

Fast-track surgery nursing intervention in CRC patients with laparotomy and laparoscopic surgery

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Abstract

In this study, the application effect of fast-track surgery (FTS) nursing intervention in laparotomy and laparoscopic surgery for colorectal cancer (CRC) is investigated, and the optimal perioperative management strategy for CRC surgery is explored. One hundred thirty CRC patients are included in this study, in which 67 patients undergo laparotomy (Group A) and 63 patients undergo laparoscopic surgery (Group B). These patients were also randomly divided into traditional nursing subgroup (Group A1 [n = 33] and Group B1 [n = 31]) and FTS nursing subgroup (Group A2 [n = 34] and Group B2 [n = 32]). The general data of patients, pre-operative preparation, intra-operative data, postoperative recovery data, and postoperative complications are recorded. Both FTS and laparoscopic surgery can advance the anal exhaust time, and shorten postoperative fasting and water deprivation time, and the hospitalization time without increasing the incidence of complications. FTS has advantages in reducing the indwelling time of gastric tube and throat pain. Simultaneous implementation of FTS and laparoscopic surgery has the best effect on the postoperative recovery of CRC patients.

Abbreviations: CRC = colorectal cancer, FTS = fast-track surgery.

Keywords: colorectal cancer, fast-track surgery nursing, laparoscopic surgery

1. Introduction

Colorectal cancer (CRC) is 1 of the most common malignant tumors in the digestive tract, and the incidence of CRC is still rising.^[1,2] Surgery is still the main treatment method for CRC. It is required that the perioperative management of surgery should ensure the safety of patients.^[3] In the current medical environment where the doctor-patient relationship is strained, medical risks should be avoided.^[4,5] Making that some unnecessary treatment measures become “routine” while some measures which are beneficial to patients have not been implemented.^[6,7] Unnecessary preoperative cleansing enema, and indwelling stomach tube, and urinary tube not only delay the patient’s recovery process but also increase the possibility of postoperative complications. However, measures that advance the postoperative ambulation time and shorten the fasting and water deprivation time have not been extensively applied. The application of new perioperative treatment measures like Fast-track surgery (FTS) is required.^[8,9] The existing perioperative treatment measures should be improved, and unnecessary medical care measures should be discarded while ensuring the safety of patients. In addition, measures that are beneficial to patients should be extensively applied.

FTS was first reported and applied by Kehlet in the 1990s, and was also named as enhanced recovery after surgery.^[10] As a new perioperative treatment method, FTS can reduce the surgical trauma of patients, physical and psychological traumatic stress, hospitalization costs, and hospitalization time.^[8,9] FTS integrates minimally invasive surgery, fast-track anesthesia, rehabilitation therapy, optimal analgesia techniques and nursing. FTS aims to help patients to go through the perioperative period safely and quickly by shortening postoperative fasting and water deprivation time and advancing postoperative ambulation time, etc.^[11,12]

At present, laparoscopic surgery has become 1 of the most mature gastrointestinal surgical methods. The application of laparoscopic surgery to CRC can effectively reduce the incidence of complications and postoperative pain, shorten the hospital stay, and speed up the recovery of patients after surgery.^[13,14] Many clinical studies have confirmed the feasibility of laparoscopic surgery for CRC patients.^[15,16] If being implemented during laparoscopic surgery, which is a minimally invasive method, FTS will greatly promote the recovery of patients. At the same time, the introduction of laparoscopic surgery into the treatment category of FTS can also extend the concept of FTS to the field of minimally invasive method. In

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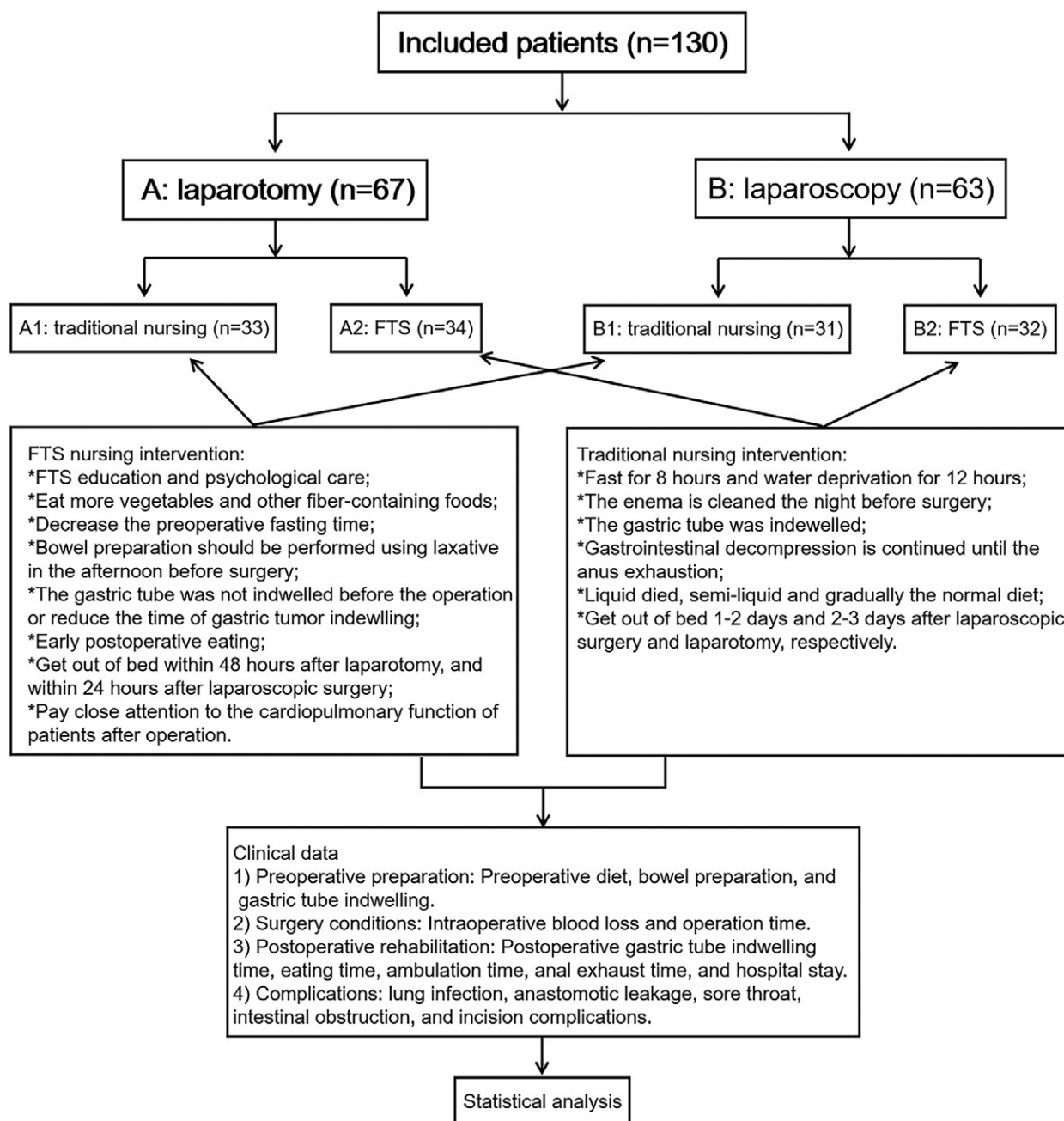


Figure 1. The study design and procedure.

a random controlled trial performed by Compagna, for CRC patients who were more than 70 years old and underwent surgical treatment, the recovery time of intestinal function was 32 and 42 hours, the time to start the liquid diet was 13 and 43 hours after the operation, the postoperative hospital stay was 6 and 9.5 days, and the complications rate was 5% and 18% in the FTS group and the traditional nursing group, respectively.^[17] Faucheron has pointed out that laparoscopic surgery combined with FTS is the best treatment strategy for CRC.^[18] However, most studies on the application of FTS in laparotomy and laparoscopic surgery for CRC are single-center experiments with small sample sizes and relatively insufficient representativeness.^[19] In addition, the effect of some FTS measures after surgery is still not fully confirmed, and the influence of laparoscopic surgery on cardiopulmonary function is still in controversy.^[17,19]

These problems are not conducive to the promotion of FTS, or the comparison between the effect of FTS in open surgery and laparoscopic surgery.

In this study, the effects of FTS in laparotomy and laparoscopic surgery are studied, and explore the optimal perioperative management strategy for CRC surgery is explored.

2. Materials and Methods

The study design and procedure are shown in Figure 1.

2.1. General data

This observation study was approved by the Ethics Committee and Institutional Review Board of the Second Hospital of

Jilin University, Changchun, China and was conducted at the Department of General Surgery of the Second Hospital of Jilin University. From January 2019 to June 2020, 130 CRC patients who had undergone surgical treatment in the Department of Surgery of the Second Hospital of Jilin University were selected. Sixty-seven patients had undergone laparotomy (Group A) and 63 patients had undergone laparoscopic surgery (Group B). These patients were also randomly divided into traditional nursing subgroup (Group A1 [n = 33] and Group B1 [n = 31]) and FTS nursing subgroup (Group A2 [n = 34] and Group B2 [n = 32]).

The inclusion criteria include: Diagnosis of CRC by histopathology. Performance of elective laparotomy or laparoscopic surgery was performed. First surgery and no neoadjuvant treatment history before surgery. The general condition tolerating operation. The exclusion criteria include: Benign colorectal diseases or benign colorectal diseases combined with intestinal obstruction, intestinal perforation, etc. History of similar surgery or neoadjuvant treatment before surgery. American Society of Anesthesiologists grade more than III or combined with severe arrhythmia.

2.2. Perioperative nursing

The patients underwent radical resection of CRC with general anesthesia and were given an analgesic pump for continuous intravenous analgesia. Patients in the FTS group were provided with rapid rehabilitation, and the traditional nursing group was offered traditional surgical nursing.

2.2.1. FTS group. Pre-operation: FTS education and psychological care for patients are performed, with the focus on explaining the significance of various rapid rehabilitation surgical care measures, and obtaining patients' cooperation. The patients are instructed to eat more vegetables and other fiber-containing foods to prevent constipation and to keep a high-calorie, high-protein, and low-residue diet before surgery to improve surgical tolerance. Before the operation, the patients fast for 4 hours, and amount replenishment should be properly performed to prevent water and electrolyte disorders. Bowel preparation should be performed using laxative in the afternoon before surgery. During bowel preparation, a proper amount of fluids should be supplied. The gastric tube was not indwelled before the operation.

Post-operation: The gastric tube is removed immediately after surgery. The patient should keep a semi-recumbent position before awakening from anesthesia. The patient should conduct bed activities, and turn over every 2 hours. If the vital signs are stable, the patients should get out of bed within 48 hours after laparotomy, and within 24 hours after laparoscopic surgery. The nurses should keep a detailed record of the time when patients start getting out of bed and protect the safety of patients during the activity. The patients should fast for 24 hours after surgery, and the fasting time should not exceed 48 hours. The patients should keep a liquid diet and have some light saltwater with an intake volume of not <300 mL, and the volume should increase gradually as long as there is no abdominal distension, nausea, etc. When the intestinal function is restored, the normal diet should be gradually resumed. The nurses should record the anal exhaustion time of the patients. During the fasting period, the patients can be instructed to chew gum to improve the comfortability. The nurses should observe and record the patients' vital signs and complications in detail, and assist in handling abnormalities. Nebulized inhalation should be carried out after the operation to help patients to expectorate. The cardiopulmonary function of patients should be monitored closely. If necessary, patients can be instructed to blow balloons to improve lung function.

2.2.2. Traditional nursing group. Pre-operation: The patients fast for 12 hours and are deprived of water for 8 hours, and

rehydration should be performed according to doctors' advice. The enema is cleaned the night before surgery. The stomach tube is indwelled for gastrointestinal decompression.

Post-operation: Gastrointestinal decompression is continued until the anus exhaustion. When the anus and intestinal function is restored, a liquid diet is allowed. When there is no abdominal distension, abdominal pain, or nausea, the patients can have semi-liquid and gradually resume the normal diet. The patients should start getting out of bed 1 to 2 days and 2 to 3 days after laparoscopic surgery and laparotomy, respectively.

2.3. Clinical data

Preoperative preparation: Preoperative diet, bowel preparation, and gastric tube indwelling. Surgery conditions: Intraoperative blood loss and operation time. Postoperative rehabilitation: Postoperative gastric tube indwelling time, eating time, ambulation time, anal exhaust time, and hospital stay. Complications: lung infection, anastomotic leakage, sore throat, intestinal obstruction, and incision complications.

2.4. Statistical analysis

SPSS 19.0 software was applied for statistical analysis. For the measurement data, which were described by $M \pm SD$, and the factorial design analysis of the variance or the rank sum test was used. For the enumeration data, the Chi-square test, Fisher test or rank sum test was used. * $P < .05$ indicates statistical significance.

3. Results

The general data of patients in 4 different groups are listed in Table 1. There is no statistical difference in the age, gender, accompanying diseases, Tumor Node Metastasis stage, and American Society of Anesthesiologists score among different groups.

Table 2 shows the pre-operative preparation and operation conditions. Twenty six patients of Group A2 do not receive indwelling gastric tubes and 29 patients of Group A2 do not receive indwelling gastric tubes. The patients in Group A2 and Group B2 are given oral sodium phosphate for bowel preparation, and Group A1 and Group B1 are given cleansing enemas. There is no statistical difference among the 4 groups with different surgical methods ($\chi^2 = 11.402, P = .213$).

The factorial design analysis of variance analysis shows that the intraoperative blood loss of Group B is less than that of Group A, and the difference is statistically significant (* $P < .05$) (Table 3). There is no statistical difference in intraoperative blood loss between Group A1 and Group A2 and between Group B1 and Group B2 ($P > .05$), and there is no interaction between the surgery method and nursing intervention method ($F = 2.312, P = .210$).

The operation time of Group A is shorter than that of Group B, and the difference is statistically significant ($P = .015$) (Table 4). There is no significant difference in terms of operation time between Group A1 and Group A2 and between Group B1 and Group B2 ($P = .925$). There is no interaction between the surgical method and the nursing intervention method ($F = 0.725, P = .680$).

Table 5 shows the postoperative recovery conditions. There is no difference in the postoperative gastric tube indwelling time between Group A1 and Group B1. The gastric tube indwelling time in Group A2 and Group B2 is greatly reduced. FTS or laparoscopic surgery method can statistically advance the eating time, anal exhaust time, ambulation time, and shorten postoperative hospital stay ($P < .001, P < .001$). The combination of laparoscopic surgery and FTS nursing intervention achieves the best effect on advancing the eating time, anal exhaust time, ambulation time, and shortening postoperative hospital stay.

Table 1
General data of patients.

Group	n	Age (yr)	Gender		Accompanying diseases						TNM stage				ASA score		
			Male	Female	Hypertension		Diabetes		Coronary heart disease		I	II	III	IV	I	II	III
					Yes	No	Yes	No	Yes	No							
A1	33	64.2 ± 7.5	15	18	8	25	5	28	7	26	2	16	14	1	15	14	4
A2	34	60.5 ± 8.2	17	17	7	27	6	28	6	28	4	14	15	1	16	14	4
B1	31	59.6 ± 6.8	16	15	10	21	8	23	8	23	4	14	13	0	16	14	1
B2	32	61.5 ± 8.0	18	14	9	23	7	25	8	24	3	12	15	2	14	15	3
Statistics		$\chi^2 = 5.004$	$\chi^2 = 3.105$		$\chi^2 = 4.140$		$\chi^2 = 1.850$		$\chi^2 = 1.702$		$\chi^2 = 3.252$				$\chi^2 = 2.750$		
P		.108	.302		.215		.220		.505		.250				.410		

ASA = American Society of Anesthesiologists, TNM = Tumor Node Metastasis.

Table 2
Pre-operative preparation and operation conditions.

Group	n	Gastric tube		Clean enema		Surgical methods					Intraoperative bleeding (mL)	Operation time (min)
		Yes	No	Yes	No	Radical resection of colon cancer	Dixon	Miles	Palliative surgery			
A1	33	33	0	33	0	8	19	5	1		56.1 ± 28.4	180.5 ± 22.0
A2	34	8	26	0	34	5	20	6	3		62.2 ± 31.5	184.5 ± 25.1
B1	31	31	0	31	0	9	17	5	0		62.0 ± 34.5	196.8 ± 32.0
B2	32	3	29	0	32	7	19	6	0		58.9 ± 44.2	198.2 ± 33.5

Table 3
Factorial design ANOVA analysis of intraoperative bleeding.

	SS	df	Mean square	F	Sig.
Surgery type	14425.677	1	14425.677	103.35	0.000
Perioperative nursing	3768.722	1	3768.722	1.345	0.255
Surgery type × Perioperative nursing	2345.440	1	2345.440	2.312	0.210

ANOVA = analysis of variance, SS = sum of squares of deviations.

Table 4
Factorial design ANOVA analysis of operation time.

	SS	df	Mean square	F	Sig.
Surgery type	21405.602	1	21405.602	10.105	0.015
Perioperative nursing	308.121	1	308.121	0.440	0.925
Surgery type × Perioperative nursing	746.452	1	746.452	0.725	0.680

ANOVA = analysis of variance, SS = sum of squares of deviations.

There is no interaction between the surgical method and the nursing intervention method.

The postoperative complications of different groups are listed in Table 6. There is no difference among the 4 groups in terms of lung infection, intestinal obstruction, anastomotic leakage, and incision complications. The incidence of throat pain in Group A2 and Group B2 is lower than that in Group A1 and Group B1, and the differences are statistically significant (A1: A2, $P < .001$, B1: B2, $P < .001$). There is no difference in throat pain between Group A and Group B (A1: A2, $P = .110$, B1: B2, $P = .225$).

4. Discussion

With the continuous deepening of research, great changes have taken place in the perioperative management of surgical

operations. New perioperative treatment methods, such as clinical nutritional support, damage control surgery, and minimally invasive surgery and FTS have been continuously applied in the clinic.^[20] FTS aims to get rid of unnecessary traditional medical nursing measures and optimize perioperative management to shorten the postoperative recovery time of patients, reduce perioperative pain, and save medical resources without increasing patient complications.^[21,22] As a minimally invasive surgery, laparoscopic surgery has attracted more and more attention. The implementation of laparoscopic surgery can greatly optimize the perioperative experience of the patients.^[23,24] In this study, through the implementation of FTS nursing intervention in laparotomy and laparoscopic surgery for CRC, the application effects of FTS in these 2 operations are investigated, and the optimal perioperative management strategy for CRC surgery is explored.

This study adopts the improved preoperative preparation method, which shortens the preoperative fasting, simplifies intestinal preparation, abandons the gastric tube, and shortens the indwelling time of the gastric tube. The incidence of lung infection, intestinal obstruction, anastomotic leakage, and incision complications does not increase.

In recent years, with the improvement of anesthesia technology, reports of aspiration caused by eating before surgery have become rare.^[20] As a result, shortening the preoperative fasting time may reduce the surgical damage of patients and benefit the postoperative recovery. Patients in Group A2 and Group B2 fast for 4 hours before surgery, which does not increase the incidence of postoperative complications. Patients in Group A1 and Group B2 fast for 12 hours and are water-deprived for 8 hours without the increase of the incidence of postoperative complications. Compared with FTS, traditional nursing management decreases the comfort of patients during the perioperative period.

Bowel preparation of Group A2 and Group B2 is performed by sodium phosphate oral solution, and cleansing enema is discarded. By simplifying bowel preparation, the rates of complications such as anastomotic leakage and abdominal infection do not increase. There is no report about the operation disturbance

Table 5
Postoperative recovery.

Group	Postoperative gastric tube indwelling time (h)	Postoperative diet recovery time (h)	Anal exhaust time (h)	Postoperative time to get out of bed (h)	Postoperative hospital stay (d)
A1	70.2 ± 30.2	132.3 ± 40.2	130.5 ± 45.6	140.5 ± 42.3	13.2 ± 4.6
A2	16.3 ± 5.2	90.2 ± 43.4	98.3 ± 30.2	89.3 ± 32.5	11.5 ± 5.2
B1	62.6 ± 15.3	69.6 ± 30.5	90.4 ± 21.2	52.4 ± 15.0	10.7 ± 3.5
B2	7.4 ± 3.2	50.2 ± 18.5	70.2 ± 15.3	20.5 ± 10.2	8.2 ± 2.2

Table 6
Postoperative complications.

Group	Lung infection	Intestinal obstruction	Throat pain	Anastomotic leakage	Incision complications
A1	5	1	12	2	3
A2	1	3	3	1	4
B1	5	2	11	1	2
B2	3	1	2	0	1
Statistics	$\chi^2 = 3.412$	$\chi^2 = 2.012$	$\chi^2 = 35.221$	$\chi^2 = 4.412$	$\chi^2 = 5.011$
P	.152	.243	.000	.168	.125

caused by insufficient bowel preparation, indicating that simplified bowel preparation is effective.

Perioperative gastrointestinal decompression is 1 of the routine treatments for diseases in the digestive tract, but its clinical significance has not been fully confirmed. Some researchers hold the opinion that an indwelling gastric tube not only fails to suck the digestive juices from the intestines but also increases the patient’s lung infection and throat discomfort.^[25] In this study, it is confirmed that shortening the indwelling time of the gastric tube or abandoning the gastric tube during the perioperative period of CRC will not increase the incidence of anastomotic leakage or intestinal obstruction, and will significantly reduce throat discomfort.

FTS psychological care strives to make patients understand, accept, and cooperate with various new perioperative treatment and nursing methods. In this study, psychological counseling is also provided for patients during the perioperative period. In this way, patients can better cooperate and maintain a good psychological state during the perioperative period, which guarantees smooth implementation.

Long-term bed rest is extremely detrimental to the patients, which will lead to many complications such as lung infection, deep vein thrombosis, delayed recovery of intestinal function, pressure sores, etc. Therefore, during FTS management in this study, patients in Group A2 and Group B2 are required to get out of bed as early as possible. The patients in Group A are required to get out of bed no more than 48 hours after surgery, and those in Group B should get out of bed no more than 24 hours after surgery. The results show that getting out of bed early will help patients recover from the intestinal function early, and patients in Group B show the most obvious advantage. However, nurses should explain to the patient of the meaning of getting out of bed early to eliminate the patient’s worries and pay attention to observe and protect the patients to avoid accidents during activities.

Reasonable nutritional support after surgery is 1 of the important factors contributing to the recovery of the patients, and enteral nutrition is the most physiological nutritional intake method. Enteral nutrition can increase gastrointestinal mucosal blood flow, and provide oxygen and nutrients required for mucosal cell metabolism, which can benefit the reparation of damaged mucosa.^[26] In FTS management in this study, the patients are required to start eating 100-mL warm water and other liquids 24 hours after the operation, and the latest eating

time should not exceed 48 hours after the operation. If there is no discomfort, the food intake amount should not be <300 mL within 48 hours after the operation and should be gradually increased according to the situation until the normal diet is resumed. The resuming time of postoperative diet patients in Group A2 and Group B2 is shorter than that in Group A1 and Group B1. The incidence of postoperative complications such as anastomotic leakage and intestinal obstruction does not increase, and anal exhaust time is not significantly delayed, indicating that FTS management is safe.

FTS not only focuses on recovery speed but also strives to guarantee that patients can pass the perioperative period steadily and safely, and reduce the pain of patients.^[27,28] In this study, the results show that both laparoscopic surgery and FTS can shorten the postoperative hospital stay. Laparoscopy is a kind of minimally invasive surgery and many studies have confirmed that it is safe to shorten the length of hospital stay after laparoscopic surgery.^[18,23] However, some reports do not support the premature discharge of patients undergoing FTS, because premature discharge may increase the rate of patient re-admission.^[29] As the postoperative follow-up was not performed in this study, it is impossible to know whether the patient’s readmission rate will be increased.

Complications such as infection, intestinal obstruction, and anastomotic leakage after colorectal surgery are the main factors affecting the postoperative recovery of patients. In this study, FTS does not increase the incidence of these complications. Besides, compared with the traditional nursing management, FTS decreases throat comfort. Laparoscopic surgery is minimally invasive and has obvious advantages in reducing incision complications.^[30]

FTS is a kind of multidisciplinary project. The implementation of FTS requires the cooperation of surgeons, anesthesiologists, rehabilitation therapists and nurses. It constantly challenges the traditional surgery and proposes a new set of perioperative medical care programs. As a minimally invasive surgical treatment, laparoscopy is also a part of the concept of FTS. The combination of laparoscopic surgery and FTS is a combination of minimally invasive and rapid recovery, which can play the advantages of minimally invasive and rapid recovery more obviously, and will bring more ideal perioperative intervention effect for CRC patients.

There are some limitations of this study: The study is a single-center retrospective analysis, and the number of samples included is not particularly sufficient, which may cause some bias in the results. The postoperative follow-up was not performed and the long-term complications of patients cannot be provided. Due to the limitations of scientific conditions and medical risks, a considerable part of medical care procedures was not implemented in this study, such as preoperative sugar water consumption, intraoperative heat preservation, postoperative fluid replacement restriction, early postoperative catheter removal, etc.

5. Conclusion

In this study, FTS nursing intervention is applied in laparotomy and laparoscopic surgery for CRC. Both FTS and laparoscopic surgery can advance anal exhaust time, and shorten

postoperative fasting and water deprivation time, and the hospitalization time without increasing the incidence of complications such as lung infection, anastomotic leakage, and intestinal obstruction. FTS has advantages in reducing gastric tube indwelling time and throat pain. Simultaneous implementation of FTS and laparoscopic surgery has the best effect on the postoperative recovery of CRC patients.

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