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Enhanced recovery after surgery for elderly patients with colon cancer

Ziwen Zhao[1], Xiaonan Xi[2], Dalue Li[1], Zhaoli Liu[1], Shunzheng Wang[1], Jihua Xu[1], Dongsheng Wang[1]*

[1]Gastrointestinal Surgery Department, the Affiliated Hospital of Qingdao University, Qingdao 266555, China

[2]Shouguang Peeople's Hospital, Shouguang 262700, China

Abstract: **To compare the incidence of postoperative complications, postoperative evacuation, defecation and length of stay, and analyze the effect of enhanced recovery after surgery on postoperative recovery of elderly patients with colon cancer and to provide theoretical support and evidence supplements. A retrospective analysis was performed on 169 old patients with colon cancer who were admitted to the Affiliated Hospital of Qingdao University from October 1, 2016 to October 31, 2017. According to perioperative period whether they accepted the enhanced recovery after surgery program, the cases were divided into Enhanced recovery after surgery (ERAS) group (n=77) and control group (n=92). The postoperative recovery of the two groups was compared and analyzed. The enhanced recovery after surgery was performed for elderly patients with colon cancer after surgery. In patients with ERAS, the time for exhaust, defecation, and hospitalization was significantly shorter than those of the control group .However, the postoperative complications and readmission rate of the patients in the ERAS group showed no increasing trend compared with the control group. The difference is not statistically significant. Enhanced recovery after surgery has a positive effect on the postoperative recovery of elderly patients with colon cancer, and has certain clinical significance.**

Keywords: Elderly people; Colon cancer; Enhanced recovery after surgery

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*Corresponding Author: Dongsheng Wang, wangds2018@126.com

1. Introduction

The Enhanced recovery after surgery (ERAS), also known as rapid rehabilitation surgery, is a perioperative treatment plan that aims to reduce the patient's intraoperative stress response and promote postoperative recovery by optimizing various treatment measures[1]. The main ERAS measures include preoperative education, adjustment of preoperative diet and rest, optimization of intraoperative anesthesia, and postoperative painless treatment[2]. The concept of accelerated healing surgery was originally proposed by the Danish surgeon Kehlet, ERAS is a multidisciplinary set of care interventions in patients with the goal to get a comprehensive recovery.The ERAS-related measures were initially used primarily for cardiovascular surgery, and were subsequently optimized and refined in subsequent surgical developments and applied to a variety of surgical procedures. The main purpose of ERAS is to reduce the risk of postoperative complications, shorten the length of hospital stay, and improve the utilization of medical resources by optimizing various treatment measures during the perioperative period[3]. In general, the ERAS protocol is mainly used in less than 60 years patients[5], because older patients often have other diseases and are less tolerant of surgery. The incidence of intraoperative and postoperative emergencies is high. However, the age of onset of colon cancer patients is usually higher than 65 years, and the peak age of onset is generally between 70-80 years old[4]. Although studies have confirmed that ERAS has a certain role in promoting postoperative recovery of general surgery, its effect on the intervention of elderly colon cancer surgery has yet to be discussed and clinically verified.

2. Information and methods

In this study, a retrospective analysis method was used to study 169 elderly patients with colon cancer who were admitted to the Affiliated Hospital of Qingdao University from October 1, 2016 to October 31, 2017. All patients were informed about the aims and details of the study and signed an informed consent form. Patients who met the eligibility criteria were randomized into two groups-a conventional protocol group and an ERAS protocol group-on the day of admission. Randomization was performed with a computer generated permuted-block sequence by a research physician at Affiliated Hospital of Qingdao University. The World Health Organization regards people aged 65 and over as elderly, but related studies regard 70 and older patients as elderly patients[5-7], so we have patients who are over 70 years old. Inclusion criteria: preoperative pathological diagnosis of colon cancer, age ≥70 years old, no preoperative adjuvant therapy; exclude those who do not want to accept the ERAS program and contraindications to the ERAS program, including (1) preoperative intestinal obstruction, intestinal perforation and other emergency operations; (2) preoperative patients severe primary heart, lung, liver, kidney and other diseases; (3) hyperthyroidism or hypothyroidism and other

metabolic or endocrine diseases; (4) preoperative imaging confirmation or intraoperative confirmation that radical resection or distant metastasis is not possible; (5) obesity (BMI >30), severe malnutrition (BMI <15).

There was no significant difference in gender, age, BMI, ASA score and TNM staging between the two groups (P>0.05) Table 1. The perioperative management measures of the two groups of patients are shown in Table 2.

Table 1 The general conditions between the two groups of patients

	Ⅰ	Ⅱ	t/χ2 value	P value
age	72.6±6.7	73.2±8.1	0.150	0.881
Sex			0.532	0.466
man	35	47		
female	42	45		
BMI (kg/㎡)	23.6±5.7	24.1±5.8	0.216	0.642
ASA score（n）			-0.548	0.584
Ⅰ	10	12		
Ⅱ	35	37		
Ⅲ	32	43		
TNM stage（n）			-0.074	0.941
Ⅰ	25	29		
Ⅱ	23	30		
Ⅲ	29	33		

ASA – The American Society of Anesthesiologists (ASA) Physical Status classification system
BMI – body mass index

Table 2 Perioperative treatment measures for the two groups of patients

Measure	Perioperative treatment measures in ERAS group	Perioperative management measures in the control group
Preoperative	Preoperative consultation, nutritional assessment, informed treatment plan to obtain patient cooperation	Fasting for 12 hours before surgery and 4 hours forbidden drinking
	Fasting for 6 hours before surgery and 2 hours forbidden (orally 10% glucose 400ml 2 hours before surgery)	Preoperative oral laxative (and cool 137.5kg, plus 2000ml warm water, oral), clean the enema during the morning
	Do not perform bowel preparation	
Perioperative	General anesthesia combined with epidural anesthesia	General anesthesia
	Intraoperative attention to warm, wash the abdominal cavity with warm water	Intraoperative warmth did not pay attention
	The surgical incision is as small as possible	Surgical incision according to the needs of surgery, without special attention
	Abdominal drainage tube is not placed routinely. If necessary, pull out as early	The abdominal drainage tube was routinely placed and the drainage should
Postoperatively	Epidural patient controlled analgesia pump (PCEA)	Intravenous patient-controlled analgesia pump (PCIA)
	After 6 h of anesthesia, patients were encouraged to get out of bed, and their ambulation gradually increased	Voluntary activities in accordance with patients, not special requirements
	After anesthesia, drink a small amount of water, gradually increase the dosage, resume normal diet 2-3 days after	After the exhaust begins to eat, gradually increase the amount, return to normal diet
	The urethral catheter was pulled out of 24h after operation	Urethral catheter was pulled out 2-4 days after operation

2.1. Discharge standard

The patient's gastrointestinal function was restored, and oral intake was good. There was no need for intravenous fluid replacement. Oral medication has satisfactory analgesic effect and can be freely activated; patients agree to be discharged from hospital. The two groups of patients have the same discharge standard.

2.2. Sample and statistical method

It was initially estimated that most patients who underwent colon operation with curative intent would need to stay in the hospital for about 7 days after surgery. On the basis of the hypothesis that the ERAS protocol would reduce the postoperative length of hospital stay from 7 to 5 days, a sample size of at least 64 patients per arm was calculated to have a power of 0.80 and a significance level of 0.05. A total sample size of 169 patients was included. All statistical analysis of data is carried out by SPSS19.0 software (American IBM). Measurement data were expressed by $\bar{x} \pm s$, and t test was used for comparison between groups. Frequency was used to count data, and Fisher exact probability or chi square test was used for difference between the 2 groups, non-parametric test was used to the one-way ordered rank data. Among them, $P<0.05$ thought the difference between groups was statistically significant.

3. Results

Postoperative complications in group ERAS were lower than those in control group (14.29% vs 20.65%), and the difference was not statistically significant ($P>0.05$). 30 days after operation, 1 patients in the control group were operated on again for complete intestinal obstruction.1 weeks later, the patients were discharged from hospital, and anastomotic leakage occurred in 3 cases (1 cases from group ERAS and 2 cases from control group), healed by conservative treatment. In the two groups, 1 cases were hospitalized due to incomplete intestinal obstruction. All were cured by conservative treatment. No death occurred in the two groups, see Table 3.

Postoperative exhaust time, defecation time and postoperative hospital stay in group ERAS were significantly shorter than those in control group ($P<0.05$). See Table 4.

Table 3 Comparison of postoperative complications between two groups of elderly patients with colon cancer (examination)

	Ⅰ	Ⅱ	t/χ^2 value	P
patients（n）	77	92		
anastomotic leakage(n)	1	2	-	1.000
pulmonary infection(n)	3	5	-	0.729
incisional infection(n)	2	1	-	0.592
rehospitalization(n	1	1	-	1.000
intestinal obstruction(n)	2	4	-	0.689
Deep venous thrombosis(n)	2	5	-	0.457
reoperation(n)	0	1	-	1.000

Table 4 Comparison of postoperative recovery of two groups of elderly patients with colon cancer($\bar{x} \pm s$, t test)

group	Patients (n)	first exhaust time (d)	first defecation time (d)	postoperative hospitalization time (d)
Ⅰ	77	2.16±0.59	2.67±0.63	5.47±2.31
Ⅱ	92	2.83±0.87	3.49±0.69	7.39±3.07
t value		2.115	2.341	2.517
P value		0.037	0.022	0.014

4. Discussion

The main purpose of ERAS is to relieve stress reaction and promote postoperative recovery in order to save medical resources. The main measures include preoperative detailed presentation so as to get patients' consent and cooperation and reduce preoperative fasting time. The best way to improve the anesthesia is to reduce the incision length, to keep warm and to relieve pain after operation[8]. In this study, compared with the traditional preoperative preparation, the preoperative nutritional assessment of patients and no

bowel preparation were made. During the operation, general anesthesia and epidural anesthesia were applied to the patients. After the operation, the patients were encouraged to get out of bed, eat as early as possible, and do not retain abdominal drainage tube.

In this study, the patients receiving the ERAS program were significantly lower than the traditional treatment group in the exhaust, defecation and hospital stay (about 5.5 days), and to a certain extent. Some studies have found that ERAS program can reduce the incidence of postoperative complications[4,9]. This study found the difference in the incidence of postoperative complications between the two groups was no significant. On the one hand, the study only contains 196 patients, because the sample size is too small to completely reflect the overall difference; on the other hand, the two groups of patients are elderly colon cancer patients, their resistance and immunity are lower, and the probability of postoperative complications is higher. May affect the difference between the two groups of patients. Generally speaking, the postoperative recovery of patients is influenced by various factors, including the patient's ability to recover, mood, medical resources and social relations. The main significance of the clinical application of accelerated rehabilitation surgery is to reduce the possible risk in the operation, to maintain the stability of the body to the maximum extent, to promote the metabolism, to make the patient's medical service quality best and to save the consumption of medical resources[10]. Traditionally, preoperative bowel preparation, including preoperative oral laxatives and morning enema, is beneficial to reduce the incidence of abdominal infection and anastomotic leakage[11,12]. However, compared with the ERAS treatment group, preoperative bowel preparation does not effectively reduce infection. Instead, it may increase the risk of operation due to intestinal flora disorder and electrolyte disturbance. In addition, in traditional concepts, eating prematurely after abdominal surgery will aggravate discomfort symptoms such as abdominal distention and nausea after operation, and will also have adverse effects on the normal healing of the wound[8]. According to the analysis of the ERAS group, early oral feeding will not only affect the healing rate of the wound, but help to accelerate the recovery of gastrointestinal function by promoting the gastrointestinal peristalsis, and maintain the stability of the intestinal microflora and improve the postoperative nutritional intake. In addition, the use of adequate postoperative analgesia measures helps to shorten the time of bed rest and provide a guarantee for patients to get out of bed early. The early subterranean bed activity is not only beneficial to the recovery of gastrointestinal function and the efficiency of nutrition absorption, but also to accelerate the metabolic rate of the patient's body, promote the healing of the wound, and be beneficial to the recovery of the patient's mental state as soon as possible, thus effectively shortening the time of hospitalization[6-8,13].

Surgical operation will inevitably lead to traumatic stress and inflammatory reaction. Serious inflammatory reaction and metabolic changes can lead to organ dysfunction, postoperative complications and even death[14]. The application of accelerated rehabilitation surgery in elderly colon patients can reduce the stress inflammation and maintain the stability of metabolism. Besides patients who were treated according to the ERAS program spent significantly less time in the hospital. This did not result in more readmissions which reflects early recovery, probably due to a more favorable postoperative course. Besides, this implies benefit for the hospital resources because with the implementation of the ERAS program a higher level of cost-effectiveness can be reached.

In the implementation of the ERAS plan, the strict implementation of every step before, during and after operation is crucial to the successful implementation of the ERAS plan. In the implementation of the program, the detailed and accurate introduction of the preoperative surgeons to the patients and their families, the strict enforcement of the measures by the anesthesiologists and the medical and nursing staff in the operation. Careful monitoring of patients after operation is of great importance to the effectiveness of ERAS implementation. In addition, the high compliance of patients receiving ERAS also plays an important role in postoperative clinical prognosis[8].

5. Conclusion

To sum up, for the elderly patients with colon cancer, the use of ERAS program during the operation can reduce the risk of operation to a certain extent and effectively promote postoperative rehabilitation. For the patients, ERAS is powerful to improve the therapeutic effect and improve the satisfaction of the treatment. For the hospital and the society, ERAS is beneficial to reduce the patient's hospitalization period, improve the medical efficiency and save medical resources. The intervention of ERAS in colon cancer surgery is safe, effective and has certain clinical application value.

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