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DIAGNOSIS OF SPONTANEOUS BACTERIAL PETITONITIS WITH ETIOLOGY OF LIVER CIRRHOSIS AND MODERN TREATMENT METHODS

Shukhrat T. Urokov [1], Jakhongir D. Komilov [2]

1 Doctor of Medical Sciences, Professor, Head of the Department of Surgical Diseases, Bukhara State Medical Institute named after Abu Ali ibn Sino, Bukhara, Uzbekistan
E-mail: Shuhrat.urakov1962@gmail.com

2 Bukhara branch of the Republican Scientific Center for Emergency Medical Care. Bukhara State Medical Institute named after Abu Ali ibn Sino, Bukhara, Uzbekistan
E-mail: komilovjahongir419@gmail.com

ABSTRACT

This article analyzes the data on the examination and treatment of 126 patients with spontaneous bacterial peritonitis of liver cirrhosis etiology treated in the surgical department of the Bukhara branch of the Bukhara State Medical Institute, the clinical base of the Department of "Surgical Diseases in Family Medicine" of the Bukhara State Medical Institute during 2016-2024. The purpose of the study: to conduct a comparative study of the diagnostics and modern treatment methods of spontaneous bacterial peritonitis of liver cirrhosis etiology.

Key words: spontaneous bacterial peritonitis, liver cirrhosis, paracentesis, translocation of microorganisms.

INTRODUCTION

One of the most urgent problems of surgical hepatology in the world is the complications of liver cirrhosis, which include bleeding from esophageal varices and spontaneous bacterial peritonitis, which are the main causes of death in patients. The latest results of the analysis of this disease show that liver cirrhosis is one of the main causes of the development of many diseases [1,2,5,6].

The liver plays a crucial role in the body's immune defenses, and liver diseases, including cirrhosis (LC), can compromise the immune system. Patients with cirrhosis are 4-5 times more likely to develop complications due to the overgrowth of microorganisms in their bodies than the general population[11].

Scientists around the world believe that the main pathogenetic factors of spontaneous bacterial peritonitis are the translocation of bacteria from the intestinal lumen as a result of increased permeability of the intestinal wall, a decrease in local immunity, impaired phagocytic activity of the reticuloendothelial system of the liver, and a decrease in the protective properties of ascites. Scientists note that the spontaneous type of bacterial peritonitis occurs only in cases of CHD with ascites.

In 80% of cases, two types of microorganisms, Escherichia coli and Klebsiella, play a significant role in the etiology of the disease[3]. Recently, there has been an increasing number of reports in hepatology practice of the occurrence of gram-positive enterococci and methicillin-resistant staphylococci in the etiology of spontaneous bacterial peritonitis (SBP) [7,8,9,10].

MATERIALS AND RESEARCH METHODS

The clinical database of the Department of "Surgical Diseases in Family Medicine" of the Bukhara State Medical Institute, the Department of Surgery of the Bukhara Branch of the Bukhara State Medical Institute, analyzed the examination and treatment data of 126 patients with spontaneous bacterial peritonitis of liver cirrhosis etiology who were treated in the period from 2016 to 2024.

All patients were divided into 2 groups according to the treatment method: in the I-comparison group (n=68), the results of traditional treatment of patients with spontaneous bacterial peritonitis of liver cirrhosis etiology were retrospectively analyzed. In the II-main group (n=58), the effect of meropenem, albumin, and additionally ulinastatin instead of ceftriaxone in addition to the active conservative method in the treatment of patients with complications of spontaneous bacterial peritonitis of liver cirrhosis etiology was studied. The effectiveness of new tactics, clinical dynamics of the disease, dynamic laboratory tests (the "flow cytometry" method), modern laboratory testing methods, results of using devices and treatment success were studied. Also, as a result of the use of improved tactics, the following were analyzed: the effectiveness of eliminating the infectious process, preserving the function of the kidneys and other vital organs, reducing the development of sepsis, reducing the duration of hospitalization and overall mortality.

In the main group of patients, laboratory tests were performed to determine the level of inflammation in the blood analysis, in addition to leukocytes, C-reactive protein (CRP), polymorphonuclear leukocytes (PML) in the ascites fluid, and total protein concentration. These tests were performed using the "flow cytometry" method available in modern laboratory equipment.

Flow cytometry is a modern innovative device used to evaluate the biophysical properties of cells of various shapes in fluid flow under the influence of laser light. The device can be used for both practical and scientific purposes.

In the main group of patients, regardless of the development of clinical symptoms of the disease, all patients with ascites underwent paracentesis on day 1, and in order to assess the effectiveness of treatment, dynamic paracentesis was performed on day 3-4 and changes in ascites fluid were determined. All paracentesis procedures in the main group of patients were performed under UTT.

When analyzing the etiological factors of liver cirrhosis, it was found that the most common etiological factor was viral hepatitis (B, C, D), which was the cause of 83 (65.4%) of the total number of patients, 10 (8%) of the patients were patients with chronic alcoholism, 10 (7.9%) of the patients were in contact with toxic chemicals, and 12 (4%) of the patients had cryptogenic cirrhosis of the liver (Table 2.1.).

2.1 - table

Classification of patients with liver cirrhosis according to etiological factors

Etiological factor	Number of patients	%
viral hepatitis (V, C, D)	83	66%
Chronic alcoholism	15	12%
Patients exposed to toxic chemicals	10	8%
Cirrhosis with autoimmune hepatitis	3	2%
Cryptogenic cirrhosis	15	12%
Total:	126	100%

Based on the analysis of the results of comprehensive examinations, the etiology of JTs and the level of liver damage were analyzed using the Child-Pugh classification (Table 2.2).

The amount of ascites fluid in the abdominal cavity was determined based on the International Club of Ascites (ICA) criteria. According to this, ascites was divided into 3 severity levels depending on the amount of ascites fluid:

The amount of fluid in the abdominal cavity of grade I can only be determined by ultrasound;

Grade II – clinically significant ascites ;

Grade III – severe ascites .

Class A is the compensated stage of liver cirrhosis , and classes V and C are the decompensated stage .

2.2 - table

JTs severity levels according to the Child-Pugh classification

Indicators	Points		
	1	2	3
Ascites (by ISA)	no	1-2	3
Hepatic encephalopathy	no	Minimum quantities available	Clearly observed
B bilirubin level in blood serum (µmol/l)	< 34	34-51	> 51
Serum albumin content (g/l)	> 35	28-35	< 28
Prothrombin index i , %	> 70	50-70	< 50
the total points			Class
5 – 6			A
7 – 9			B
10 – 15			C

Depending on the amount of ascites fluid in the abdominal cavity, we divided the patients into the following groups (*Pearson Chi-square = 1.059; r = 0.589*) (Table 2.3) .

1. Mild degree - the amount of liquid in the abdominal cavity is observed when it is less than 500 ml. Ascites symptoms were observed in 11 (16.1%) patients of the comparison group, and in 9 (15.5%) patients in the main group. In this case, patients do not feel the symptoms of ascites syndrome, but it was detected using the UTT examination.
2. Medium-severe level - observed when the amount of fluid in the abdominal cavity is more than 500 ml. This condition was observed in 38 (55.8%) patients of the comparison group. From the main group, 37 (63.7%) people were observed in moderate severity. When the patients were viewed objectively, it was found that the abdominal area was enlarged in a symmetrical position.
3. Severe level - symptoms of ascites syndrome were observed in 19 (27.9 %) patients of the comparison group, and 12 (20.6 %) patients in the main group . Severe ascites fluid collection was observed with clearly expressed enlargement of the abdominal cavity, and umbilical hernias were formed in patients.

We used the following gradation to assess the expression of splenomegaly in all patients included in our study. Protrusion of the spleen up to 5 cm from the rib arch was observed in 23 (18.2%) of 126 patients, 5 to 10 cm was observed in 45 (35.7%) patients, and more than 10 cm in 58 (46%) patients.

In 89 (70.9%) patients, the duration of the disease was from 3 to 7 years. The duration of the disease was observed in 15.4% of patients for more than 7 years, and in 13.7% of patients for 1–3 years. In addition, in 20% of patients, liver cirrhosis was detected within a year of hepatitis, mainly among those with viral hepatitis.

Comprehensive examination of patients included in our study included clinical, biochemical, instrumental, radiological and bacteriological studies. Based on the data obtained as a result of the analysis, a diagnosis was made, the course of the disease was monitored, and the results of treatment were evaluated.

Ultrasound examination of all patients included in our study is of great importance not only in determining the amount and condition of ascitic fluid in the abdominal cavity, the presence of turbidity and fibrin fibers, but also in determining the volume and condition of the liver, the condition of its parenchyma, the diameter and condition of the intrahepatic vessels of the portal system, the location of the hepatic hilum, the condition of the gallbladder, and the condition of the inferior vena cava.

Spontaneous bacterial peritonitis of liver cirrhosis etiology included in our study were determined as follows, and patients were selected based on these criteria.

2.5 - table

Diagnostic criteria of spontaneous bacterial peritonitis with liver cirrhosis etiology

Diagnostic criteria	Indicators	Points
Body temperature	37-38 ºC	1
Leukocytosis, a shift of the leukocyte formula to the left	>12.0×109/l	1
Tachycardia	> 90 beats/min	1
Breathing	> 20 beats/min	1
Pain in the abdomen	On palpation or in a free state	2
Dyspeptic condition	Nausea and vomiting	1
Encephalopathy	Yes or no	1
Hepatorenal syndrome	Yes or no	1
Diarrhea	Yes or no	1
Amount of polymorphonuclear leukocytes in ascites fluid	> 250/mm3	3
C is the amount of reactive protein	> 5.0 g/l	2
Identification of microorganisms		3

Chai ld – JTs on Pyu	Class B and C	2
Ultrasound examination	Ascites fluid turbidity analysis	2
Total points	1 – medium difficulty degree 2 – severe degree 3 – critical situation	6 – 8 9 – 14 15 -18

When analyzing this table 2.5, we conditionally divided patients into 3 categories. Based on the diagnostic criterion, patients with symptoms of 6 to 8 points were classified as 1 medium-severe patients, patients with symptoms from 9 to 14 points were classified as severe, and patients with symptoms above 15 were classified as 3-critical patients.

Ultrasound examination – the presence and amount of ascites fluid in the abdominal cavity of patients were determined. Ultrasound examination determined the nature of the ascites fluid. The appearance of ascites fluid in a fine or large dispersed form, the detection of fibrin threads and numerous fibrinoses confirmed the diagnosis of peritonitis.

Ultrasound is the most reliable diagnostic tool for bacterial peritonitis, with a sensitivity of 88-92%, especially for SBP (fibrin fibers, fibrin deposits).

The diameter of the hepatic veins was measured at the level of 2 cm from the place of its descent into the inferior vena cava. The main column of DV is on the left side of the patient It was analyzed in the lying position, and the transmitter is perpendicular to the horizontal plane placement is alive . For measurement, we selected the main column of the DV in the region of the hepatic portal (at the level of the hepatic margin) . The second stage of research is the main vessels of the liver - allowed to evaluate the permeability of hepatic veins (JV) , DV and hepatic arteries (JA) , as well as splenic artery (TA) and vein (TV) . For this Ts DK (tsvetnoe dopplerovskoe kartirovanie), That is, we used the color Doppler mapping (CDM) mode, which helped us determine the direction of blood flow .

In the control group, polymorphonuclear leukocytes (PML) in the ascites fluid were determined under a light microscope in the Goryaev chamber for microscopic counting, and in the main group, the modern laboratory method "Flow cytometry" was used instead. Therefore, in the main group of patients, these examinations were performed by the "Flow cytometry" method, which are modern innovative devices used to evaluate the biophysical properties of cells of various shapes in the fluid

stream under the influence of laser rays. The device can be used for both practical and scientific purposes.

Methodology for the detection of polymorphonuclear leukocytes (PML) in ascitic fluid using the Sysmex XN-550. Purpose: To automatically determine the number of polymorphonuclear leukocytes (PML) in ascitic fluid and diagnose spontaneous bacterial peritonitis (SBP) and other inflammatory processes. The analysis is performed in **Body Fluid** Mode .

Sample preparation. Ascites fluid is collected by sterile paracentesis. Centrifugation is not required.

Advantages of automated analysis on the Sysmex XN-550:

Speed - analysis is ready in
1-2 minutes . Accuracy - the ability to calculate the amount of PML more accurately than microscopy.
Reduction of subjective errors - automatic calculation without operator intervention.

Ascites fluid analysis using Sysmex XN-550 allows to quickly and accurately determine the level of PML and diagnose SBP . This automated method requires much less labor than manual calculation and provides high reproducibility and accuracy .

Bacteriological studies. In order to determine the degree of microbial contamination of the ascitic fluid in all patients and to prescribe adequate antibiotic therapy, ascitic fluid cultures were taken and antibiotic sensitivity was determined by the disk diffusion method. Empirical antibiotic therapy was used in all patients until the results of the bacteriological analysis were clear.

Bacteriological research Bacteriological laboratory at the Bukhara branch of RShTYoIM performed in the center. As a result of bacteriological analysis, the degree of infection of ascites fluid was determined depending on the amount of microorganisms in 1 mm ^{3} of ascites fluid, and patients were divided as shown in table 2.5.

2.5 - table

Distribution of patients according to the degree of infection of ascites fluid

Groups	Number of microorganisms (COE/mm3)				Total
	250-500	500-750	750-1000	> 1000	
Comparison group	22 (32.3%)	15 (22%)	18 (26.4%)	13 (19%)	68
Main group	16 (27.5%)	14 (24.1%)	18 (31%)	10 (17.2%)	58

This Table 2.5 shows that in the comparison group, 19% of patients had a microbial count of more than 1000 cfu/mm3 in their ascitic fluid, while in the main group, 31% of patients had a microbial count of 750-1000 cfu/mm3 in their ascitic fluid.

Based on the results of bacteriological analyses, all patients included in our study were divided into clinical variants of spontaneous peritonitis. Based on the data in Table 2.6, we can see that the majority of patients were patients with classical SBP, that is, 60.2% of the comparison group and 62% of the main group.

2.6 - Table

Distribution of patients according to the clinical variant of spontaneous bacterial peritonitis with liver cirrhosis etiology

Clinical variants of SBP	Number of microorganisms (coe/mm3)	Comparison group	Main group
Classic SBP	≥ 250	41 (60.2%)	36 (62%)
Culture-negative bacterial ascites	≥ 250	14 (20.5%)	17 (29.3%)
Monomicrobial bacterial ascites	< 250	8 (11.7%)	3 (5.1%)
Polymicrobial bacterial ascites	< 250	5 (7.3%)	2 (3.4%)
Total		68	58

Based on bacteriological analyses, the causative agent of SBP was *E. coli* in 85% of cases, followed by *Proteus and Klebsiella* .

Endoscopic venous ligation (EL) was performed to stop bleeding in patients with SBP and esophageal venous bleeding. Given that EL was performed using multi-charge ligators, a “circular” ligation of all esophageal varices, starting from the level of the esophageal-gastric junction, was performed in one session. If necessary, repeated ligation of the varices was performed after one month.

RESEARCH RESULTS

Based on the goals and objectives of our study, the results of traditional treatment of 68 patients with spontaneous bacterial peritonitis of liver cirrhosis etiology, belonging to the I-comparison group, out of a total of 126 patients, were retrospectively analyzed . It should be emphasized that these patients were treated

in the surgical departments of the Bukhara branch of the RSHTYIM during 2016-2020. The duration of the disease in these patients ranged from 1 to 10 years.

In the complex treatment of these patients, empirical antibiotic therapy was carried out according to international standards, and the third-generation cephalosporins were used as the drug of choice, that is, in most cases, ceftriaxone was administered intravenously at a single dose of 2.0 g every 12 hours and intramuscularly at a daily dose of 4.0 g. The duration of treatment was from 5 to 14 days.

In cases where third-generation cephalosporin drugs were ineffective, combination antibiotics, namely amoxicillin/clavulanate potassium, were used in 3 patients at a dose of 1-2 g every 6 hours.

As a criterion for evaluating the effectiveness of traditional treatment methods, the following indicators were monitored:

- the number of microorganisms in the ascites fluid decreases on the second day of antibiotic treatment;
- regulation of body temperature;
- decrease in the number of leukocytes;
- Reduction of clinical symptoms of SBP.

The effectiveness of complex treatment methods performed by traditional methods in the comparison group of patients was noted in 54 (79%) patients, while 14 (21%) of the patients died due to various causes (renal failure, progression of peritonitis (sepsis) and multi-organ failure). The main reason for this high mortality rate was found to be systemic inflammatory reactions occurring in the body. The duration of inpatient treatment of patients was 14 ± 2.2 days.

In contrast to the patients in the control group, the patients in the II-main group (n=58) with spontaneous bacterial peritonitis complicated by liver cirrhosis were included in our study, and in addition to active conservative treatment methods, meropenem, albumin, ulinastatin and paracentesis were dynamically administered, all puncture procedures were performed under UTT. In the patients in the main group, along with PML, the concentrations of total protein and leukocyte esterase in the ascitic fluid were dynamically monitored. In addition to an objective assessment of the inflammatory process in laboratory tests, the dynamics of C-reactive protein were monitored.

At the time of diagnosis, most patients underwent paracentesis on the day of admission. In order to evaluate the dynamics of the effectiveness of antibacterial therapy, patients in the main group underwent dynamic paracentesis every 4 days, and all paracentesis procedures were performed under UTT.

Patients included in the main group were treated at the surgical department of the Bukhara branch of the Russian State Institute of Internal Medicine from 2020 to 2024. The duration of illness of these patients, like the patients in the comparison group, was from 1 to 10 years.

Ulinastatin is a multivalent inhibitor of Cupping-type proteases (trypsin, chymotrypsin, thrombin, plasmin, elastase, cathepsin). In addition, Ulinastatin is a potent anti-inflammatory and immunomodulator. Given the systemic inflammatory reactions observed in the body of patients with SBP, Ulinastatin significantly improved the effectiveness of treatment in the main group of patients.

The drug Ulinastatin, which was used in addition to complex treatment measures, was administered intravenously to patients at 100,000 IU once a day for 5-7 days. From the 3rd day of treatment, patients experienced a sharp decrease in SBP symptoms, a sharp decrease in the amount of α -amylase and diastase in the urine up to 3 times. Duration of inpatient treatment of patients is 9 ±2.3 days.

CONCLUSIONS

1. The development of small intestinal SBP in the setting of liver cirrhosis has a mortality rate of 24% in Child-Pugh B and C classes. If, according to previous data, mainly gram-negative bacteria were detected, now gram-positive bacteria are also observed. Based on bacteriological analysis of ascites fluid, E. coli was found in 5 (8.5%) cases and Klibsiella in 7 (12%) cases.

2. In a retrospective analysis, the effectiveness of complex treatment methods performed by traditional methods was noted in 54 (79%) patients, while 14 (21%) of the patients died from various causes, including: renal failure, progression of peritonitis (sepsis) and multiorgan failure, and gastrointestinal bleeding. At the same time, retrospective results showed that in 20 (29.5%) of 68 patients, paracentesis was performed within 3 days of hospitalization, in 43 (63%) - within 4 days, and in 5 (7.5%) patients - within 5 days. This was due to the lack of development of pronounced symptoms of the disease.

3. The use of meropenem, albumin, ulinastatin for the purpose of empiric antibacterial therapy had a positive effect on the effectiveness of treatment. In the main group, the death rate decreased from 21% to 8.7%, that is, a decrease of 2.4 times. It was found that the days of inpatient treatment of patients decreased from an average of 14±1.8 days to 6.5±1.8 days.

4. In patients with SBP, regardless of the development of clinical symptoms of the disease, all patients with ascites should undergo paracentesis on the 1st day and the ascitic fluid should be examined for PML, microbiological tests, as well as total protein, leukocyte esterase, and CRP in the blood to determine the presence and

degree of inflammatory processes. In order to assess the effectiveness of treatment, it is advisable to perform dynamic paracentesis on the 3rd-4th day and observe changes in ascitic fluid. All paracentesis procedures should be performed under ENT.

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