

## MANAGEMENT OF POSTOPERATIVE PERITONITIS IN LOW-RESOURCES SERVICES

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### Abstract

**Background.** Postoperative peritonitis (PP) reminds one of the most difficult complications in abdominal surgery with mortality rate 22.3 – 90 %.

**Methods.** In Ivano-Frankivsk Regional (tertiary level) Clinical Hospital (Ivano-Frankivsk, Ukraine) during 2010–2017 were operated 8762 patients with acute and chronic diseases of digestive system (appendicitis, pancreatitis, cholecystitis, bowel obstruction, complicated ulcer of upper gastrointestinal tract, mesenteric vessels thrombosis, abdominal adhesion diseases, hernia, Chron's diseases, abdominal trauma), among them in 209 (2.4 %) patients developed PP. Local PP (abscess of abdominal cavity) had 142 (67.9 %), diffuse PP – 67 (42.1 %) patients.

**Results.** Clear local symptoms of peritonitis were absent in 178 (85.1 %) of 209 patients. General complication, such as acute respiratory failure had 95 (45.5 %), cardiovascular insufficiency – 68 (32.5 %), hepato-renal dysfunction – 46 (22 %) patients with PP. 129 (61.7 %) patients were treated by minimally invasive approach: 24 patients had laparoscopic lavage with drain of abdominal cavity abscess and 105 – ultrasound guided drain of abscess with catheter. 80 (38.3 %) patients had re-laparotomy (RL): 61 (91 %) from 67 with diffuse PP, 19 (13.4 %) from 142 patients – with local PP. 46 (57.5 %) patients underwent one RL, 26 (32.5 %) – two, 8 (10 %) patients – three RL. With increasing numbers of RL, increase mortality rate: after first RL died 7 (15.2 %) of 46 patients, after second RL – 12 (63.2 %) of 19, after third RL 6 (75 %) of 8 patients.

**Conclusions.** Together with standard surgical methods and precise technique were used lavage of abdominal cavity with 8–12 litres of antiseptic solutions, solution for peritoneal dialysis intraabdominally, nasointestinal drain tube, what was favourable for faster treatment of abdominal sepsis, reducing number of RL and postoperative mortality.

**Keywords:** postoperative peritonitis, relaparotomy, abdominal sepsis.

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### 1. Introduction

Postoperative peritonitis (PP) is most common intraabdominal complication what needs relaparotomy (RL). Cause what could lead to PP could be: severity of diseases, delay surgical treatment, surgical tactical and technical mistakes like irrational access, poor lavage of abdominal cavity, ineffective drain, wrong understanding of exudate origin, rough manipulation with tissue, insufficiency of hollow organs sutures [1, 2].

PP reminds intra-abdominal infection with high rates of mortality. Mortality rate after the RL for PP is 23–34 %, and in some cases – 70–90 % [3, 4]. Unsatisfactory results of the treatment first of all, due to atypical signs of diseases and it complication what lead to late diagnostic and delay RL [5].

Majority of patients with PP have complications – multiple organ failure (MOF) and multiple organ dysfunctions (MOD) [6, 7]. In 67–75 % patients who died because of MOF during autopsy diagnose intra-abdominal abscesses or their uncleaned “remnants”. It is known that MON / MOF of unclear etiology in post operated patients is an indicator of the undiagnosed center of intraperitoneal infection presence [8]. Beside this, in patients who already stressed by the previous operation, sepsis can escalate to severe sepsis and septic shock very quickly, what can increase dramatically mortality rate [9].

One from main reason of unsatisfactory results could be absence of standard globally accepted guidelines of diagnostic and surgical treatment of patients with PP what could be used and work in different countries around the world.

That is why problem of rise quality of early diagnosis and surgical/intensive care treatment of patients with PP remind crucially important especially in low to middle income countries, among which there is Ukraine.

## 2. Aim of research

Rise quality of surgical treatment of patients with postoperative peritonitis by improving timely diagnosis and implementation of optimal surgical tactics.

## 3. Materials and Methods

Our study is retrospective analysis of prospectively collected data of 209 (2.4 %) patients with intraabdominal complications and indications for reinterventions/reoperations among 8762 patients with acute or chronic diseases of digestive tract operated during 2010–2017 in Ivano-Frankivsk Regional (tertiary level, high specialised) Clinical Hospital (Ivano-Frankivsk, Ukraine). 142 (67.9 %) patients had local PP (abscess of abdominal cavity), 67 (42.1 %) – diffuse PP.

All laboratory data were investigated by standard methods (according to the intra – hospital protocols) in the Laboratory of Ivano-Frankivsk Regional Clinical Hospital (Ivano-Frankivsk, Ukraine).

For diagnosis of intraabdominal complications together with clinical symptoms, laboratory and X-ray data were used ultrasound, Computer Tomography (CT) and diagnostic laparoscopy. For diagnosis of intraabdominal sepsis in 95 (45.5 %) patients additionally investigated levels of lipid oxidation products (LOP) – malonic dialdehyde (MDA) and diene conjugate (DC). The frequency and nature of MOF/MOD and septic shock were studied. Estimation of severity of the patient's condition conducted base on Marshall J.C. Multiple Organ Dysfunction Score (1995) [10].

Minimally invasive technology (laparoscopic lavage with drain of abscess and abdominal cavity; ultrasound guided drain of abscess with catheter) were effective in treatment of 129 (61.7 %) patients. Re-laparotomy (RL) was necessary in treatment of 80 (38.3 %) patients: in 61 (91 %) of 67 – with diffuse PP; in 19 (13.4 %) of 142 patients with local PP.

For data analysis in this research work were used Excel 10, standard variation statistical methods and evaluation by Students-Fisher. A p-value of less than 0.05 was deemed significant.

## 4. Results

During anamnesis and clinical examination were diagnosed hyperthermia till 39 °C in 68.5 %; tachypnoe (more than 20 in 1 min), tachycardia (more than 90 in 1 min) – in 45.8 % patients.

Classical symptoms of peritonitis (intensive pain, muscular defense, peritoneal symptoms) were absent in 178 (85.1 %) of 209 patients. Development of intraabdominal complications manifested like abdominal sepsis 1–3 days before appearance of PP local symptoms. First manifestations of intraabdominal complications in patients with abdominal sepsis were: acute respiratory failure in 95 (45.5 %), cardiovascular insufficiency – in 68 (32.5 %), hepatorenal dysfunction – in 46 (22 %) patients, and not clear local symptoms.

Laboratory data showed: increase level of leukocytes in peripheral blood (more than  $9 \cdot 10^9$  in l) – in 76.8 % patients; increase level of neutrophils from 8 till 49 % in 52 (24.8 %) patients; decrease level of lymphocytes – in 35 (16.7 %), among them less than 10 % – in 18 (8.6 %) patients. 172 (82.3 %) of 209 patients had hyponatremia. Increase level of AsAT till 4.5 and AlAT till 4.2 mmol / l per hour measured by calorimetric method - in 31 (14.8 %) patients; increase level of total bilirubin in blood serum in 34 (16.3 %) patients with average level  $41.6 \pm 4.35$   $\mu\text{mol/l}$ . Increase level of creatinine in 83 (39.7 %) patients with average  $92.6 \pm 9.18$   $\mu\text{mol/l}$ . Increase level of urea in 79 (37.8 %) patients with medium  $10.13 \pm 1.13$  mmol/l.

The concentration of DC ranged from 2.967 to 4.832 units of optical density, and averaged  $4.875 \pm 0.402$ . The MDA concentration exceeded the upper limit in 74 (77.9 %) of 95 patients, reaching a maximum of 6.754 nmol/ml with average  $5.976 \pm 0.592$  nmol/ml. This indicated a significant endogenous intoxication that could potentially lead to a critical level of defeat of vital organs and systems. Analyzing all received data were concluded presence of abdominal sepsis in patients with PP.

Initial antibacterial therapy was empirical and included a combination of cephalosporin's III–IV generation with antianaerobic antibiotics. After receiving the results of bacterial study and determining the sensitivity of the microflora, antibiotics were also changed. In 37 (46.3 %) patients with severe sepsis, from the first day after RL, carbapenems were used, at a dose of 1.0 g intravenously 3 times a day. To prevent fungal pathological colonization and superinfection, were prescribed antifungal agents diflucan (fluconazole) in a daily dose of 50–100 mg.

In a bacterial study of pus from the abdominal or/and abscess cavity discovered *E. coli* in a concentration of  $5 \times 10^6$  bacterias per  $1 \text{ cm}^3$  in 18 (22.5 %) patients; *Pr. Mirabilis* at a concentration of  $5 \times 10^6$  microbial bodies in  $1 \text{ cm}^3$  in 15 (18.8 %) patients; *St. aureus* at a concentration of  $5 \times 10^6$  microbial bodies in  $1 \text{ cm}^3$  in 11 (13.8 %) patients; *Ps. auruginosa* at a concentration of  $5 \times 10^6$  microbial bodies in  $1 \text{ cm}^3$  in 12 (15 %) patients. Various combinations of these pathogens were detected in 24 (30 %) patients. In the bacterial study of blood and urine, the results were positive only in 19 (23.8 %) patients; in the rest of the patients was not growth of microorganisms despite repeated sowing. Most often PP was complication after procedures as showed in **Table 1**.

**Table 1**

List of surgical procedures after which PP has developed

| Type of procedure                                    | Number of patients | %    |
|--|--------------------|------|
| Procedures on stomach and duodenum                   | 34                 | 16.3 |
| Procedures on small bowel                            | 51                 | 24.4 |
| Procedures on large bowel                            | 33                 | 15.8 |
| Post appendectomy                                    | 4                  | 1.9  |
| Post abdominal trauma surgery                        | 6                  | 2.9  |
| Post operations for mesenteric vessels re-thrombosis | 8                  | 3.8  |
| Post pancreonecrosis procedures                      | 39                 | 18.7 |
| Post operations on bile duct                         | 26                 | 12.4 |
| Others   | 8                  | 3.8  |
| Total  | 209                | 100  |

In 80 patients with PP using of minimally invasive approach for the treatment was ineffective.

RL performed in 61 (91 %) of 67 patients with diffuse PP. 19 (13.4 %) of 142 patients had RL for local PP – abscess of abdominal cavity (main indications were absence of direct trajectory or ineffective ultrasound guided abscess drainage).

During RL was used precise technique, abdominal cavity lavage with 8–12 l antiseptic solutions, nasointestinal drain.

In 36 (45 %) patients during RL after intraoperative lavage with 2 l of 0.02 % Decamethoxin solution were poured into abdominal cavity of solution for peritoneal dialysis – which uses for treatment patients with chronic renal insufficiency (active substances: ikodextrin, sodium chloride, calcium chloride, magnesium chloride, sodium lactate, that is, it contains no glucose which can be a nutrient for microorganisms and has an antimicrobial effect because of high osmotic). Procedures were finished with closure of abdominal cavity. Dual- or polychlorvinyl drainage was placed from 4 and more points and was opened after 6 h post RL.

7 patients of this group had 1–4 points by Marshall J.C. scale in the day of RL (estimated mortality 0–7 %); 16 patients had 5–8 points (estimated mortality 16 %); 13 patients had 9–12 points (estimated mortality 50 %). On the 7<sup>th</sup> post RL day by Marshall J.C. MODS in 29 (80.6 %) patients were 1–4 points (estimated mortality 0–7 %). Laboratory data in the day of RL and on the 7<sup>th</sup> post op day (main group) showed in **Table 2**.

**Table 2**  
Laboratory results in patients with PP

| Laboratory indicators         | Main group (abdominal cavity lavage with peritoneal dialysis solution) (n=36) |                             | Control group (abdominal cavity lavage with chlorhexidine) (n=44) |                             |
|-------------------------------|---|-----------------------------|---|-----------------------------|
|                               | In RL day   | 7 <sup>th</sup> post RL day | In RL day   | 7 <sup>th</sup> post RL day |
| Leukocytes g/l                | 10.7×10 <sup>9</sup> /l±0.95  | 7.5×10 <sup>9</sup> /l±0.81 | 10.6×10 <sup>9</sup> /l±1.1                                       | 8.9×10 <sup>9</sup> /l±0.86 |
| De Ritis Ratio                | 0.65±0.08   | 0.95±0.13                   | 0.63±0.07   | 1.12±0.14                   |
| Bilirubin (μM/l)              | 28.6±2.9  | 17.1±0.81*                  | 29.4±2.8  | 19.8±2.1*                   |
| AlAT (mM/hour.l)              | 1.64±0.21   | 0.83±0.06*                  | 1.68±0.22   | 1.74±1.14*                  |
| AsAT (mM/hour.l)              | 1.58±0.18   | 0.78±0.05*                  | 1.62±0.21   | 1.82±1.16*                  |
| DC (units of optical density) | 2.821±0.164   | 1.41±0.09                   | 2.826±0.168   | 1.68±0.11                   |
| MDA (nmol/ml)                 | 4.482±0.368   | 3.62±0.24                   | 4.486±0.372   | 3.79±0.26                   |

Note: \* –  $p < 0.05$ ; AlAT – Alanin Aminotransferase; AsAT – Aspartat Aminotransferase; DC – Diene Conjugates; MDA – Malonic Dialdehyde

44 (56 %) patients with diffuse PP during RL had lavage of abdominal cavity with chlorhexidine solution. In the day of RL by Marshall J.C. MODS 9 patients had 1–4 points; 13 patients had 5–8 points; 22 patients had 9–12 points. Laboratory data in the day of RL and on the 7<sup>th</sup> post op day also for this category of patients (control group) showed in Tab. 2. On the 7<sup>th</sup> post RL day only 17 (38.6 %) patients had 1–4 points by Marshall J.C. MODS.

Laboratory indicators were similar in both group, but return to normal level in control group slowly.

Repeat RL performed in 7 (19.4 %) of 36 main group patients, who had 9–12 points by MODS (estimated mortality 50 %). 4 (11.1 %) patients died from multiple organ failure.

Repeat RL performed in 27 (61.4 %) of 44 control group patients, among them two RL had 19 (59.1 %), three RL – 8 (40.9 %) patients. Cause of repeat RL in 5 (18.5 %) patients was insufficiency of suture of intestinal anastomosis; in 14 (51.9 %) – acute stress ulcer of stomach, small or large bowel; in 8 (29.6 %) – ineffective drainage of interintestinal abscesses. Those patients had 9–12 points by Marshall J.C. MODS (estimated mortality 50 %). 21 (47.7 %) of 44 patients died with multiple organ failure.

For extracorporeal detoxification, intermittent venous-venous hemodiafiltration, metabolic plasmapheresis was used in 31 (38.8 %) out of 80 patients with endogenous intoxication and severe sepsis. The use of these methods contributed to reducing the level of endogenous intoxication, which facilitated the manifestations of multiple organ dysfunction, that is the elimination of septic encephalopathy, improvement of oxygenation and ventilation in the background of regression of acute respiratory distress syndrome, restoration of renal function after primary acute injury, correction of water-electrolyte imbalance and acid-alkaline equilibrium, improvement of the indicators of system hemodynamics. Such therapy also contributed to the restoration of effective intestinal motility.

## 5. Discussion

Emergency surgery diseases increase worldwide, especially in low to middle income countries where is visible enormous gap in access to surgical treatment and intensive care [11, 12]. In many countries, many hospitals continue to have logistic barriers associated with the application of evidence-based practice. In result, it leads to an overall poorer adherence to international guidelines, making them impractical for a large part of the world's population [12]. Poorly management of patients with complicated intra-abdominal infections (cIAIs) could cause high morbidity and

mortality [11]. A lot of authors agree that prognosis and outcome of patients with PP are directly related to early diagnosis and prompt treatment interventions [12].

WSES guidelines for management of intra-abdominal infections [12] suggest empiric broad-spectrum regimens including either piperacillin plus tigecycline or in critical ill patients' anti-pseudomonas carbapenems (meropenem, imipenem, doripenem) plus a glycopeptide for Gram-positive coverage. However, while high-income countries (HICs) have extensive surveillance systems to monitor antimicrobial resistance [13], in low- and middle-income countries LMIC surveillance systems have not really been established.

The primary objectives of surgical intervention include the cause of peritonitis determining, fluid collections draining, and the origin of the abdominal sepsis controlling.

Ultrasound and CT-guided percutaneous drainage of abdominal and extraperitoneal abscesses in selected patients are safe and effective [14–17]. Percutaneous drainage is the optimal means of treating post-operative localized intra-abdominal abscesses when there are no signs of generalized peritonitis. Conversely, diffuse PP remains a challenge for the surgeons.

In recent years, laparoscopy has been gaining wider acceptance in the diagnosis and treatment of intraabdominal infections. The laparoscopic approach in the treatment of peritonitis is feasible for many emergency conditions. It has the advantage to allow, at the same time, an adequate diagnosis and appropriate treatment with a less invasive abdominal approach [12, 18]. However, laparoscopy due to the increase of intra-abdominal pressure due to pneumoperitoneum, may have a negative effect in critically ill patients leading to acid–base balance disturbances, as well as changes in cardiovascular and pulmonary physiology [12].

Severe infection may be associated with marked inflammatory responses, which in the extreme circumstance may result in an excessive, dysfunctional immune response, with resultant physiological collapse. These shocked patients develop organ dysfunction and progress to a multiple organ dysfunction syndrome (MODS) [6, 12, 19].

However, deciding if and when to perform a re-laparotomy in cases of secondary peritonitis remains difficult. Factors indicative of progressive or persistent organ failure during early post-operative follow-up analysis are the best indicators of ongoing infection [5, 12]. Three relaparotomy strategies are currently employed for management of abdominal sepsis following an initial laparotomy: open abdomen, planned re-laparotomy, and on-demand re-laparotomy. The on-demand re-laparotomy is recommended for patients with severe peritonitis because its ability to streamline healthcare resources, reduce overall medical costs, and prevent the need for further re-laparostomies [12]. Open abdomen – laparostomy with early definitive closure (within 4–7 days of the initial laparostomy) is the basis of preventing or reducing the risk of complications [20–22].

In surgical patients, early intervention and implementation of evidence-based guidelines for the management of severe sepsis and septic shock improve outcomes in patients with sepsis [22].

Fluid resuscitation should be initiated as early as possible in patients with severe sepsis or septic shock (20). Some authors recommend blood purification and detoxification for the patients with severe abdominal infections and sepsis [21, 22].

## 6. Conclusion

1. 34 (42.5 %) of 80 patients after relaparotomy (RL) had 9–12 points by Marshall J. C. MODS.
2. 46 (57.5 %) patients had one RL; 26 (32.5 %) – two; 8 (10 %) patients had tree RL.
3. Increase number of RL lead increase mortality rate: 7 (15.2 %) of 46 patients died after first RL; 12 (63.2 %) of 19 – after second RL; 6 (75 %) of 8 patients died after third RL.
4. Using of standard surgical methods with precise technique and lavage of abdominal cavity with 8–12 litres of antiseptic solutions, solution for peritoneal dialysis intraabdominally, naso-intestinal drain tube, was favourable for faster treatment of abdominal sepsis, reducing number of RL and postoperative mortality from 47.7 to 11.1 %.

**Perspectives.** Patients with PP complicated by abdominal sepsis have high mortality rate, that's why is necessary to continue investigation for optimal treatment with using minimally invasive surgical approach, directed antibiotic therapy and blood purification.

**Footnote**

The author has no conflict of interest to declare. The author has no financial disclosure to declare.

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## EVALUATION OF THE INTERNAL PICTURE OF HEALTH IN PATIENTS WITH ACUTE CORONARY SYNDROME IN PRESENTING WITHOUT ST-SEGMENT AFTER PERCUTANEOUS CORONARY INTERVENTIONS AND IN THE PROCESS OF REHABILITATION

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### Abstract

Ischemic heart disease remains an actual problem of modern clinical and rehabilitation medicine. One of the forms of ischemic heart disease (IHD) is an acute coronary syndrome (ACS) in patients presenting without persistent ST-segment, the treatment of which involves the use of conservative treatment and reperfusion techniques. An integral part of the management of patients after acute coronary syndrome is rehabilitation and restoration with the search for methods of changing the attitude of the patient to his health. To improve the rehabilitation of patients it is important to assess the internal picture of health with the formation of the correct attitude of the patient to his health.

**Aim.** To study the peculiarities of the components of the internal picture of health in patients with acute coronary syndrome in patients presenting without persistent ST-segment in the process of treatment and rehabilitation.

**Materials and methods.** There were examined 135 patients with ACS presenting without persistent ST-segment, who were divided into the groups depending on the treatment performed; 60 patients with conservative treatment tactics and 75 patients with the performed PCI. The analysis of the internal picture of health was carried out with the help of methods: hospital scale for the detection of anxiety and depression (HADS); patient health questionnaire (PHQ-9); scale for measuring the level of reactive (situational) and personality anxiety of Spielberg-Hanin; SF-36; indicators of the Seattle Quality of Life Questionnaire for Patients with Angine Pectoris (Seattle Angina Questionnaire – SAQ).

**Results.** The study of the internal picture of health in patients with ACS presenting without persistent ST-segment showed low levels of emotional, sensory, cognitive, value-motivational, behavioral components on the appropriate scales, which also depend on the method of treatment used. The revealed peculiarities of patients with ACS presenting without persistent ST-segment need to increase the knowledge of the patient about the disease and the importance of rehabilitation measures.

**Conclusions.** In assessment of the internal picture of health in patients with ACS presenting without persistent ST-segment after transcatheter coronary intervention and in the process of rehabilitation, it has been determined that the course of ischemic heart disease in patients with ACS presenting without persistent ST-segment, both during conservative treatment and in the course of PCI at the stages of rehabilitation, is accompanied by significant changes of the internal picture of health (IPH); the most significant changes in patients with ACS presenting without persistent ST-segment is the value-motivational and behavioral components of the