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ANALYSIS OF SURGICAL TREATMENT TACTICS AND TREATMENT RESULTS FOR COMMON PURULENT PERITONITIS IN A MULTIDISCIPLINARY SURGICAL HOSPITAL

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The aim of the study was a retrospective analysis of the choice of surgical treatment tactics and the results of CPP treatment in a multidisciplinary urgent surgical hospital. **Material and methods.** The study is based on a retrospective analysis of the results of complex treatment of 253 patients with CPP who were treated in the emergency surgical departments of the Republican Hospital №2 - Emergency Medical Aid Center (RHN№ 2-CEMA) of the Republic of Sakha (Yakutia) in the period from 2015 to 2022. Results. In the clinic under consideration, the CPP tactic was most often used for CPP – 47,4%, while the share of ROD accounted for at least 27,7%, which is largely due to the profile of the clinic (Center for Emergency Medical Aid of the third level), but already at 31,4 In% of cases, after ROD, the transition to RAP was carried out, which led to a low mortality rate even with HS and SS – 16,7%. Moreover, in more than 91,7% of cases with CPP, as a rule, no more than two or three sanitizing relaparotomy were performed. The widespread introduction into surgical treatment practice of integral scales for assessing the severity of the general condition and the nature of damage to the abdominal organs – APACHE II, SOFA, MIP and ACI made it possible to more objectively assess the clinical situation and choose surgical treatment tactics. **Conclusion.** The results of the clinical study presented by us allow us to conclude that the use on an ongoing basis of the currently existing systems for assessing the severity of the condition and the nature of damage to the abdominal organs, along with intensive therapy, can reduce the level of postoperative mortality to 20-30% even with the development of HS.

Keywords: common purulent peritonitis, relaparotomy, surgical treatment tactics.

Introduction. Despite the advances in modern medicine, common purulent peritonitis (CPP) is still one of the topical problems of modern urgent abdominal surgery [9, 12, 14]. According to the generalized data of leading specialists of domestic and foreign clinics, the mortality rate in CPP over the past decade does not have a significant tendency to decrease and ranges from 10-60%, and with the development of severe abdominal sepsis, septic shock and multiple organ failure it can reach 70-80 % and more [2, 5, 15]. An equally important circumstance in the list of problems in the treatment of CPP is the high incidence of postoperative complications, the level of which reaches 10-30% and has not changed significantly in recent years [3]. The main role, according to a number of researchers [13, 17], is played by ineffective surgical debridement of the site of infection, ongoing peritonitis, untimely re-intervention, underestimation of the severity of the condition and inadequacy of intensive therapy.

Currently, for the treatment of CPP, four main strategies of surgical intervention at the end of primary laparotomy are most widely used: the traditional (closed) method, when, upon completion of all stages of the operation, the abdominal cavity is sutured tightly; staged operations using half-open / half-closed technologies (relaparotomy "according to plan" or according to the program (RAP), relaparotomy "on demand" (ROD)); combined (a combination of the traditional method with programmed endoscopic sanitation of the abdominal cavity); open abdomen (laparostomy) [8, 9, 18].

The currently existing surgical therapeutic tactics of sanitizing relaparotomies, according to the conclusion of a number of researchers, have a number of known advantages and disadvantages [8, 11, 16], therefore, the timing, volume and procedure of these interventions are currently not standardized and vary widely. The disadvantages of traditional methods of surgical treatment, first of all, are: the danger of incomplete elimination of the source of peritonitis in the course of one operation, late diagnosis of developing local and systemic complications, and, as a consequence, untimely decision-making on the need for re-intervention with subsequent radiotherapy [1]. Evaluation of the effectiveness of various surgical strategies is also difficult due to the heterogeneity of the compared groups of patients under study and the equipment of specific medical institutions [12, 19]. To some extent, these problems can be avoided by using the method of repeated (programmed) interventions, which is one of the most popular among others in modern surgery for CPP [4]. As indicated in their works [1, 6], RAP give the surgeon the opportunity to establish complete control over the course of the inflammatory process in the focus of infection and the abdominal cavity as a whole, to carry out complete and timely elimination of emerging complications. However, it should be noted that in this case, too, the issue of indications for programmed interventions, the timing of their implementation and an objective assessment of the degree and nature of damage to the abdominal organs has been insufficiently worked out [10, 7].

The **aim** of the study. Retrospective analysis of the choice of surgical treatment tactics and the results of treatment of common purulent peritonitis in a specific multidisciplinary urgent surgical hospital of the third level.

Material and methods. The presented work is based on a retrospective analysis of the results of complex treatment of 253 patients with CPP who were treated in the emergency surgical departments of the Republican Hospital №2 - Emergency Medical Aid Center (RHN№ 2-CEMA) of the Republic of Sakha (Yakutia) in the period from 2015 to 2022. The diagnosis of

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CPP was verified on the basis of a comprehensive examination, which included data from physical, laboratory, instrumental and apparatus research methods. The average age of patients was 33,2 ± 6,5 years, with 156 men (61,7%), women – 97 (38,3%). Of 253 patients with CPP, only primary laparotomy was performed in 63 (24,9%) patients, 70 (27,7%) patients were operated on in the ROD mode and 120 (47,4%) patients with CPP who underwent staged surgical treatment in the RAP mode.

The initial severity of patients was assessed using the APACHE II scale (Acute Physiology And Chronic Health Evaluation). The Mannheim Peritonitis Index (MIP) and the Abdominal Cavity Index (ACI) were used to assess the severity and nature of abdominal lesions. The presence and severity of multiple organ failure at baseline and over time was determined using the SOFA (Sequential Organ Failure Assessment) scale. When assessing the severity of the systemic inflammatory response syndrome (SIRS) adhered to the definitions presented by the consensus conference of the American College of Pulmonologists and the Society of Critical Medicine Specialists – ACCP / SCCM.

Statistical processing of this material was carried out using the MS EXCEL software package for the Microsoft Office 2010 operating system. The calculation of the indicators of the variation series with the calculation of the arithmetic mean and standard deviation (M ± σ) was carried out using the wizard of functions (fx). The assessment of the significance of differences (p) was determined by the Student's t-test. Differences were considered significant at p <0,05.

Results and discussion. During the statistical processing of the obtained clinical data aimed at identifying the causes of the development of CPP, the predominant cause was postoperative peritonitis, recorded in 87 (34,4%) treated patients, in second place, destructive appendicitis – in 58 (22,9%) patients, third place, destructive pancreatitis – in 34 (13,5%) patients. Somewhat less often, the reasons for the development of CPP were: acute intestinal obstruction – in 26 (10,3%) patients, perforation of the small intestine, usually caused by foreign bodies in the form of metal wire or nails, as well as fish bone – in 16 (6,3%) patients , trauma to the abdominal organs (damage to parenchymal organs with the formation of hematomas, suppuration and subsequent breakthrough into the abdominal cavity) – in 14 (5,5%) treated patients, destructive cholecystitis – in 10 (3,9%) patients, perforated gastroduodenal ulcer – in 5 (2,0%) patients, colon perforation (Crohn's disease and ulcerative colitis (NUC)) – in 3 (1,2%) patients.

The results of the analysis of the data show that the main nosologies that required reoperations in the ROD and RAP modes were: postoperative peritonitis – in 87 (100%) patients, colon perforation (Crohn's disease and NUC) – in 3 (100%) patients, perforated gastroduodenal ulcer – in 4 (80,0%) patients, destructive cholecystitis – in 7 (70,0%) patients, destructive pancreatitis – in 23 (67,6%) patients, destructive appendicitis – in 37 (63,8%)) patients, acute intestinal obstruction – in 16 (61,5%) patients. Somewhat less frequently, such reasons were: perforation of the small intestine – in 8 (50,0%) patients, trauma of the abdominal organs – in 5 (35,7%) patients. In total, the need to perform ROD and RAP arose in 190 (75,1%) patients (table 1). At the same time, the indications for ROD and RAP were: persistent or progressive peritonitis – in 109 (57,4%) patients, the emergence of new sources of peritonitis – in 24 (12,6%) patients, including incompetence of the sutures of the hollow organs – in 19 (10,0%) patients, abscesses (single or multiple) of the abdominal cavity – in 15 (7,9%) patients, eventration – in 7 (3,7%) patients, non-resolving intestinal paresis – in 2 (1,0%)) patients, adhesive intestinal obstruction – in 11 (5,8%) patients, intra-abdominal bleeding – in 3 (1,6%) patients.

It should be noted that in most cases, the use of the ROD regimen for CPP required the use in cases when an unfavorable course of the infectious process was not predicted during the primary operation or was due to the profile of the clinic (regional level, Emergency Medical Center - CEMP), patients were evacuated from others surgical hospitals of regional hospitals and the city of Yakutsk. At the same time, one surgical intervention to stop CPP was sufficient only in 63 (24,9%) patients. At the same time, in 70 (27,7%) patients, therapy was required to relieve widespread peritonitis and eliminate intra-abdominal complications. Of these, 22 (31,4%) patients ultimately required a transition to the programmed mode of abdominal management. According to some authors [1, 5, 11], which is also confirmed by our studies, unfortunately, as a result of one operation, it is not always possible to perform a full sanitation of the abdominal cavity and achieve complete control over the focus of infection. In such clinical cases, for dynamic control and active influence on the infectious process in the abdominal cavity with CPP, RAP is performed. At the same time, traditional and non-traditional indications, as well as various integral systems and scales for assessing the degree of damage to the abdominal cavity and the severity of the patient's condition, are used to select the program mode for the abdominal cavity management. A similar surgical tactic was used in 120 (47,4%) patients. At the same time, in more than half of these patients – 71 (59,2%), one-time sanitation of the abdominal cavity was required to stop the main manifestations of CPP, and only 21 (17,5%) required 3 or more RAP (table 2).

Table 1

Characteristics of patients due to the development of CPP and the chosen surgical treatment tactics

The cause of common purulent peritonitis and the number of patients (n)*	Abdominal guidance technique			
	Relaparotomy "on demand"		Relaparotomy "by program"	
	abs.	M±σ	abs.	M±σ
Postoperative peritonitis (n=87)	19	21.8±8.8	68	78.2±4.7
Destructive appendicitis (n=58)	16	27.6±8.5	21	36.2±8.0
Destructive cholecystitis (n=10)	2	20.0±8.9	5	50.0±7.1
Destructive pancreatitis (n=34)	16	47.1±7.3	7	20.6±8.9
Perforated gastroduodenal ulcer (n=5)	3	60.0±6.3	1	20.0±8.9
Acute intestinal obstruction (n=26)	6	23.1±8.8	10	38.5±7.8
Small bowel perforation (n=16)	3	18.8±9.0	5	31.3±8.3
Colon perforation (Crohn's disease and NUC) (n=3)	1	33.3±8.2	2	66.7±5.8
Abdominal trauma (n=14)	4	28.6±8.4	1	7.1±9.7
Total for groups of ROD and RAP modes	70	100%	120	100%

* Significance of differences between group I in relation to group II at least p <0.05

With the management of the abdominal cavity by a semi-open method, the lowest mortality was observed when performing one program sanitation – 2,8% of patients. With an increase in the number of programmed readjustments, the mortality rate also increased: 17,9% of patients with two RAP, 54,5% with three RAP and 80,0% with 3 or more RAP.

During the analysis of the material, some differences were found in the severity of the initial manifestations of systemic inflammation in patients with CPP, depending on the surgical treatment tactics used. Thus, severe manifestations of abdominal sepsis (the stage of heavy sepsis (HS)) were more often diagnosed in patients who underwent RAP – in 84 (70,0%) patients. At the same time, RAP was more often performed in the stage of septic shock (SS) – in 10 (14,3%) patients. With less severe manifestations of SIRS (SIRS-3 and SIRS-4), both ROD and RAP were used almost equally often – in 20 (28,6%) and 25 (20,8%) patients.

Abdominal sepsis (SIRS 3-4, HS, SS) was initially observed in 190 (75,1%) patients with CCP. At the same time, there was a direct relationship between the presence and severity of abdominal sepsis and mortality. In the absence of HS events, mortality was minimal – in 4 (8,9%), in the presence of HS and SS symptoms, mortality was already 19,4% and 80,9%, respectively. In the absence or unexpressed initial manifestations of systemic inflammation in patients with CCP, there were no significant differences in mortality rates with different surgical treatment tactics. In patients with initial HS during program sanitation, mortality was significantly lower than in the semi-closed method – in 9 (7,5%) patients, and with initial manifestations of SS, the mortality did not depend on the chosen surgical treatment tactics – 8,6% and 9,2% respectively. The overall mortality rate was 45 (23,6%) (table 3).

The analysis of the initial severity of the condition of patients with different surgical treatment tactics showed that significant differences were noted both in the severity of the general condition (according to the APACHE II scale), and in the severity of multiple organ failure syndrome (MOFS) (according to the SOFA scale), and in the degree and nature of abdominal lesions – MIP and ACI. Speaking about the possible differences in the mortality rate in the groups of patients with CPP, depending on the surgical tactics used, it should be remembered that the initial severity of the condition, the severity of the MOFS, the degree and nature of damage to the abdominal organs, as well as the severity of the initial manifestations of SIRS were significantly higher in patients. with RAP. At the same time, mortality in CPP directly depended on the severity of the course of peritonitis. With MIP less than 21 points, mortality was 11,1%, with MIP 21-29 points – 12,1%, with MIP 29 or more points – 28,1%. Accordingly, with ACI less than 14 points, the mortality rate was 11,1%, and with ACI 14 or more points – 27,6%.

When analyzing the mortality rate of patients with different surgical tactics, depending on the severity of CCP according to MIP, significant differences can also be noted in patients with the use of ROD and RAP with MIP values of 21-29 points – 20,0% and 8,7%, respectively, and MIP more than 29 points – 44,6% and 19,5%, respectively. Significantly higher mortality rates were observed in patients with ROD in terms of the severity of ACI in the ACI group of less than 14 points – it was 20,0%. At the same time, in patients with RAP, the mortality rate in this group was no more than 4,0%. Also, with ACI of 14 or more points in the group of patients with staged sanitization of the abdominal cavity, the mortality rate was two times lower than with semi-closed administration – 21,1% and 40,0%, respectively. When analyzing mortality according to the integral scales APACHE II and SOFA, a fairly clear relationship was traced, the higher the scores, the greater the percentage of mortality was observed. However, when comparing the predicted mortality rates according to the above-described scales indicated by the developers, a higher mortality rate can be noted in the group of patients with ROD (table 4).

Table 2

Characteristics of the chosen surgical treatment tactics in patients with CPP

Surgical treatment option	Number of patients		Mortality	
	abs.	M±σ	abs.	M±σ
Semi-closed method				
ROD reoperation	48	68.6±5.6	18	37.5±7.9
ROD reoperation with transition to RAP	22	31.4±8.3	6	27.3±8.5
Total for the group of the ROD mode	70	100%	24	34.3%
Semi-open method				
1 programmed relaparotomy	71	59.2±6.4	2	2.8±9.9
2 programmed relaparotomies	28	23.3±8.8	5	17.9±9.1
3 programmed relaparotomies	11	9.2±9.5	6	54.5±6.7
More than 3 RAP	10	8.3±9.6	8	80.0±4.5
Total for the group of the RAP mode	120	100%	21	17.5%

Table 3

Clinical characteristics of abdominal sepsis depending on the severity of SIRS and abdominal management technique

Clinical syndrome	Abdominal guidance technique				Mortality Σ (ROD и RAP) n (M±σ)
	ROD n (M±σ)	Mortality n (M±σ)	RAP n (M±σ)	Mortality n (M±σ)	
SIRS-3	13 (18.6±9.0)	1 (1.4±1.4)	5 (4.1±9.7)	–	1 (5.6±5.4)
SIRS-4	7 (10.0±9.5)	2 (2.9±2.0)	20 (16.7±8.4)	1 (0.8±0.8)	3 (11.1±6.0)
Heavy sepsis	40 (57.1±6.5)	15 (21.4±4.9)	84 (70.0±5.5)	9 (7.5±2.4)	24 (19.4±3.5)
Septic shock	10 (14.3±9.3)	6 (8.6±3.3)	11 (9.2±9.5)	11 (9.2±2.6)	17 (80.9±8.6)
Total for ROD and RAP groups	70 (100%)	24 (34.3%)	120 (100%)	21 (17.5%)	45 (23.6%)

Table 4

Clinical characteristics of the initial severity of the condition and methods of abdominal management in patients with CCP

Diagnostic scales	Abdominal guidance technique				Mortality Σ (ROD и RAP) n,%
	ROD, n	Mortality n,%	RAP, n	Mortality n,%	
APACHE II less than 19 points	10	1 (10.0%)	11	1 (9.1%)	2 (9.5%)
APACHE II 20-29 points	21	8 (38.1%)	25	3 (12.0%)	11 (23.9%)
APACHE II more than 30 points	39	15 (38.5)	84	17 (20.2%)	32 (26.0%)
SOFA less than 3 points	18	6 (33.3%)	22	2 (9.1%)	8 (20.0%)
SOFA more than 3 points	52	18 (34.6%)	98	19 (19.4%)	37 (24.7%)
ИБП less than 14 points	20	4 (20.0%)	25	1 (4.0%)	5 (11.1%)
ИБП 14 or more points	50	20 (40.0%)	95	20 (21.1%)	40 (27.6%)
МИП less than 21 points	13	1 (7.7%)	5	1 (20.0%)	2 (11.1%)
МИП 21-29 points	10	2 (20.0%)	23	2 (8.7%)	4 (12.1%)
МИП more than 29 points	47	21 (44.6%)	92	18 (19.5%)	39 (28.1%)
Total for ROD and RAP groups	70	24 (34.3%)	120	21 (17.5%)	45 (23.6%)

Thus, the main publicly available options for surgical treatment tactics in CPP remain staged operations using half-open / half-closed technologies – ROD and RAP. At the same time, the use of the RAP method allows timely detection and complete sanitation of all foci of the infectious process in the abdominal cavity. The analysis showed that the most rational use of the RAP method in patients with CPP at the stage of the process – HS and SS and with the severity and nature of the lesion of the abdominal organs – MIP more than 20 points, ACI 14 and more points, when this tactic is much more effective than ROD. At the same time, it must be remembered that surgery itself is an undoubted factor aggravating the course of systemic inflammation. This is confirmed by a significant increase in the mortality rate with an increase in the number of sanitary relaparotomies. Therefore, when managing patients with the RAP method, it is optimal to perform two or three relaparotomies. Based on this, the most promising direction in the optimization of surgical treatment tactics in CPP are tactical and therapeutic measures aimed both at reducing the number of sanitation interventions and at reducing the severity of systemic inflammation.

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