting to partial or complete blockade of functions of organs and systems of life-support, disturbance of the basic parts of homeostasis, that in one's turn intensifies the endogenous intoxication concerns to the reasons of development for purulent-septic diseases [2]. It is most serious a lesion of parenchyma organs and first of all of liver, that provides the active desintoxication of organism and supports homeostasis [3]. However researches of a state of a liver at the patients with suppurative inflammations of soft tissues are not numerous and are based on not enough informative parameters [4,5]. Biochemical and enzyme tests used by authors rather are not specific and only indirectly allow to judge on state of a liver [6]. Only in individual works the dependence of a degree of a liver lesion from marked endogenous intoxication is reflected. All this complicates the interpretation of received results, and does not allow a comparison the data to parameters of endotoxycosis and seriousness of the basic disease [7,8].

Among numerous functions of a liver being on importance for maintenance homeostasis there is important its participation in metabolism of a lot of biologically active substances [9] ensuring functions of the essential organs such as: gluconeogenesis, urea synthesis, the production of "reactants of acute phase" and other proteins [7,8].

Now it is difficult to imagine the section of reanimation, where it would be not necessary rather frequently to carry out intensive therapy and reanimation of a measures concerning acute hepatic insufficiency (AHI). This circumstance is connected as to growth of liver diseases and other serious pathological states that are complicated AHI [10].

Taking into account the above-stated arguments we have put a task to carry out a complex estimation of a functional state of a liver at various purulent-septic diseases, in particular at gangrene of extremities and diabetic footstep.

## 2. MATERIALS AND METHODS

With the purpose of study of a liver functional state and optimization of treatment of hepatic encephalopathy we carried out the research in section of intensive therapy and reanimation both RCPS and SCSD (Republican Centre of Purulent Surgery and Surgical Complication of Sugar Diabetes) on the basis of 2-clinic of TMA.

34 patients with sugar diabetes complicated various purulent-septic diseases are studied: gangrene of lower extremities (18 patients), phlegmon of fore abdominal wall (4 patients), carbuncle of a neck and head (7 patients), phlegmon of perineum (2 patients), sluggish peritonitis (3 patients) - J Table 1. On serious of course and prevalence of purulent process all patients have been divided into 3 groups. The first group consist of 9 patients with a satisfactory general state and easy degree of endogenous intoxication. Inflammatory process at them was located in one isolated cellular tissue. Second group included 14 patients with a general state of average serious and average degree of endogenous intoxication, the process was distributed on 2 - 3 topographical areas at them.

The third group included 11 patients with serious progressing inflammatory process on a background expressed intoxication syndrome

(serious degree of endogenic intoxication), the purulent process was distributed on superficial and deep fascial-cellular tissue at them; at 6 patients from this group the damp gangrene of lower extremities was diagnosed. All patients of three groups besides surgical operation there was a traditional therapy directed on desintoxication of organism carried out. The antibiotics and anticoagulants were introduced and sugar in blood was corrected.

Serious of inflammatory process was estimated as clinic and with the help of markers of endogenic intoxication (leucocytic, pulse-leucocytic-temperature indexes of intoxication, there was the haematologic index of intoxication - the level of average weight molecules in blood serum -studied). The state of liver was estimated on activity of cytological enzymes of blood plasma-aspartate - and alaninaminotransferases (AT and ALT) (colorimetric method), organospecific enzymes glistidase and urocinase (unified spectrophotometric method), total protein and its fraction (refractometric method by Pulrih), bilirubin (on a method Jendrassik) and urea (diaceticmonooxime method). The tool methods of research of function of a liver with the help of radioisotope scanning and hepatographic method were carried out also. There was an ultrasonic research of a liver carried out for all patients. To study the character of a lesion of liver cells with the help of radioactive isotopes two methods of research were applied. Radioisotope hepatographic method was performed on the device "Small Scale laboratory" (Hungary) with technetium marked medide in a doze 40 MBk on 1 kg of weight of the patient. A preparation was introduced i.v. on the eve of research. The radioisotope scanning of a liver was carried out on scanner " Small Scale laboratory " with use of technetium marked technifit in a doze 150 MBk on 1 kg observable for 30 minutes before research. The researches carried out at receipt of the patient (1 -2<sup>nd</sup> day) during the treatment and before the discharge. At hepatographic

method there were delay of accumulation of a preparation in hepatocytes, prolongation of plateau time and delay of term of removing radionuclide in intestines marked. On scannograms the reduction of intensity of radiopharmpreparation accumulation (RPP) and non-uniformity of the picture texture were marked. The marked changes were in direct dependence on a degree endotoxicosis. Decrease (sometimes quick) of the accumulation of an isotope, the presence of the centers with absence of accumulation indicated on functional and structural lesions of a liver at chronic purulent infection.

At scanning of liver also are established functionally - morphological changes in it. However mentioned lesions of liver function did not depend on duration of intoxication and age of the patients, whereas terms of a chronic purulent infection correlated with degree of lesion of liver.

The absence of accumulation of isotope at 28 patients (from 34) we considered as the centers of liver steatosis.

All patients were divided into two groups: The first group - (control group, patients receiving traditional therapy) consist from 16 (m) patients with easy and average degree of endogenic intoxication. The second group - (patients besides traditional therapy receiving hepatoprotectors in particular Hepa-Merz) included 18 (nr) patients with average and serious degree of endogenic intoxication on a background expressed intoxication syndrome (Table 2).

At repeated research of the same patients after surgical treatment and conservative use of hepatoprotectors in particular infusion preparation Hepa-Merz (L - ornitin- L - aspartate) there was obvious positive dynamics as regards clinic - biochemical analyses and radionuclide researches of a liver marked at the patients of researched group in comparison with other patients that received traditional therapy.

**Table 1. Distribution of the patients on nosologic forms**

No n/n	Nosogic form	Patient quantity	In percentage (%)
1	Gangrene of lower extremities	18	53.0
2	Phlegmon of fore abdominal wall	4	11.8
3	Carbuncles of neck and head	7	20.6
4	Phlegmons of perineum	2	5.9
5	Sluggish peritonitis	3	8.7
	<b>Total</b>	<b>34</b>	<b>100</b>

**Table 2. Clinic - biochemical parameters of the patients before and after treatment**

Parameter	Limit in SI units	Initial state n <sub>1</sub> =16	After treatment n <sub>1</sub> =16	Initial state n <sub>2</sub> =18	After treatment n <sub>2</sub> =18
Haemoglobin g/l	120.0-160.0 g/l	91.0	98.0	89.0	101.0
Total protein	65-85 g/l	43.4	47.9	42.1	52.4
Bilirubin	8.55- 20.5 mkmol/l	41.4	33.7	41.9	21.2
Urea	2.49- 8.32 mmol/l	9.41	8.67	10.1	7.2
ACT	28-139 nmol s <sup>-1</sup> l <sup>-1</sup>	117	97	116	59
ALT	28-194 nmol s <sup>-1</sup> l <sup>-1</sup>	144	101	148	66
Leucocytes	4-9*10 <sup>9</sup> /l	9.2	7.1	9.4	6.9

### 2.1 Hepa-Merz was Applied under the Following Scheme

The second group (serious degree of endogen intoxication); the first stage - 7 injections i.v. on 20 r per day, second stage - 5 days - taking of preparation per os on 15 r per day (on 5 r 3 times per day 20 minutes prior meal).

The rate of injections i.v. was made 55 - 60 mg/min. A preparation was diluted by 200 - 400 ml isotonic solution NaCl. The total duration of treatment by a preparation Hepa-Merz was made 12 days.

### 3. RESULTS AND DISCUSSION

The received data testified of toxic lesion of patients' liver, its degree depended on a degree of endogen intoxication. Even at an insignificant degree of endogen intoxication there is a damage of liver cells and first of all those cell parties that participate in detoxication process. At increase of endogen intoxication the damage of a liver is aggravated. At the patients with endotoxiosis of an average degree (2 - th group) there was the authentic hyperfermentemia ALT and ACT revealed. It is necessary to note, that ALT is located mainly in hepatocyte cytoplasm and therefore increase of its activity also is observed at initial stages of a liver damage. After treatment the activity of these enzymes in plasma of blood was normalized or has come nearer to norm.

degree, as well as at the patients 2 - th group, the activity of ALT and ACT was increased. The increase of ACT, as it is known, testifies to more serious damage of a liver. The fact is that given

enzyme mainly is located in mitochondria, therefore its hyperfermentemia reflects not only the increase of permeability of hepatocyte membranes, but also degree of dystrophic changes down to necrosis at them. After complex treatment with inclusion of desintoxication therapy the level investigated enzymes was reduced, however control meanings did not achieve. Such hyperfermentemia at the patients with expressed endogen intoxication indicate on toxic lesion of hepatocytes, that result in a significant excretion of cytolytic ferments in blood.

### 4. CONCLUSION

Revealed dynamics of ferment activity allows to make a conclusion about direct dependence between endotoxiosis degree and degree of liver damage. Thus, the data, received by us, testify that the degree of change of the majority of parameters of a liver functional state at the patients with purulent-septic complications depends on serious of suppurative inflammation. In this connection taking into account a state of a liver we regard necessary to include hepatoprotectors in particular Hepa-Merz (L-ornitine-L-aspartate) in treatment besides desintoxication therapy.

### CONSENT AND ETHICAL APPROVAL

It is not applicable.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
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