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EXPERIENCE OF USING ENHANCED POSTOPERATIVE RECOVERY PROGRAM IN THE TREATMENT OF PELVIOPERITONITIS

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ABSTRACT

***Purpose*:** This article describes the experience of using the Enhanced Recovery After Surgery (ERAS) program in the treatment of female patients with pelvioperitonitis in a gynecological in-patient department.

***Materials and Methods*:** We examined 60 female patients who were divided into the main and comparison groups. The groups were comparable in terms of age, marital status, education, and place of residence. In addition to the standard approaches in the treatment of pelvioperitonitis, 30 patients of the main group were treated using some elements of the concept of enhanced recovery, such as detailed preoperative counseling about future treatment, non-use of premedication, control of hypothermia during and after surgery, prevention of dyspeptic disorders in postoperative period, avoiding narcotic analgesics, early enteral nutrition and mobilization. In the comparison group, which also included 30 patients, the treatment of pelvioperitonitis was carried out in strict accordance with the standard scheme - surgery, balanced infusion therapy, symptomatic treatment.

Results: At the same time, the pain level by the visual analogue scale (VAS) averaged 6.11 ± 0.34 after 2, 4 and 8 hours in women from the comparison group. Vomiting was registered in 3 (10.0%) patients from the main group on the day 1 of the postoperative period. Whereas 7 (23.3%) patients from the comparison group had vomiting on the day 1 of the postoperative period.

The absence of active motility and passage of flatus, an increase in hypoproteinemia, hypoalbuminemia, and an increase in the level of leukocytosis in both groups showed the severity of the systemic inflammatory response. However, by the end of the day 2 of the postoperative period, the improvement in biochemical parameters was registered as a sign of a positive change in the patients' general condition. LII decreased by 1.5 times by the day 5 in the comparison group; but in the main group it decreased by 2.3 times.

First active peristaltic noises were auscultated and first passage of flatus were noted on average after 20.33 ± 1.02 hours in the main group, but in the comparison group - after 40.28 ± 0.81 hours. In addition to that, the need for pharmacological intestinal stimulation was 2.5 times higher in patients from the comparison group than in patients from the main group.

Postoperative purulent inflammation of the wound was registered in 9 (30.0%) women from the control group. However, only 2 (6.7%) women from the main group had one of the above mentioned disorders. The absolute risk reduction is 15% and NNT = 7.

The average hospital stay for patients from the main group was 6.15 ± 0.25 days, and 8.64 ± 0.38 days for

women from the comparison group.

Conclusion: The results obtained during the study prove the effectiveness of the concept of enhanced recovery in the treatment of pelvioperitonitis.

Keywords: *pelvioperitonitis, "fast-track surgery", ERAS, enhanced recovery after surgery.*

INTRODUCTION

According to the literature data, inflammatory diseases of the pelvic organs (PID) account for 55-65% in the structure of gynecological pathology [1,2]. Statistics from European countries and the United States shows that the annual incidence of salpingitis and oophoritis is 12–14 cases per 1000 women [3], while 5–15% of women are diagnosed with purulent inflammatory diseases of the fallopian tubes and ovaries [4]. Inflammatory processes affecting the internal genital organs lead to a decrease in the reproductive potential of women, provoking the development of chronic pelvic pain, miscarriage, infertility and ectopic pregnancy [5]. The most prognostically unfavorable inflammatory disease for female fertility is pelvioperitonitis - one of the most urgent problems of gynecology, which accounts for about 30% of the total number of patients in a gynecological hospital. Over the past decade, there has been a double increase in the incidence of this pathology among women aged 22–24 years [6].

Pelvioperitonitis is an acute local infectious and inflammatory lesion of serosa of the small pelvis, which is almost always a secondary process. The main characteristic of the infectious lesion of pelvic peritoneum is a local inflammation reaction in the small pelvis: microcirculatory disorders, increased vascular permeability, fibrinogen, albumin, and leukocytes extravasation, formation of a serous or purulent effusion. Analysis of the literature and statistical data suggests that pelvioperitonitis is not only a problem of the past, but a problem of nowadays, and given the growing resistance to effective antibacterial drugs, this may become a serious problem in the near future. Dynamic development of science and practical medicine has changed the ratio of etiological factors in the development of pelvioperitonitis, its clinical manifestations, as well as the methods of its diagnosis and therapy. The issue of tactics for the treatment of pelvioperitonitis is relevant due to the increase in the number of women with pelvic inflammatory diseases, growing antibiotic resistance, early and late postoperative complications. To date, there are a huge number of publications about the modernization of the tactics of managing patients with pelvioperitonitis and methods for preventing complications after surgical treatment [7]. The most relevant today’s issue is the search for measures that would prevent the development of complications and reduce the rehabilitation period after surgery. At the end of the last century, H. Kehlet, an anesthesiologist-resuscitator, proposed a program for the accelerated recovery of patients. This concept is called "Fast-track surgery" and is a new strategy for active surgical treatment of patients with surgical, gynecological, urological and oncological diseases. Its main goal is reduced risk of complications in the postoperative period, early activation of the patient, and shorter inpatient treatment [8]. The program is characterized by two terms: Fast-Track Surgery and Enhanced Recovery After Surgery (ERAS). The application of the new strategy involves reducing the stressful effect of treatment on the patient's body, which includes rational preoperative preparation, the use of minimally invasive and high-tech surgical methods, the use of short-acting anesthetics and multimodal analgesia, followed by early rehabilitation [9-11]. The above measures result in an increase in the quality of surgical treatment, minimization of complications, reduction in the cost of treatment, and an increase in patient satisfaction with the treatment process [12].

The purpose of this work is to study the possibility of using the ERAS program in the treatment of gynecological diseases requiring surgical treatment and to evaluate the effectiveness of using some of its elements for the treatment of pelvioperitonitis.

MATERIAL AND METHODS

The study was conducted in the gynecological department of the GBUZ RK Simferopol Clinical Maternity Hospital No. 1. To achieve our goals, we conducted a prospective analysis of the results of treatment of 30 patients with pelvioperitonitis who underwent surgery in the period from 2018 to 2019 - the main group. We also performed a retrospective analysis of the results of treatment of 30 women in the period from 2017 to 2018 - a comparison group. Treatment of patients in the comparison group was carried out in strict accordance with the traditional method of managing patients with pelvioperitonitis, i.e. surgical elimination of the cause of pelvic peritonitis, sanitation and drainage of the abdominal cavity, balanced infusion-detoxification therapy, antibiotic therapy, and symptomatic therapy. The treatment of women in the main group was supplemented with elements of the ERAS strategy. The main group and the comparison group were comparable in terms of age, comorbidities, obstetric and gynecological history, pelvioperitonitis etiology, and the extent of surgical intervention. There were no statistically significant differences in the severity of the patients' condition upon admission to the hospital between the groups ($p>0.05$).

The distribution of patients according to the etiology of pelvioperitonitis is presented in the Table 1.

Table 1. Etiology of peritonitis

Cause of pelvioperitonitis	Main group (n=30)	Comparison group (n=30)
Prolonged use of intrauterine contraception (IUD)	11 (36,7%)	13 (43,3%)
Purulent tubo-ovarian formation, pyosalpinx, pyovar	16 (53,3%)	15 (50,0%)
Purulent salpingitis	3 (10,0%)	2 (6,7%)

There were no statistically significant differences in the etiological factor between the groups (p>0.05).

The age of the patients ranged from 22 to 60 years. The average age was 34.6±2.4 years in the main group, and 33.3±1.8 years in the comparison group. There was no significant difference between the groups (p>0.05).

The severity of the patients' condition was assessed on the SAPS by calculating the sum of scores for clinical and laboratory parameters. The sum of the scores determined the prognosis of the probability of a lethal outcome. Clinical parameters, such as age, body temperature, pulse rate, respiratory rate, systolic blood pressure, the presence or absence of mechanical ventilation, the degree of impairment of consciousness, were assessed on the Glasgow scale. Among the laboratory parameters, the following indicators were used: leukocytosis, hematocrit, urea, glucose, potassium, sodium, buffer capacity of blood.

The distribution of patients according to the severity of their condition is presented in the Table 2.

Table 2. The severity of the condition of patients upon admission to the hospital on the SAPS scale

SAPS score	Main group (n=30)	Comparison group (n=30)
10-12	17 (56,6%)	18 (60,0%)
13-16	11 (36,7%)	9 (27,0%)
17-20	2 (6,7%)	3 (10,0%)
21 and above	-	-

There were no statistically significant differences in the severity of the patients' condition upon admission to the hospital between the groups (p>0.05).

At the preoperative stage, the patients of the main group were counseled, which is part of the accelerated recovery program, with a purpose to provide detailed information about the upcoming treatment and the benefits of the ERAS concept.

During preoperative preparation of patients of the main group, we refused premedication.

Also, the patients of the main group in the operating room were regularly monitored for hemodynamic parameters, indicators of external respiration, and body temperature. Target body temperature was 35-37°C. To ensure normothermia during surgery, the air temperature in the operating room was maintained at a level of at least 22 °C. Infusion therapy was carried out with solutions heated to a temperature of 37 °C. In the postoperative period, the patients were kept warm with low thermal conductivity blankets until their body temperature was over 36°C.

To prevent nausea and vomiting in the early postoperative period, patients were administered intravenously 4-8 mg of dexamethasone during induction of anesthesia and 25-50 mg of metoclopromide 30 minutes before the end of the surgery.

In all patients of the main group, the surgical aid began with a survey video laparoscopy. In 18 (60.0%) cases, diffuse pelvioperitonitis was detected, which served as the basis for laparoconversion. The scope of surgical intervention was determined by the prevalence and source of pelvioperitonitis. Extraction of the uterus with fallopian tubes was performed in 11 (36.7%) patients, panhysterectomy - in 3 (10.0%)

patients. 14 (43.3%) women underwent laparoscopic bilateral tubectomy, and 3 (10.0%) patients underwent laparoscopic unilateral adnexectomy. Drainage of the abdominal cavity. The drains were removed when the volume of daily discharge did not exceed 40 ml of serous-hemorrhagic exudate, on average, on the day 2-3 of the postoperative period.

In the postoperative period, patients of the main group underwent analgesia without narcotic analgesics. For pain relief, a combination of NSAIDs was used, by the following scheme: solution of Paracetamol 100.0 - 1 g intravenously in the first hour after surgery, solution of Ketorolac 1.0 - 30 mg/ml intramuscularly after 1 hour, then 3 times a day. The level of analgesia adequacy was assessed using a visual analogue scale (VAS). The assessment was carried out according to the standard method using a ruler, on which patients put marks corresponding to the level of pain [13].

The evaluation was carried out on the first day after the operation after 2, 4 and 8 hours, as well as on the day 2, 3 and 4 of the postoperative period. When the VAS level of pain on the was not above 3 points, Ketorolac 1.0 was used - 30 mg/ml intramuscularly 2 times a day.

Early enteral nutrition was started 6 hours after the end of the surgery. On the first day after the operation, patients were allowed to consume up to 400 ml of a clear liquid, from the second day the volume was increased to 1 liter of liquid.

Provided adequate analgesia, mobilization of patients was induced during the first 48 hours after surgery. Early mobilization of patients included the following elements: breathing exercises, sitting up with legs lowered and resting on the floor, getting out of bed, walking around the ward. The target figures were the patient being out of bed for at least 1 hour on the day of surgery and at least 4 hours on the following days, with clear consciousness and VAS pain score not exceeding 4.

Treatment of women in the comparison group was carried out according to traditional standards. All patients in this group underwent lower median laparotomy. The scope of surgical intervention was based on the prevalence and source of pelvioperitonitis. Surgical treatment was carried out according to the standard method. In all cases, drainage of the abdominal cavity was performed. Pain relief in the postoperative period involved the following scheme: Promedol solution 1.0 - 20 mg/ml every 6 hours on the first day. After that, Ketorolac solution 1.0 - 30 mg/ml intramuscularly, then 3 times a day. The level of analgesia adequacy was also assessed using the VAS. Upon having the VAS score below 3 points, they switched to the introduction of Ketorolac 1.0 - 30 mg/ml intramuscularly 2 times a day. Mobilization of patients began on the day 2 of the postoperative period, under condition of adequate analgesia.

We assessed the effectiveness of the therapy based on clinical signs: the severity of the pain syndrome, the presence of nausea and vomiting in the postoperative period, and the timing of the onset of passage of flatus.

We also took into account general and biochemical blood tests (the level of total protein and albumin), the dynamics of systemic endotoxicosis and the frequency of complications.

Leukocytosis was calculated according to the standard method in the clinical laboratory of the Simferopol Clinical Maternity Hospital No. 1 and was assessed on the day of surgery, on the day 1, 3, 7 and 10 of the postoperative period.

According to the leukocytogram, the leukocyte intoxication index (LII) was calculated by the Kalf-Kalif method on the day of the operation, as well as on the day 1, 3, 7 and 10 of the postoperative period.

We made a comparative assessment of the frequency of complications in the postoperative period.

Statistical processing of the obtained data was performed in the application Statistica® 10 (StatSoft) using the methods of descriptive and nonparametric statistics. Descriptive statistics data are presented as mean (M) ± standard error of the mean (m). The difference between the groups was assessed using the Wald Wolfowitz run test, the Kolmogorov-Smirnov test, and the Mann-Whitney U-test. The critical level of significance of the null hypothesis (about the absence of significant differences or factorial influences) was assumed at $p<0.05$. The effectiveness of the ERAS approach in preventing the development of complications was assessed by calculating the Number Needed to Treat (NNT) indicator. The NNT measures the average number of patients that need to be treated to achieve a certain favorable outcome or to prevent one unfavorable outcome compared to a control group.

RESULTS

After 2, 4 and 8 hours, as well as on the day 2 of the postoperative period, in 100% of patients of the main group, the VAS score did not exceed 4. At the same time, in women from the comparison group after 2, 4 and 8 hours, the VAS score averaged 6.11±0.34.

Vomiting was registered in 3 (10.0%) patients from the study group on the first day of the postoperative period. Whereas in the comparison group, in which no prevention of nausea and vomiting was carried out,

vomiting was registered in 7 (23.3%) patients on the first day. The absolute risk reduction is 13.3% and NNT = 7.

The dynamics of laboratory parameters in the first 2 days after the operation had the same direction, and the results obtained did not differ significantly. The absence of active motility and passage of flatus, increasing hypoproteinemia, hypoalbuminemia, and an increase in the level of leukocytosis in both groups reflected the severity of the systemic inflammatory response. However, by the end of the day 2 of the postoperative period, there was an improvement in biochemical parameters as a sign of a positive turn in the general condition of patients. In patients of the comparison group, the level of total protein and albumin increased to 54.62±1.70 g/l and 33.15±1.42 g/l, respectively, while in the main group these figures increased to 62.80±1.77 g/l and 39.55±1.43 g/l, respectively. The difference is significant with $p<0.05$. LII in the comparison group decreased on the day 5 by 1.5 times, and by 2.3 times in the main group.

The beginning of active motility and passage of flatus (indicating the restoration of the motor-evacuation function of the gastrointestinal tract) was noted on average after 20.33±1.02 hours in the main group, while in the comparison group, on average, after 40.28±0.81 h. The difference is significant with $p<0.05$. At the same time, the need for medical stimulation of the intestine in patients in the comparison group was 2.5 times more frequent than in the main group.

9 (30.0%) patients from the comparison group had suppuration of the postoperative wound. Whereas in the main group, cases of suppuration of the postoperative wound were recorded in 2 (6.7%) patients. The absolute risk reduction is 15% and NNT = 7.

The average length of hospital stay for patients from the control group was 6.15±0.25 days. In turn, the average length of hospital stay of patients from the control group was 8.64±0.38 days. The difference is significant at $p<0.05$.

DISCUSSION

The obtained clinical and laboratory data indicate the effectiveness of refusing the use of narcotic analgesics and replacing them with a combination of NSAIDs in the postoperative period. It was also proved that the use of elements of the ERAS concept made it possible to reduce vomiting in the early postoperative period in patients of the main group relative to the comparison group. The dynamics of laboratory parameters in the early postoperative period indicate a more rapid decrease in the level of endotoxicosis in patients of the main group subject of the accelerated recovery program relative to the comparison group [14,15].

A comparative analysis of the onset of active motility and passage of flatus indicates the effectiveness of the ERAS program in order to accelerate the recovery of bowel function. Restoration of motility and passage of flatus in the main group occurred 2.0 times faster than in the comparison group.

Also, the use of this technique made it possible to reduce the number of complications in the early postoperative period and reduce the length of hospital stay for women in the main group relative to the comparison group.

CONCLUSIONS

Based on the above, the following conclusions can be drawn:

1. The use of certain elements of the ERAS program in the treatment of patients with pelvioperitonitis helps to reduce pain in the postoperative period, contributes to an earlier recovery of the motor-evacuation function of the intestine, an accelerated decrease in the level of systemic endotoxicosis, as well as a decrease in the risk of postoperative complications, which significantly reduces the length of hospital stay and enhances patients' rehabilitation.
2. Refusal of premedication, narcotic analgesics, prolonged fasting and prolonged bed rest in the postoperative period favorably affects the pace of rehabilitation after surgery in patients with pelvioperitonitis.
3. The results of the use of certain elements of the ERAS program in the treatment of patients with pelvioperitonitis make it urgent to revise the traditional scheme for managing patients with acute gynecological pathology, in order to improve postoperative results, and subsequent refinement of existing program components and the development of new ones.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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back