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STUDY ON THE ERAS PROTOCOL IN COLORECTAL CANCER

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Abstract: *Colorectal cancer is now the third most common malignant tumour in the world. Colorectal surgery is associated with an increased morbidity and mortality with rates that varies in between 1-16.4%. The aim of "fast track" surgery known as enhanced recovery after surgery (ERAS) presumes using several perioperative strategies to facilitate better surgical conditions and to obtain a faster recovery and an earlier patient discharge from the hospital. Reassessing implementation and the results of ERAS protocol in patients with colorectal malignant tumour we observed the clinical benefits such as fast recovery of bowel function, reduce postoperative complications and a shorter hospital stay for patients with colorectal cancer.*

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) protocol or fast-track is a combination of different perioperative care methods based on a multimodal approach which reduce surgical stress, maintain postoperative physiological function and fasten recovery for patients undergoing a major curative surgical procedure (1) with a significant reduce of hospital stay.(2,3)

MATERIALS AND METHODS

For evaluation of implementation and results of ERAS protocol in patients with malignant colorectal cancer we have conducted a prospective observational study, for a period of 5-years in the Clinical Surgery Department of Pelican Hospital in Oradea, on 169 patients undergoing curative surgery for colorectal tumour.

Patients were split in two groups, a group A (n=55) with traditional patient care protocol and a group B (n=114) with ERAS protocol. Regarding the two groups several parameters have been observed, such as intraoperative aspects (the amount of intraoperatory perfusion, duration of surgical procedure), postoperative aspects such as bowel function recovery (nasogastric tube suppression, first flatulence, first stool, moment of oral fluid diet start and moment of solid diet start), complications, patient mobilisation, inflammatory answer of the body to the surgical offense, mortality and hospital stay.

All information were stocked and analysed with the help of Microsoft Excel 2010 (Microsoft Corporation, USA), representing the data file base for the analytic statistics. For statistical analysis we make use of Fisher's test, Chi-square test, Comparison of means test(t-test) and Comparison of proportions test applying medical statistic program MedCalc version 12.2.1.0 (MedCalc Software, Mariakerke, Belgium). Value p<0,05 proves a significant statistical difference between the two study groups. The study was approved by the Ethics Commission and all patients were asked to complete and sign an informed consent form.

RESULTS

Operation duration did not registered significant differences from the statistical point of view in the two groups but the volume of infused fluid during the surgical procedure was significantly reduced in the group with ERAS protocol (p<0,05) (table no.1).

In the postoperative period we observed an earlier recovery of bowel function in the group with ERAS protocol, so the first flatulence was in an average duration of 1,2 days in comparison with 2,8 days for the traditional group (p<0,0001), and the first stool was in an average duration of 2,4 days compared to 3,5 days for the traditional group (p<0,0001) (table no. 1).

Also, the nasogastric tube has been removed earlier in the ERAS protocol group compared to traditional group (0,4 ± 0,2 days compared to 3,4 ± 0,3 days; p<0,001). Resuming fluid and solid diet was significantly earlier in the ERAS group then in the classical group (p < 0,001) (table no. 1).

Postoperative gastrointestinal complications generally were easier and recoverable. The patients complained of abdominal cramps, abdominal distension, nausea and vomiting in a large number of cases in the classical group compared to those from ERAS group (p< 0,05). In these cases, with abdominal discomfort, nasogastric tube was inserted again. As a consequence the average duration of parenteral feeding in these patients was 4,08 ± 0,8 compared to 1,7 ± 1,1 days for the two groups, respectively (p < 0,001). Also, there are significant statistical differences in the incidence of prolonged ileus (p = 0,0304), but there are no significant statistic differences for early ileus (p < 0,9398) in between the two groups (table no. 1).

Early postoperative mobilisation is very important by raising the patient out of the bed for 2 hours in the first day of the surgery and six hour later in ERAS protocol group. As a consequence the patients in this group were mobilized in 1,5 ± 1,1 days in postoperatory period compared to 3,1 ± 0,7 days for patients in the classical group (p< 0,0001) (table no.1).

Following postoperative patient evolution we observed that in the ERAS protocol group, these patients tend to have less general complications (pneumoniae, systemic infection, surgical site infection) in a significant lower cases than in the classical care group (p < 0,0257) (table no. 2).

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Table no. 1. Intraoperative and postoperative characteristics

Intraoperative aspects			
	Group A (n = 55) Traditional protocol	**Group B (n = 114) ERAS protocol**	***p*†**
Intraoperative time classic/ laparoscopic *(minutes) (average ± SD)*	139,16 ± 25,09 (90 – 180) / 169,9 ± 30,21 (120 – 222)	134,45 ± 25,61 (90 – 180) / 166,37 ± 31,54 (120 – 222)	P=0,2611**/ P=0,4905**
Amount of fluids infused intraoperatively*(ml) (average ± SD)*	2264,63 ± 165,48	1760 ± 142,95	**P < 0,0001****
Postoperative evolution			
First flatulence *(days) (average± SD)*	2,8 ± 1,0	1,2 ± 0,6	**P < 0,0001****
First stool *(days) (average ± SD)*	3,5 ± 1,5	2,4 ± 1,4	**P < 0,0001****
Nasogastric tube suppression *(days) (average ± SD)*	3,4 ± 0,3	0,4 ± 0,2	**P < 0,0001****
Oral fluid nutrition *(days) (average ± SD)*	3,2 ± 0,4	0,6 ± 0,5	**P < 0,0001****
Oral solid nutrition *(days) (average ± SD)*	5,4 ± 0,4	2,5 ± 0,4	**P < 0,0001****
Abdominal cramps *n (%)*	9 (16,36)	16 (14,03)	P = 0,8661*
Abdominal distension *n (%)*	25 (45,45)	20 (17,54)	**P = 0,0003***
Nausea and vomiting *n (%)*	35 (63,63)	42 (36,84)	**P = 0,0019***
Early ileus *n (%)*	12 (21,81)	27 (23,68)	P = 0,9398*
Prolonged ileus *n (%)*	10 (18,18)	7 (6,14)	**P = 0,0304***
Average duration of parenteral nutrition *(days) (average± SD)*	4,08 ± 0,8 (n = 35)	1,7 ± 1,1 (n = 42)	**P < 0,0001****
Mobilization *(days) (average ± SD)*	3,1 ± 0,7	1,5 ± 1,1	**P < 0,0001****
**Comparison of proportions test; **Comparison of means test; †p < 0,05 proves a statistically significant difference between the studied groups*			

Also, if in the first postoperative day reactive protein C (PCR) remains increased in both groups, beginning with the fifth day, PCR tended to get normalized in the group undergoing ERAS protocol (5,02 ± 1,47 vs. 10,05±2,53, p<0,0001) (table no. 2).

As considering the surgical procedure complications, the anastomotic leakage, peritonitis, abdominal abscess which presumed reintervention, readmittance in 30 days there were no significant differences between the two groups of patients (table no. 2).

Average length of hospital stay in ERAS protocol group was 6,43 ± 0,49 days, much smaller then in the classical protocol group (p < 0,0001) (table no. 2).

Table no. 2. Postoperative results

	Group A (n = 55) traditional protocol	**Group B (n = 114) ERAS protocol**	***p*†**
General complications *n (%)*	16 (29,09)	20 (17,54)	**P = 0,0257***
PCR în POD1 *(NV. 0 – 5) (average ± SD)*	17,87 ± 1,38	18,13 ± 1,47	P = 0,2735**
PCR în POD5 *(NV. 0 – 5) (average± SD)*	10,05 ± 2,53	5,02 ± 1,47	**P < 0,0001****
Anastomotic leakage *n (%)*	2 (3,63)	1(0,87)	P = 0,5139*
Peritonitis or abscess *n (%)*	3 (5,5)	4 (3,5)	P = 0,9480*
Re-laparotomy *n (%)*	5 (9,09)	5 (4,38)	P= 0,7467 *
Mortality *n (%)*	0	0	0
Readmission to the hospital in 30 days *n (%)*	5 (9,09)	5 (4,38)	P= 0,7467 *
Average length of hospital stay*(days)(average± SD)*	10,98 ± 0,81	6,43 ± 0,49	**P<0,0001****
PCR (Reactive C Protein); POD1, POD5 (postoperatively day 1, postoperatively day5) ** Comparison of proportions test; **Comparison of means test; †p < 0,05 proves a statistically significant difference between the studied groups*			

DISCUSSIONS

ERAS protocol aim is to improve the response of the body to the surgical procedures. Preoperative classical fasting leads to increased insulin resistance producing prolonged postoperative ileus and increased hospital stay.(4) Methods to reduce insulin resistance include proper reduce of the pain, avoiding preoperative fasting and preoperative oral administration of carbohydrates.(5,6)

In addition to preoperative oral administration of carbohydrates early postoperative oral nutrition may improve the body's metabolic response, which induces lower insulin resistance, decrease nitrogen losses and reduced muscle strength. A meta-analysis found that there is no advantage in keeping the patient without oral feeding after gastrointestinal elective resection and early feeding could be beneficial by reducing infectious complication and hospital stay.(7,8,9)

Lewis et al. have not proved any harm of early oral feeding but on a contrary a lower incidence of anastomotic leakage, surgical site infections, pneumonia, intraabdominal abscess or reduced mortality in patients with early oral feeding. A Cochrane review from 2018 shows that early oral feeding reduces complications and mortality rate.(10,11) Enteral feeding has been proved to keep the architecture of the intestinal flora and preventing gastrointestinal mucosa from atrophy.(12)

Early enteral nutrition reduces inflammatory answer and increases the blood flow in the bowels which improves the bowel function. As a consequence a well-preserved postoperative immune system could improve the surgical outcomes.(13) In this study, CRP was at a higher level immediately after the operation and significantly decreased earlier at normal values in the 5th postoperative day.

Etiology of postoperative ileus is multifactorial, bowel function is based on a combination between enteric and central nervous system, hormonal influences, neurotransmitters and local inflammatory pathway.(14,15) Surgical stress, bowel manipulation, opioids and intraoperatory fluid resuscitation may disturb these normal arrangements in the gastrointestinal tube and can lead to postoperative ileus with the damage of gastrointestinal absorption function.(8) Factors that helps reducing prolonged postoperative ileus are epidural anaesthesia, minimally invasive surgery, gentle tissue manipulation, avoiding intraoperative fluid overloading and early enteral feeding.(16,17,18) Even more, using nasogastric tube as a routine must be avoided after the operation because incidence of fever, pulmonary atelectasis and pneumonia are increased at patients with nasogastric tube, and any nasogastric tube placed during the surgical procedure must be removed before extubation.(19,20) Excess crystalloids are involved in coagulation, which could be associated with thrombosis, and oxygen tissue perfusion decreases with volume overload, that leads to unfavourable postoperative recovery.(21) Early mobilisation is one of the key elements of perioperative care, that enable a faster recovery.(22)

CONCLUSIONS

The present study shows the feasibility of implementation and effectiveness of ERAS protocol in patients undergoing surgical procedure for colorectal cancer bringing clinical benefits like fast recovery of bowel function, reduced postoperative complications and reduce hospital stay.

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