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The Choice of Treatment Tactics in Patients with Severe Acute Pancreatitis Taking Into Account the Factor of Intra-Abdominal Hypertension

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RELEVANCE Increased intra-abdominal pressure (IAP) in patients with severe acute pancreatitis (AP) is one of the triggers for the development of a functional organ failure, which leads to death. In this case, the favorable outcome of treatment of patients with severe AP is largely determined by early diagnosis and timely elimination of intra-abdominal hypertension (IAH). At the same time, there is no unified and agreed opinion on the principles and specific methods of eliminating the IAH syndrome in patients with severe AP today, which greatly complicates the choice of treatment strategy and tactics.

AIM OF STUDY To assess the role and clinical significance of IAP monitoring in patients with severe AP with various manifestations of organ dysfunction and, offer a set of therapeutic measures aimed at resolving intra-abdominal hypertension.

MATERIAL AND METHODS The current study included 199 patients with severe AP, divided into two groups depending on the chosen treatment strategy. Group I included 107 patients where the diagnosis and treatment of the disease corresponded to generally accepted standards. Group II included 92 patients, where, in order to objectify the severity and prognosis of the course of AP, along with standard studies, IAP and APACHE II scale indicators were additionally monitored during treatment, and the severity of organ dysfunctions was assessed. In these patients the choice of medical tactics, including the use of conservative and surgical interventions, was made on a differentiated basis, based on the severity of the disease and the dynamics of the IAH.

RESULTS The role and significance of IAP monitoring and APACHE II scale indicators in the treatment of patients with severe AP were determined. The use of a differentiated approach to the choice of treatment strategies for patients with AP considering the severity of the disease and severity of IAH syndrome results in reduced hospital mortality by 10.3% and reduced postoperative mortality by 11.4%.

CONCLUSION Monitoring of intra-abdominal pressure and APACHE II scale indices in conjunction with standard clinical and laboratory parameters allows patients to be clearly stratified according to the severity of acute pancreatitis, which helps optimize the choice of treatment tactics, including methods and timing of surgery, as well as the use of a set of effective therapeutic measures aimed at eliminating intra-abdominal hypertension.

Keywords: severe acute pancreatitis, multiple organ failure, intra-abdominal pressure, intra-abdominal hypertension

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ACS - abdominal compartment syndrome
IAH - intra-abdominal hypertension
IAP - intra-abdominal pressure
VLSK - video laparoscopy
RPT - retroperitoneal tissue
LII - leukocyte intoxication index
AP - acute pancreatitis
ICU - Intensive Care Unit
MMP - medium molecular peptides
EIS - enteric insufficiency syndrome
Us- guidance - ultrasonic guidance
PPDI - percutaneous puncture and drainage interventions

INTRODUCTION

Acute pancreatitis (AP) is one of the important and unsolved problems in emergency surgical gastroenterology. First of all, this is explained by the continuing increase in the incidence rate against the background of a steady increase in the number of destructive forms of this pathology and significantly non-decreasing hospital mortality rates, which in severe AP reaches 26.5–45% [1–3]. In 55–69% of patients with severe AP, the main cause of death during the early phase of the disease is the persistence or progression of organ disorders [4–6].

One of the pathogenetically significant mechanisms of the formation of early multiple organ failure in patients with severe AP is a persistent increase in the level of intra-abdominal pressure (IAP). The main factors contributing to an increase in IAP in patients with severe AP include paresis of the gastrointestinal tract, edema of the peritoneum lining the abdominal cavity and its organs, the presence of massive accumulations of fluid in the abdominal cavity and retroperitoneal cellular tissue, pronounced stiffness of the abdominal muscles due to edema and insufficient analgesia [2, 5, 7]. Increased IAP causes a number of serious systemic disorders that include circulatory, respiratory, hepatic, renal, and enteral failure [5, 8, 9]. A sharp increase in IAP leads to compression of the vessels of the abdominal cavity, a decrease in the flow of venous blood to the heart, a decrease in abdominal perfusion pressure, impaired visceral blood flow, microcirculation and tissue perfusion. The combination of persistent intra-abdominal hypertension (IAH) and enteric insufficiency syndrome (EIS) in patients with severe AP is the main cause of infection with pancreatic necrosis and the development of sepsis. [4–6]. Increase in IAP more than 20 mm Hg in conditions of organ failure causes the presence of abdominal compartment syndrome (ACS), which significantly increases the risk of death in patients with severe AP [5, 8, 9].

In accordance with this, strategic measures to actually reduce hospital mortality in the early period of severe AP are to clearly identify the category of patients with a high risk of developing fatal systemic complications, prevent and timely correct organ failure. This provides for an objective assessment of the severity and prognosis of the course of AP, which determines the choice of the optimal conservative and operative treatment program [10–12].

Given the close pathogenetic relationship between IAP and early progressive organ disorders, it is of undoubted interest to monitor IAP from the first day of the disease as one of the significant additional factors in assessing the severity and predicting the course of AP [2, 5, 7, 13].

The favorable outcome of the treatment of patients with severe AP is largely determined by early diagnosis and timely elimination of intra-abdominal hypertension associated with various manifestations of organ failure [2, 5, 14]. At the same time, there are still no unified and agreed views on the methods of eliminating IAH in patients with severe AP, which greatly complicates the choice of an effective conservative treatment program and surgical tactics..

Purpose of the study: to assess the role and clinical significance of IAP monitoring in patients with severe AP with various manifestations of organ dysfunction and, on this basis, to propose a set of therapeutic measures aimed at resolving IAH.

MATERIAL AND METHODS

The current study included 199 patients with severe AP who were treated at the clinic from January 2004 to December 2018, including 136 men (68.3%) and 63 women (31.7%). Сроки от начала заболевания не превышали 1–4 суток. The average age of the patients was 44.7 ± 3.2 years (from 21 to 78 years). The reason for the development of AP was in 129 patients (64.8%) the abuse of alcohol and its surrogates, in 65 (32.7%) - pathology of the biliary tract and in 5 (2.5%) - instrumental endoscopic transapillary manipulations.

On admission, all patients had free pancreatogenic effusion in the abdominal cavity and / or delimited retroperitoneal fluid accumulations. The prevalence of the process on the pancreas and retroperitoneal tissue (RPT) was assessed according to the results of ultrasound examination, X-ray computed tomography with contrast enhancement, magnetic resonance imaging, video laparoscopy (VLS), as well as according to data obtained during surgery. Pancreatogenic lesion of the RPT within the boundaries of one anatomical region of the retroperitoneal space was regarded as limited retroperitoneonecrosis, with the defeat of two or more anatomical areas of the retroperitoneal cellular space, retroperitoneonecrosis was considered as spread one [11].

All patients during the study were divided into two groups matched by sex and age. The main principle of the distribution of patients into groups was the approach to the choice and implementation of therapeutic and diagnostic tactics for severe AP in the early phase of the disease.

Group I (comparison group) included 107 patients with severe AP, in whom the treatment and diagnostic process was carried out on the basis of standard approaches and protocols. In these patients, the examination was carried out according to the generally accepted scheme, which included a general clinical examination, traditional methods of laboratory and instrumental diagnostics. In this category of patients, multivariate predictive systems were not used and IAP was not monitored to assess the severity and predict the course of AP. With this approach, in patients of group I, the choice of tactics and treatment program, including the use of numerous methods of conservative treatment and surgical interventions, was largely implemented on an empirical basis, without taking into account the dynamics of IAP, a specific assessment of the severity and prognosis of the course of the disease.

The II (main) group included 92 patients who, in order to objectify the severity and prognosis of the course of AP, along with conducting standard studies, in addition to the course of treatment, IAP and the APACHE II scale index were monitored, and the nature of organ dysfunctions was assessed. To a large extent, these studies created the basis for determining the adequate treatment tactics in each patient

with severe AP in the early period of the disease. Accordingly, in patients of group II, the choice of treatment tactics, including the use of conservative measures and surgical interventions, was implemented on a differentiated basis, with due regard for the severity of AP and the dynamics of changes in intra-abdominal hypertension.

The selection of patients into the study groups was carried out retrospectively, that is, the patients who were in fact already treated without taking into account the monitoring of IAP dynamics and the APACHE II scale index were included in group I, while group II included patients in whom these studies were carried out during the diagnostic process, and their results were taken into account in the treatment process.

IAP registration was carried out according to the method I.L. Kron et al. [4–6] using a special urine collection device with a graduated scale UnoMeter Abdo-Pressure ("ConvaTec", Great Britain), which was connected to the urethral catheter. The degree of intra-abdominal hypertension was determined on the basis of a unified classification of M.L. Malbrain et al. [4–6]. The assessment of the functional organ-systemic viability in severe AP was carried out according to the criteria of A. Baue et al. (2000) [4–6].

The severity of endotoxicosis and systemic inflammatory response in patients with severe AP at the time of their admission and in the dynamics of treatment was assessed using laboratory tests: leukocyte intoxication index (LII), the level of C-reactive protein (CRP) and the content of medium molecular weight peptides (MMP) in blood plasma.

All hospitalized patients were in the intensive care unit (ICU). In the ICU, in 24 patients (22.4%) of group I and 21 patients (22.8%) of group II in the early phase of severe AP, extracorporeal methods of hemocorrection (plasma exchange, prolonged veno-venous hemofiltration) were used. For the purpose of pain relief and control of intestinal paresis, all patients underwent epidural analgesia.

At different stages of the course of AP, depending on the period of the disease and the nature of complications in the treatment of patients, different methods of surgical interventions were used on the pancreas, abdominal cavity and RPT, as well as on the biliary tract.

In the early phase of the disease (the first 7–10 days from the onset of AP), patients, as a rule, received only minimally invasive surgical interventions: VLS-sanitation and drainage of the abdominal cavity, as well as percutaneous puncture-draining interventions (PPDI) under ultrasound (US) guidance. If indicated, the patients additionally underwent decompression-sanitation mini-laparotomy and bursomentostomy using a set of instruments "Mini-Assistant». Traditional open-type surgical interventions (laparotomy) during this period were performed only with the development of destructive complications that, for one reason or another, could not be eliminated using minimally invasive technologies.

During the development of purulent-necrotic complications in patients with AP, both traditional operations (laparotomy, lumbotomy) and minimally invasive surgical interventions were performed. The choice of surgical access, methods of sanitation surgery and the sequence of their use were determined by the prevalence, localization and nature of the lesion of the pancreas and RPT, as well as the severity of the patient's condition.

To carry out a statistical analysis of the data obtained, we used standard programs Microsoft Excel 2016 and Stata 15 (USA). In each number row, the arithmetic mean (M), the error of representativeness (m), and the standard deviation (□) were determined. To check the normality of the distribution of the sample of the considered groups, the Shapiro-Wilk test was used. When comparing the mean values of quantitative data in the study groups, the Kruskal – Wallis test was used. Qualitative indicators were compared using Fisher's exact test adjusted for multiple comparisons according to Holm's method. The significance of the differences was recognized at $p < 0.05$. To study the correlation, we used $\chi 2$ - Pearson's test.

RESULTS AND DISCUSSION

In group I, in 20 patients (18.7%), only conservative measures were used in the treatment of severe AP in the early phase of the disease. In 87 patients (81.3%) with OP during this period, a complex of conservative measures was combined with surgical methods of treatment. Surgical interventions performed in patients of group I in the first phase of the disease are shown in Table 1.

Table 1

Surgical interventions performed in patients with acute pancreatitis in the first phase of the disease (Group I)

Types of operations	Number of operations
Video laparoscopic debridement and drainage of the abdominal cavity	73
Laparotomy, bursomentostomy	8
Percutaneous puncture and drainage interventions under ultrasound guidance	6
Total operations performed	87

From the presented data, it follows that out of 87 operations performed in patients with OP of group I in the first phase of the disease, in 73 cases (83.9%), VLS-sanitation and drainage of the abdominal cavity were performed. In 8 cases (9.2%), traditional laparotomy was

performed. The main indication for laparotomy in the first phase of AP was the suspicion that the patient had widespread peritonitis of unclear etiology. In these patients, during an open operation, peritoneal effusion was evacuated, the omental bursa and abdominal cavity were sanitized, and nasoenteric intubation was performed using a double-lumen probe. The operation was completed with drainage of the abdominal cavity and omental bursa with suturing of the laparotomic wound around the drainage like bursoomentostomy. In another 6 patients (6.9%) of group I, percutaneous drainage of fluid accumulations under ultrasound guidance was performed to remove free pancreatogenic exudate from the abdominal cavity or omental bursa.

In group II, in the first phase of the disease, purely conservative treatment was carried out only in 15 patients (16.3%), and in 77 patients (83.7%) there was a need for surgical treatment. Under these conditions, in patients with AP of group II, the choice of the optimal surgical tactics, including the determination of the method, the volume of surgery and the specific timing of its implementation in the early phase of the disease, was primarily determined by the vector of development of intra-abdominal hypertension, the dynamics of changes in the APACHE II scale index and manifestations of organ inadequacies.

All patients of the main group were divided into four subgroups depending on the manifestations of organ system insufficiency. The 1st subgroup included 38 patients (41.3%) in whom organ disorders were absent or manifested in the form of transient disorders. The 2nd subgroup included 18 patients (19.6%) in whom one organ failure was observed. The 3rd subgroup included 17 patients (18.5%) with manifestations of dysfunction of two organs and the 4th subgroup - 19 patients (20.6%) in whom there was a failure of three or more organs..

The dynamics of changes in the IAP value in patients with severe AP in the subgroups under consideration is shown in Fig.1.

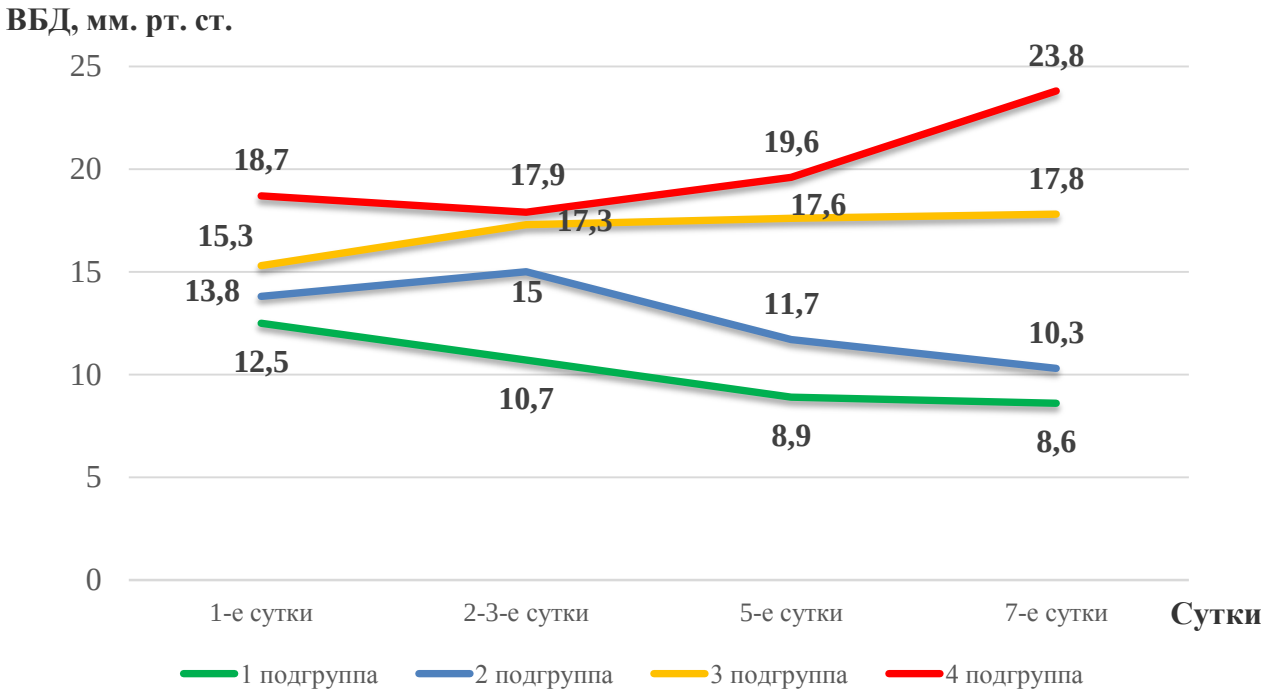

Fig. 1. Dynamics of changes in the index of intra-abdominal pressure in patients with acute pancreatitis with various manifestations of organ failure (Group II)

In patients of subgroups 1–3, IAP levels increased moderately within 1 day and fell within the 1st degree of IAP. At the same time, the parameters of their fluctuations between subgroups were not statistically significant. At the same time, in patients of the 4th subgroup, in contrast to patients of other subgroups, the IAP index increased more significantly ($p < 0.05$) and corresponded to the 2nd degree of IAH.

In the context of complex treatment (including the use of minimally invasive surgical interventions), the tendency towards normalization of the IAP level in patients of the 1st subgroup was revealed already by the end of the 2nd - the beginning of the 3rd days, in patients of the 2nd subgroup - somewhat later than these terms (closer to the 7th day) from the moment of hospitalization.

In patients of the 3rd subgroup, after 2 days, the IAP level gradually increased to the 2nd degree of IAH and practically reached a plateau without any tendency to decrease in subsequent periods (up to 7 days). In patients of the 4th subgroup, up to 5 days, IAH of the 2nd degree was persistently maintained. On the 7th day, patients of this subgroup had a rapid increase in IAP (23.8 ± 1.9 mm Hg), which correlated with the 3rd degree of IAH. It is characteristic that in 4 patients (21.0%), against the background of the development of ACS, the IAP level was higher than 25 mm Hg (4th degree IAH).

The dynamics of changes in the APACHE II scale index in patients with severe AP in various subgroups is shown in Fig. 2.

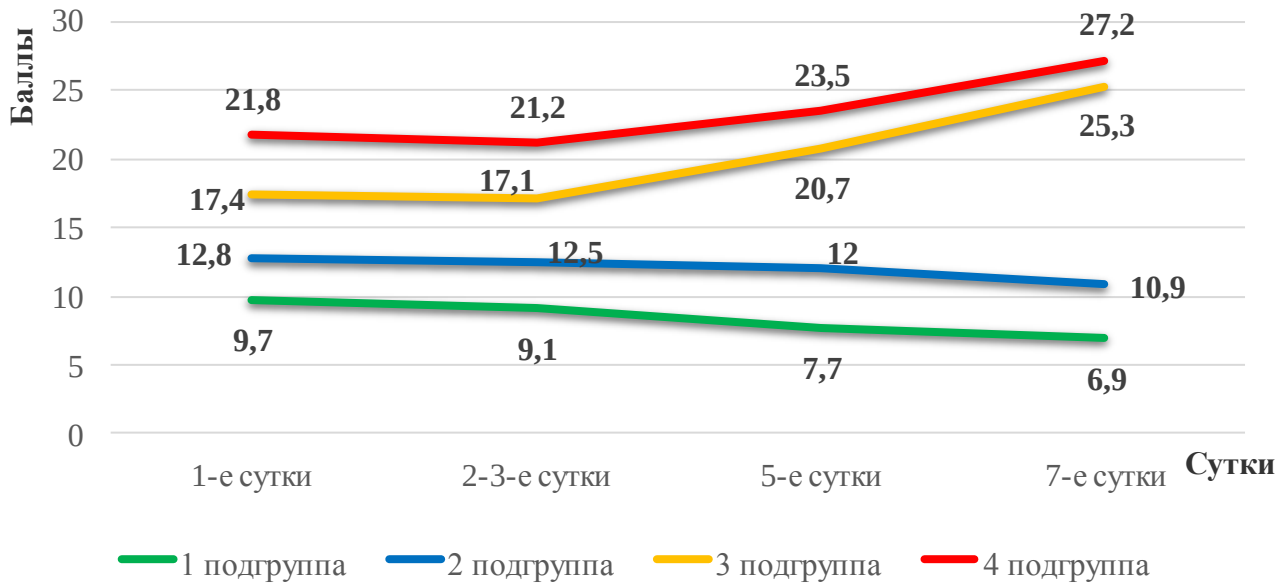

Fig. 2. Dynamics of changes in the APACHE II scale index in patients with acute pancreatitis with various manifestations of organ failure (Group II)

Already at the time of hospitalization and on the 1st day, patients of the 2nd, 3rd and 4th subgroups with various manifestations of organ failure, in contrast to patients of the 1st subgroup, showed rather high values of the APACHE II scale index, which corresponded to the severe variant course of the AP. During treatment, patients of subgroups 1–2 by days 2–3 showed a positive trend in the evolution of the disease, which was accompanied by a regression of APACHE II index values, while in patients of subgroups 3–4 there was a significant increase in this indicator by 5 7th and 7th days. In this case, there was an average direct correlation between the IAP value and the values of the scale index APACHE II (r=0,58). It was also revealed that in patients with severe OP with a widespread variant of PCD lesion, the level of intra-abdominal hypertension and the APACHE II scale index were higher in relation to patients with limited retroperitoneonecrosis. ($p<0,05$).

The results of the studies carried out to a large extent made it possible to verify patients of group II in proportion to the severity of AP and the degree of risk of developing systemic complications, which was of decisive importance in objectifying the assessment of the prognosis of the course of the disease. At the same time, they were considered as significant additional criteria for choosing the most preferable treatment tactics, as well as determining a conservative and surgical treatment program aimed at eliminating intra-abdominal hypertension in patients with AP in the early phase of the disease.

Surgical interventions performed in the first phase of the disease in patients of group II with varying severity of the course of AP are given in Table 2.

Table 2

Surgical interventions performed in patients with acute pancreatitis in the first phase of the disease (Group II)

Types of operations	Subgroups of patients				Number of operations	
	1 (*n*=38)	2 (*n*=18)	3 (*n*=17)	4 (*n*=19)	abs.	%
Video laparoscopic debridement and drainage of the abdominal cavity	22	16	17	19	74	78.7
Laparotomy, bursomentostomy	-	-	-	4	4	4.3
Mini-laparotomy, bursomentostomy	-	-	5	6	11	11.7
Percutaneous puncture and drainage interventions under ultrasound guidance	1	2	1	1	5	5.3
Total operations performed					94	100.0
Number of operated patients					77	-
Note. The number of operations performed exceeds the number of operated patients since some patients underwent two surgical interventions						

Of 94 operations performed in patients of group II in the early phase of the disease, 74 cases (78.7%) underwent to VLS-sanitation of the abdominal cavity, which was performed along with the diagnostic stage of the study in patients with severe AP in all studied subgroups. It is characteristic that this surgical intervention in the early period of the course of AP was performed in 74 (96.1%) of 77 initially operated patients.

In the course of VLS-sanitation, if necessary, the posterior leaf of the parietal peritoneum was dissected over the most affected and protruding sections of the RPT in the form of a "twig" in order to fully decompress the retroperitoneal space.

In 4 patients with severe AP, who belonged to the 4th subgroup, in conditions of a progressive increase in IAP, paresis of the gastrointestinal tract that does not respond to conservative treatment, intoxication syndrome and manifestations of organ failure on the 5-7th day after the previously performed VLS-sanitation of the abdominal cavity, it became necessary to perform repeated surgical intervention in the form of decompression laparotomy, bursomentostomy and nasoenteric intubation. This amounted to 5.2% in relation to the total number of patients of group II operated on in the first phase of the disease. The traditional (open) surgical intervention in this phase of the AP was justified primarily by the insufficient effectiveness of the intensive therapy and the previously performed sanitation laparoscopy with the resumption of a rapid increase in intra-abdominal fluid accumulation, the progression of intestinal paresis, the development of refractory intra-abdominal hypertension and manifestations of ACS. For the most part, these patients had macrofocal or subtotal pancreatic necrosis, which developed against the background of "phase intersection" of the disease, when early destructive complications of AP were superimposed on the manifestations of severe pancreatogenic toxemia.

In another 11 patients included in the 3rd and 4th subgroups, who at the initial stage of treatment also underwent sanitation VLS, on days 7-9 due to the presence of persistent intra-abdominal hypertension and manifestations of organ disorders, additional decompression intervention in the abdominal cavity was performed by mini-laparotomy and the formation of a bursomentostomy using a set of instruments "Mini-Assistant". This amounted to 14.3% in relation to the total number of patients in group II operated on in the first phase of the disease. During the operation, all rejected sequesters and demarcated necrotic tissue areas were removed through the formed bursomentostomy.

In 5 patients with severe AP, we undertook PPDI under ultrasound guidance, which amounted to 6.5% of the total number of patients of group II operated on in the first phase of the disease. At the same time, in 3 patients of the 1st and 2nd subgroups, PPDI in the abdominal cavity (omental bursa) with evacuation of pancreatogenic effusion was the main and final version of the sanitation surgical aid. At the same time, in 2 patients (3rd and 4th subgroups), who underwent to VLS-sanitation of the abdominal cavity at an early stage of treatment, minimally invasive drainage of intraperitoneal and retroperitoneal fluid accumulations under ultrasound guidance was used as a repeated sanitation surgery due to ineffectiveness of conservative measures.

The analysis of the obtained results showed that, in contrast to patients of group I, who at the first stage of the disease underwent to a single surgical intervention in all cases, in 17 patients of group II (22.1% of all operated patients in the main group) against the background of progression of intra-abdominal hypertension in the early period there was a need for repeated sanitation and decompression surgeries. At the same time, repeated surgical interventions were performed in patients with severe AP only in the 3rd and 4th subgroups (out of 17 patients in 6 patients and, accordingly, out of 19 patients in 11 patients).

When choosing the preferred tactics and treatment program for severe AP, we first of all proceeded from the position that this category of patients was rather heterogeneous in terms of the level of intra-abdominal hypertension and manifestations of organ failure. So, in the 1st subgroup of 38 patients with AP, 16 (42.1%) in intensive care conditions observed positive clinical dynamics against the background of a decrease in the APACHE II scale index and IAP. These patients continued conservative treatment. Only in one patient, due to the formation of a delimited intra-abdominal fluid accumulation, it was subsequently drained percutaneously under ultrasound guidance. At the same time, in 22 patients (57.9%), despite persistent conservative measures, there was an increase in free effusion in the abdominal cavity with the development of a clinic of pancreatogenic peritonitis, which was combined with grade 1 intra-abdominal hypertension and high values of the APACHE II scale index. In these patients, during the first three days from the moment of admission, sanitation VLS was performed.

In the 2nd subgroup of 18 patients, 16 (88.9%) did not have the proper clinical effect from the intensive conservative therapy. These patients had signs of pancreatogenic peritonitis, persisted pain syndrome against the background of high values of the APACHE II scale index and an increase in IAP. In these patients, within the next 3 days after hospitalization (on average, 1.7 ± 0.4 days), the VLS-sanitation of the abdominal cavity was performed. Percutaneous drainage under ultrasound guidance in two patients at the same time was carried out in order to remove free pancreatogenic effusion and sanitize the abdominal cavity.

Thus, the results of the study showed that if patients with severe AP have organ dysfunction of a transient nature or manifestations of insufficiency of one organ, in most cases, an effective and quite sufficient surgical method for eliminating intra-abdominal hypertension in the early period of the disease is VLS-sanitation and drainage of the abdominal cavity with full laparoscopic decompression of the affected RPT.

In all patients without exception with severe AP in the 3rd and 4th subgroups due to the progression of pancreatogenic peritonitis and organ disorders, along with an increase in IAP values and the APACHE II scale index within the next 24-72 hours after hospitalization (on average, 25.6 ± 4.2 hours) we performed sanitation VLS. In the 3rd subgroup of 17 patients, 5 (29.4%), despite performing laparoscopic debridement and carrying out a complex of intensive therapy, there was persistent intra-abdominal hypertension of the 2nd-3rd degree against the background of manifestations of endotoxicosis and organ failure. On the 5-7th day after the laparoscopic operation, these patients underwent additional repeated surgical intervention in the form of mini-laparotomy and decompression bursomentostomy. In addition, in one patient of the 3rd subgroup, after a previously transferred sanitation laparoscopy, percutaneous drainage of a delimited intra-abdominal fluid accumulation under ultrasound guidance was performed at the same time.

In the 4th subgroup of 19 patients with severe AP, 10 (52.6%) performed sanitation laparoscopy and full intensive conservative therapy did not lead to a significant fracture of the negative variant of the course of the disease. In these patients, manifestations of severe endotoxicosis, gastrointestinal paresis and organ disorders persisted against the background of a clear increase in the APACHE II and IAP values, which was accompanied by the development of ACS (in 6 patients, IAH of the 3rd degree and in 4 patients of the 4th degree). In this category of patients, this served as the basis for the use of surgical methods for decompression of the abdominal cavity in the early period of the disease and for repeated (control) sanitation of the zones of pancreatogenic destruction and sequestration of necrotic tissues. As a matter of urgency, within 5-7 days after the previously performed VLS, decompression laparotomy, probe nasoenteric intubation were performed in 4 patients and mini-laparotomy in 6 patients. In all cases, surgical intervention was completed with the formation of a decompression bursomentostomy or retroperitoneostomy with drainage of the cavities with double-lumen tubes through the bursoomentostomy. After performing sanitation and decompression surgeries in this category of patients, the IAP level decreased by 4–11 mm Hg over the next 2 days (on average by 7 mm Hg) compared with the baseline.

Thus, in patients with severe destructive AP with manifestations of functional insufficiency of two or more organs, the development of refractory intra-abdominal hypertension with high IAP and APACHE II scale index within 5-7 days after sanitation laparoscopy was regarded as an absolute indication for urgent early sanitation and decompression surgery. At the same time, the choice of the method and volume of

the repeated corrective surgical aid, as well as the timing of its implementation, were correlated with the severity of intra-abdominal hypertension and the severity of the course of AP.

Comparative analysis of the timing of the primary surgical intervention from the moment of hospitalization in patients with severe AP in both groups revealed their significant differences. Within the next 3 days after admission in group I, surgical interventions were performed only in 66.7% of patients (in 58 out of 87 patients), while in group II - in 97.4% of patients (in 75 out of 77 patients) in relation to the total number of operated patients in each of the groups in the early period of the disease. It is characteristic that all patients of group II operated on during these periods underwent only minimally invasive surgical interventions (VLS-sanitation of the abdominal cavity and percutaneous drainage under ultrasound guidance), while in group I in 8 patients (13.8%) due to incorrect interpretation of the direction of the evolution of the process in the foci of pancreatogenic destruction a traditional midline laparotomy was wrongfully performed in the early period of the disease. Open surgery at the peak of toxemia inevitably led to the progression of endotoxicosis and early multiple organ failure, which significantly increased the risk of death in patients. In addition, in 5 patients of group I, due to underestimation of the severity of the disease at the time of admission, there was an unjustified delay in the timing of sanitation laparoscopy by an average of 33.6 ± 5.8 hours.

Errors in treatment tactics, committed in patients of group I, were largely caused by an arbitrary interpretation of the severity and prognosis of the development of the disease, as well as an empirical approach to the choice of a conservative and surgical treatment program. The consequence of this was the untimely (late) execution of minimally invasive surgical interventions, unjustified traditional (open) operations in the early period of the disease, as well as the disordered use of various conservative measures in patients of group I in the treatment of severe forms of AP.

Along with the rational and timely implementation of sanitation and decompression surgeries, an extremely important role in the elimination of intra-abdominal hypertension in patients with severe AP was assigned to the elimination of gastrointestinal tract paresis and the resolution of EIS. For this purpose, in patients of group II in the early period of the disease we used a special set of therapeutic measures aimed at eliminating EIS, which, in addition to traditional methods of combating intestinal paresis (balanced infusion therapy, adequate epidural analgesia, therapeutic microclysters, etc.), included methods of intestinal therapy (nasoenteric lavage with crystalloid solutions and early nutritional support through a nasojejunal probe inserted endoscopically distal to the Treitz ligament, enterosorption), as well as pharmacostimulation of intestinal motor activity by intravenous administration through an infusomat of the drug Dinaton (a pharmacological analogue of the neurotransmitter serotonin) at a dosage of 20-60 mg /day.

Comparison of the dynamics of changes in laboratory parameters of endotoxicosis in the studied groups of patients indicated a faster rate of decrease in toxemia during treatment in patients of group II than in patients of group I (Fig. 3).

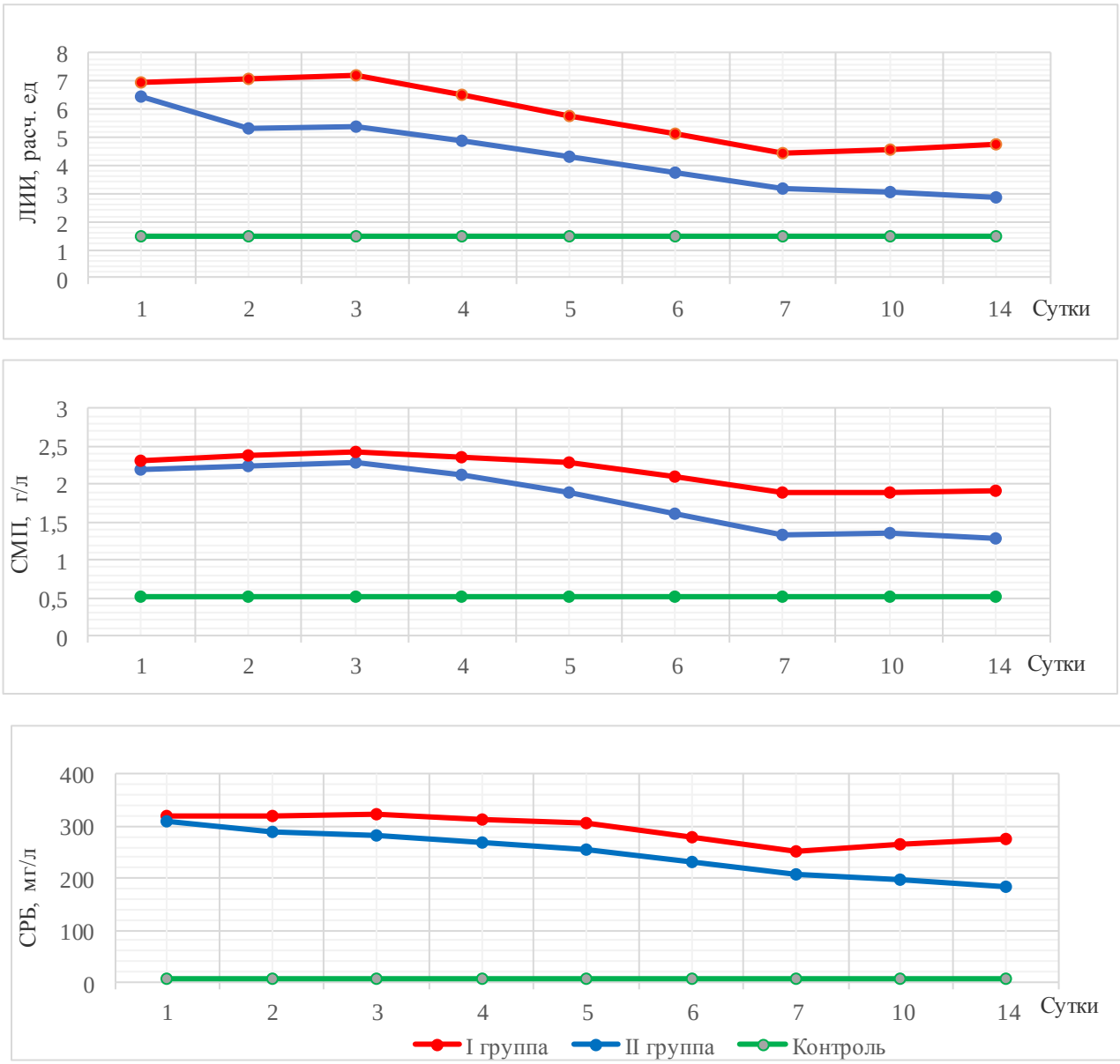

Fig. 3. Dynamics of changes in laboratory parameters of endotoxicosis in patients with acute pancreatitis in the study groups during treatment

In group I, 32 out of 107 patients with AP died (hospital mortality - 29.9%). Within 14 days from the onset of the disease, a fatal outcome was noted in 19 patients (17.8%). Subsequently, out of 88 survivors, 42 patients (47.7%) developed purulent-destructive complications. Of these, 13 patients died (30.9%). In group I out of 87 operated patients 30 patients died (34.5%).

In group II, out of 92 patients with AP, 18 died (hospital mortality - 19.6%). In the early period of the disease (the first 14 days from the onset of AP), a fatal outcome was noted in 10 patients (10.9%). In the subsequent periods, out of 82 patients who survived by that time, 27 (32.9%) had purulent-destructive complications. Of these, 8 patients died (29.6%). In group II, out of 77 operated patients, 18 died (23.4%).

Thus, in patients with severe AP, the levels of hospital and postoperative mortality in group II were statistically significantly lower than in group I ($p<0,05$).

Patients with AP with various manifestations of organ disorders were considered separately. In the 1st subgroup, there were no deaths in patients with transient organ disorders. In the 2nd subgroup, out of 18 patients with one organ failure, 2 (11.1%) died, in the 3rd subgroup, out of 17 patients with two organ failure, 5 (29.4%) died, in the 4th subgroup, out of 19 patients with dysfunction of three or more organs, 11 died (57.9%). At the same time, there was no statistically significant difference in the mortality rate between patients of the 1st and 2nd subgroups ($p> 0.05$). At the same time, there were statistically significant differences in mortality rates between patients of the 3rd and 4th subgroups ($p <0.05$), as well as between patients of these subgroups and patients of the 1st and 2nd subgroups ($p<0,05$). In patients with the most severe manifestations of organ disorders and intra-abdominal hypertension syndrome (subgroups 3, 4), the total hospital mortality was 44.4% (16 of 36 patients died). The data obtained convincingly confirmed that the leading role in the unfavorable outcome of the disease in patients with severe AP is determined by the presence of early organ disorders.

CONCLUSION

Monitoring of intra-abdominal pressure and the APACHE II scale index, in combination with standard clinical and laboratory parameters, makes it possible to clearly stratify patients according to the severity of acute pancreatitis and predict the dynamics of the development of

the disease, which helps to optimize the choice of tactics and treatment program. At the same time, it is extremely important at the early stages of the course of the disease to timely isolate from the general generation of patients with severe acute pancreatitis the category of patients with refractory intra-abdominal hypertension and manifestations of organ disorders, which primarily require early urgent decompression surgery, as well as the use of persistent conservative measures. aimed at resolving intra-abdominal hypertension. The use of such an approach in the treatment of patients with severe acute pancreatitis contributed to a decrease in hospital mortality by 10.3% (mainly due to a decrease in early mortality) and postoperative mortality by 11.4%.

FINDINGS

1. The level of intra-abdominal pressure, along with the APACHE II scale index, makes it possible to assess the severity and prognosis of the disease in the early phase of acute pancreatitis. At the same time, in patients with severe acute pancreatitis with a widespread type of lesion of the retroperitoneal cellular space, the level of intra-abdominal hypertension and the APACHE II scale index are higher in relation to patients with limited retroperitoneonecrosis ($p<0,05$).

2. Monitoring the index of intra-abdominal pressure from the first day of the disease allows, at an early stage, to clearly stratify patients with severe acute pancreatitis according to the degree of risk of developing fatal complications directly related to uncorrected intra-abdominal hypertension and progressive organ disorders, which largely determines the choice of tactics and treatment programs.

3. One of the priority and pathogenetically grounded directions of a unified program of treatment measures in patients with severe acute pancreatitis is the timely elimination of the syndrome of intra-abdominal hypertension. This task is solved by using a special treatment complex, which should include rationally programmed intensive therapy, surgical methods of decompression of the abdominal cavity, measures to resolve the syndrome of enteric insufficiency (epidural analgesia, nasoenteric drainage and intestinal therapy, as well as effective pharmacostimulation of intestinal motor activity). The strategy for the implementation of this treatment complex is determined by the dynamics of intra-abdominal hypertension and the degree of manifestation of organ disorders.

4. Persistent intra-abdominal hypertension refractory to conservative treatment in combination with organ abnormalities in patients with severe acute pancreatitis should be considered as an indication for surgical decompression of the abdominal cavity. In this case, indications for sanitation and decompression surgeries are usually urgent and vital.

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