RESEARCH ARTICLE

# The clinical study of fast-track rehabilitation nursing in the perioperative period of therapeutic laparoscopy of colon cancer patients

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## Abstract

**Objective:** To explore the clinical application of fast-track rehabilitation nursing in the perioperative period of therapeutic laparoscopy of colon cancer patients.

**Methods:** Patients with colorectal cancers who were hospitalized in the Department of Oncology and General Surgery of The Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University from August 2016 to December 2018 were selected as the research subjects of the study. All the research subjects were divided into the study group 1(n=29), the study group 2(n=29) and the control group (n=24). The control group received routine nursing during the perioperative period, and the research group 1 and 2 received rapid rehabilitation nursing during the perioperative period. Postoperative comparison was made between the two groups on the differences in the time of the first time out of bed, the time of the first anal exhaust, and the time of the first feeding. The differences of pain control in each group after nursing care were evaluated by the pain scale, and the degree of satisfaction of each group was evaluated by the satisfaction scale.

**Results:** In terms of the basic information of patients, the experimental results had indicated no significant statistical difference among the study group 1, the study group 2, and the control group (P>0.05). By analysing the postoperative physical condition indicators of patients, the time of first off-bed activity, the time of first anal exhaust, and the first time of food intake of patients in the observation group 1 and the observation group 2 were significantly different (P<0.05) as compared with the control group. Besides that, the postoperative pain scale and pain satisfaction of patients were observed, in which the difference in pain scales at each 6h, 12h, 24h, and 48h after the surgeries were statistically significant (P<0.05). In terms of the satisfaction of pain control or pain relief, the differences were statistically significant (P<0.05).

**Conclusions:** Therefore, it was concluded that the fast-track rehabilitation nursing could promote the treatment of colon cancer patients. Despite the deficiencies of the experimental processes, the study has provided the good results on fast-track rehabilitation nursing with a reliable theoretical basis.

**Keywords:** fast-track rehabilitation nursing, colon cancer, perioperative period, laparoscope.
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## Introduction

Modernization and improved living standards lead to a change in the eating habits and the quality of food which is an important factor for adversities on health. The high incidence of cancer and the low cure rate has attracted the attention of medical professionals. People have no choice but to be careful about it. Colon cancer is one of the most common malignant tumours of the digestive tract and ranks second in gastrointestinal malignancies, posing a serious threat to human health. The predilection positions of colon cancer are the rectum and the interface of rectum and sigmoid colon, making 60% of the total. The age group involved is usually over 40 years, the proportion of male and female patients was 2~3:1.[1,2]

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Currently, the basic therapeutic plan of colorectal cancer is still dominated by radical surgical resection. However, with the advancement of society, the laparoscopic technology has been gradually applied to colorectal cancer surgery and become a primary surgical treatment for colorectal cancer.[3]

The philosophy of fast-track surgery (FTS) is to reduce and diminish the traumas and accelerate the postoperative recovery speed of patients through various methods during the perioperative period, which would shorten the length of hospital stay as well as reduce the cost of hospitalization and the use of medical human resources. It is a multidisciplinary collaborative medical care model based on evidence-based medicine and laparoscopic and minimally invasive surgery, which is also an optimized clinical pathway.[4] Fast-track rehabilitation nursing is based on the fast-track surgery. It is a nursing intervention implemented from the aspects of surgical decompression, effective analgesia, early activity, fast

recovery, and normal diet, with the goal of improving the quality of surgical care for patients.[5] One of the core elements of the philosophy of fast-track surgery is that the stomach tube should not be indwelled or be removed as early as possible for patients to perform early self-feeding, which is inconsistent with the conventional concept.[6] The common practice is to indwell the stomach tube before surgery. Once the gastrointestinal function of the patient is restored (autonomous anal exhaust), the stomach tube is removed.[7] At present, the concept of such common practice is still the dominant view in most parts of China. Currently, FTS has been widely applied to colorectal cancer surgeries, yet, the application of fast-track rehabilitation nursing and its pathways to colon cancer throughout the perioperative period is still in need of clear instructions.[8,9]

In summary, in terms of the detailed comprehension on the application of fast-track rehabilitation nursing and its pathways to colon cancer throughout the perioperative period. The influence of routine nursing and rapid rehabilitation nursing mode on postoperative recovery speed and recovery effect of patients with colon cancer during perioperative period of laparoscopic surgery. The objective of the paper is to explore the clinical application of fast-track rehabilitation nursing in the perioperative period of therapeutic laparoscopy of colon cancer patients.

## Patients and Methods

A total of 82 patients with colorectal cancers hospitalized in the Department of Oncology and General Surgery of The Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University from August 2016 to December 2018 were selected as the research subjects. The sample size was calculated as follows. According to the pre-test results of 10 cases, the VAS differences of the control group, study group 1, and study group 2, 6h after intervention and 72h after intervention were -0.825, -0.712, 0.394 and 0.463, respectively. The smallest difference was -0.825. Based on the results of 2.014±0.784 in the literature, the overall standard deviation of 0.784 was selected. The estimation equation of the sample sizes of the two groups of measurement data was as follows.

$$n_1 = n_2 = n_3 = 3[(z_\alpha + z_\beta)^2 \sigma^2 / \delta^2]$$

In the equation, $\alpha = 0.05$, $\beta = 0.1$, $z_\alpha = 1.6449$, $z_\beta = 1.2816$, $\sigma = 0.784$, and $\delta = 0.825$. After calculation, $n_1$, $n_2$, and $n_3$ were 23. Due to the need to eliminate approximately 10% of estimated cases, 25 cases were sampled per group.

There were 50 males and 32 females aged between 27 and 79 years with an average age of 59.09±9.22 years. Their body mass index (BMI) ranged from 16.26 to 32.96, with an average value of 24.17±2.07. There were 23 cases of sigmoid colon cancer, 35 cases of left colon cancer (LCC) and 24 cases of right colon cancer (RCC).[10] In accordance with the different methods of perioperative gastric tube treatment in colorectal cancer, the single blind random number table method was applied. The control group (long-term stomach tube indwelling) included 24 patients who were indwelled with stomach tubes before the surgeries and had the stomach tubes removed after postoperative anal exhaust. The study group 1 included 29 patients who were indwelled with stomach tubes before the surgeries and had the stomach tubes removed as soon as they recovered from anaesthesia (4-6h after the surgeries). The study group 2 were the 29 patients who had never been indwelled with stomach tubes throughout the pre-operative period. Informed consent was signed by all patients or their families and this study was approved by the Ethics Committee of The Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University.[11-14]

The inclusion criteria were patients diagnosed through the electronic colonoscopy and pathological diagnosis, and were confirmed by postoperative pathology as colorectal cancer; no symptoms of intestinal obstruction before the surgery; the age ranged from 25 to 80 years, patients who accepted laparoscopic surgery, with concurrent radiotherapy and chemotherapy being feasible before the surgery; both patients and their families gave consent. The exclusion criteria: were patients with severe abdominal adhesions due to past surgeries; large intestine perforation; patients who accepted conversion laparotomy during the surgery and patients who accepted preventive ostomy surgeries due to the intraoperative mal-anastomosis; the length of tumour was greater than 10cm, and had infiltrated the adjacent organs including the uterus, bladder, ureter, small intestine, duodenum, pelvis, and abdominal wall muscles.

**Clinical trial during perioperative period:** The patients in the control group received routine surgical nursing during perioperative period, while patients in the study group 1 and 2 received rapid rehabilitation nursing during perioperative period. All patients in the 3 groups underwent the same regime of providing the medical history, nutritional status and target notification before admission. The study group was given 2 bottles of 500mL enteral nutrient suspension (TP-MCT, Kang Quan Gan) of 1kcal. The patients in the control group received conventional mechanical enema 1 day before surgery and

gastric tube was indwelled. They began fasting 12h before surgery and water was forbidden for 4h before surgery. General anaesthesia was used during the operation and they could carry out appropriate activities on the hospital bed after the surgery. Analgesia pump was used to relieve pain and the patient's pain score was completed by the responsible nurse. One day after surgery, patients were allowed to sit up or move out of bed, but no water was allowed. Two days after surgery, the indwelling catheter was removed, and full liquid diet was given. Activity was increased 3-4 days after operation. The drainage tube was removed 5 to 6 days after surgery. The patient's pain score was completed by the responsible nurse.

In the study group, intestinal preparation was started at noon one day before surgery and oral administration of polyethylene glycol electrolyte was instituted at 1hour, 2hours and 5:00 am on the day of surgery. Diet was forbidden 6hours before the operation, and 500mL of 10% glucose solution was taken orally 2 hours before the operation. The gastric tube was not indwelling during the operation, and high epidural anaesthesia was combined with general anaesthesia. The appropriate activities could be carried out on the sickbed after the surgery, and pain medication was given in advance. Analgesic pump combined with parecoxib sodium was injected intramuscular for 3 days continuously after operation. The indwelling catheter was removed within 24 hours after the operation and sitting up or moving out of bed was allowed. No water intake was permitted, but at least 500mL 10% glucose solution was taken orally every day and the parecoxib sodium was used to relieve pain. Two days after the operation, the patients were allowed out of bed activity. There was no limitation to the amount of water, but at least 500mL of 10% glucose solution had be taken orally every day. Rice soup could be taken orally. Three or four days after surgery, the activity was increased. If there was a drainage tube, it was removed. Five to six days after surgery, patients who met the criteria were allowed to leave the hospital. The patient's pain score was completed by the responsible nurse.

For patients with anastomotic leakage, fasting, anti-infection, nutritional support, drainage tube irrigation, and even proximal ostomy of the transverse colon were applied. Patients with intestinal obstruction underwent fast fluid replacement, and nutritional support. The obstruction was removed through surgery according to the cause. Anti-infective treatment was applied to patients with pulmonary infections. Patients with cough and sore throat were treated with oral care and aerosol inhalation. Patients with nausea and emesis were given antiemetic drugs as appropriate. Those with pulmonary aspiration underwent bronchoscopy and were prescribed phlegm drugs. If hypokalaemia or hyponatraemia was detected, replacement was done with sodium and potassium supplementation. If wound infection was present it was treated with local incision and drainage and enhanced dressing changes.

**Observation indicators of the perioperative period:** In the clinical applications, it was found that indwelling stomach tube would be very painful with many complications, as nausea, emesis, throat pain, cough, lung infection, gastrorrhagia, etc. The general information of the patients included gender, age, tumour location, and pathological stage. The gender and age of the patients were recorded in accordance with the objective indicators obtained when the patients were admitted to the hospital. The location of the tumour was determined according to the results of abdominal phase-3 enhanced computed tomography (CT). The histo-pathological stages of the tumour were determined in accordance with the intraoperative pathological results.

The observation indicators of patients were noted by responsible nurses on observation sheets and included, the period between the time they returned to the ward after surgery and the time of first off-bed activity. This included the time of first anal exhaust (the natural exhaust in non-sleep states) and the first fluid food intake. The off-bed activity $\geq$10min was considered effective for the former and $\geq$20mL for the latter.

The visual analogue scale (VAS) was used for recording postoperative pain was scaled and the analgesia satisfaction was recorded at 6 hours, 12 hours, 24 hours, 48 hours, and 72 hours after the surgery. The pain satisfaction of the patients was assessed by pain control satisfaction questionnaires that surveyed the satisfaction of analgesia management after surgery. Each item was evaluated by a 0-10 numerical rating scale, 0 was not satisfactory and 10 was very satisfactory. The greater the number, the higher the satisfaction.

**Statistical analysis:** The database was built by Microsoft Excel and the statistical analysis was performed by the SPSS 20.0 statistics software. The count data were expressed in the form of N (%) and tested by the $\chi^2$ method or the Fisher Exact Probability Test. The quantitative data in normal distribution were expressed in the form of $x(-)\pm s$ while the group comparisons were tested by t. For quantitative data that did not conform to normal distribution, the group comparisons were tested by the rank sum. The differences of $P<0.05$ were considered statistically significant.

## Results

**Comparative analysis of basic information of patients:** As can be seen from Table, the collection and analysis of data indicated no statistical difference between the basic information of patients in the study group 1, the study group 2 and the control group.

**Analysis of physical condition observation indicators of postoperative patients:** It could be inferred from Figure-1 that the statistical analysis was applied to the collected data to obtain the related histogram of observation indicators of the study groups and the control group. The comparison between the study group

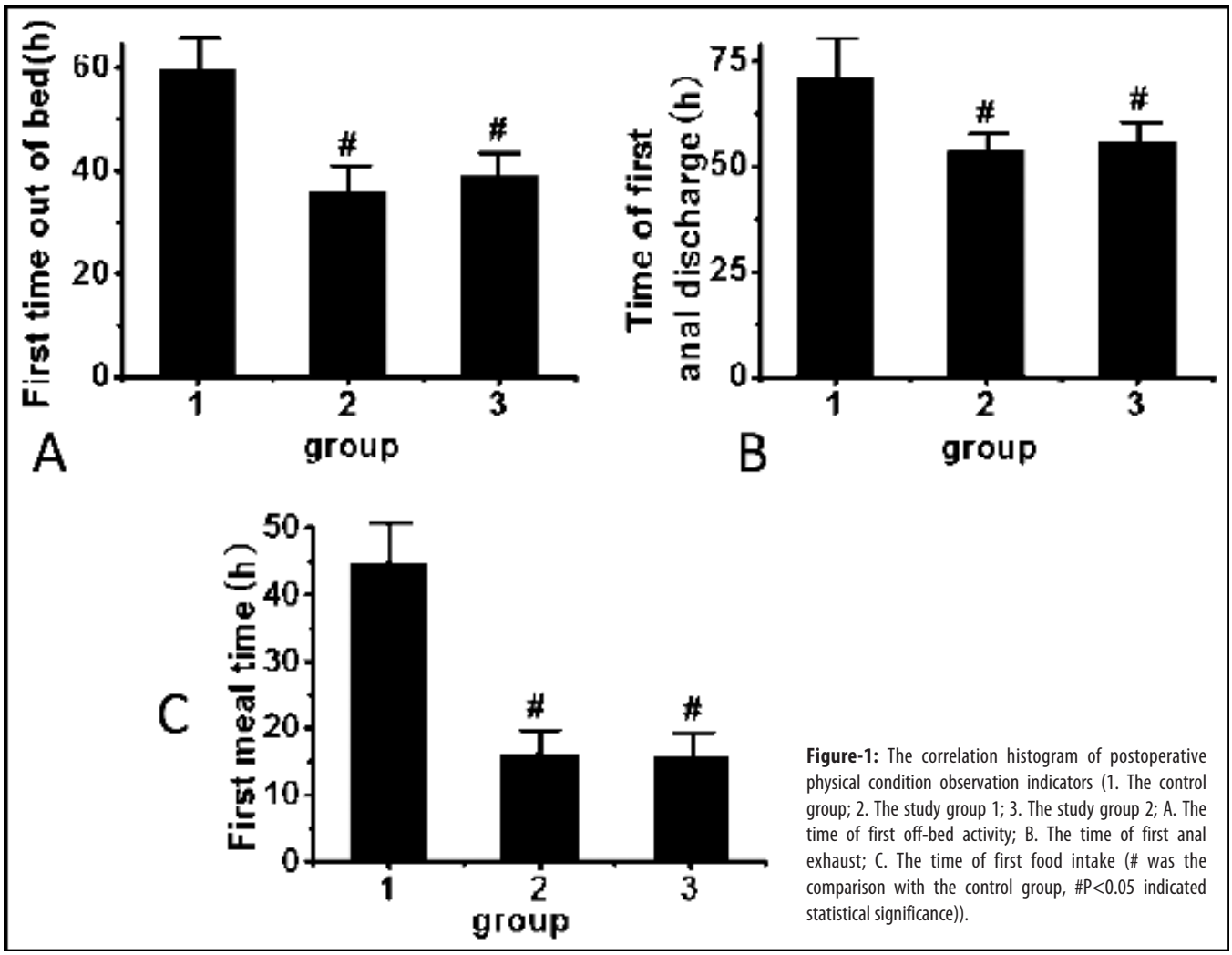


**Figure-1:** The correlation histogram of postoperative physical condition observation indicators (1. The control group; 2. The study group 1; 3. The study group 2; A. The time of first off-bed activity; B. The time of first anal exhaust; C. The time of first food intake (# was the comparison with the control group, #P<0.05 indicated statistical significance)).

**Table:** The comparison of basic information among the observation 1 group, the observation 2 group, and the control group.

| Indicators observed | | The study group 1 | The study group 2 | The control group | P Value |
|---|---|---|---|---|---|
| Sex | Male | 19 (65.51%) | 17 (58.62%) | 14 (58.33%) | 0.798 |
| | Female | 10 (34.48%) | 12 (41.38%) | 10 (41.67%) | |
| Age (years old) | 59.02±8.21 | 60.03±9.32 | 59.98±4.51 | 0.092 | |
| Position of the tumour | Left | 13 (44.83%) | 12 (41.38%) | 10 (41.67%) | |
| | Right | 9 (31.03%) | 8 (27.59%) | 7 (29.17%) | 0.635 |
| | Sigmoid | 7 (24.14%) | 9 (31.03%) | 7 (29.17%) | |
| Neoplasm Staging | I | 13 (44.83%) | 12 (41.38%) | 10 (41.67%) | |
| | II | 9 (31.03%) | 9 (31.03%) | 8 (33.33%) | 0.139 |
| | III | 7 (24.14%) | 8 (27.59%) | 6 (25.00%) | |

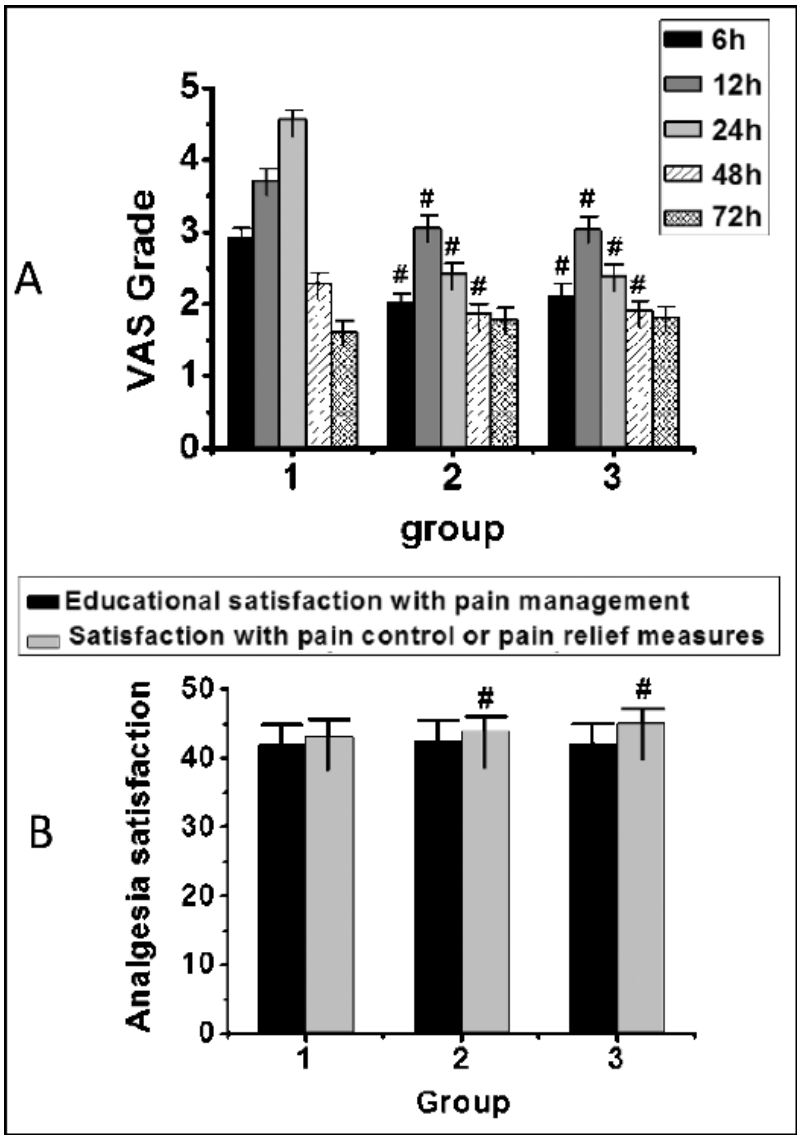


**Figure-2:** The histogram of the pain scale and pain satisfaction of the study groups and the control group (1. The control group; 2. The study group 1; 3. The study group 2; A. The pain scale; B. The pain satisfaction (# was the comparison with the control group, #P<0.05 indicated statistical significance)).

1 and the control group can be inferred in Figure-1A. Their time of first off-bed activity of patients (35.85±7.12h vs 59.76±7.43h) was statistically significant (P<0.05). Similarly, study group 2 also had a statistical difference (38.92±6.37h vs 59.76±7.43h) (P<0.05).

Figure-1B shows the time of the first anal exhaust of patients in both study groups to be significantly earlier compared to the control group. The time period for Group 1 was (53.89±8.57h vs 71.36±4.69h) (P<0.05) and for Group 2 (55.78±5.37h vs 71.36±4.69h) (P<0.05).

Figure-1C describes the time of first food intake after returning to the ward. Both Study Groups 1 and 2 had better results compared to the control group. Group 1 showed (16.30±3.13h vs 44.90±3.65h) (P<0.05) whereas Group 2 showed (15.87±2.49h vs 44.90±3.65h) (P<0.05).

**Postoperative pain scale and pain satisfaction analysis:** The collected data was statistically analysed to obtain the histogram of the pain scale and pain satisfaction of the study groups and the control group, shown in Figure-2. Figure-2A revealed the pain scales of patients in the study group 1, recorded at 6h, 12h, 24h and 48h after the surgery were of statistical significance (P=0.001, P=0.001, P=0.001, P=0.008). The pain scales of patients in the study group 2 recorded at 6 hours, 12 hours, 24 hours and 48 hours after the surgery were also statistically significant (P=0.001, P=0.001, P=0.001, P=0.009). However, the pain scales of patients in both the study group 1 and 2 recorded at 72 hours after surgery indicated no statistical significance. By comparing the study groups and the control group in Figure-2B, the pain satisfaction of patients in both study groups 1 and 2 showed no statistical difference (P=0.499, P=0.349). Nevertheless, the satisfaction on pain control and pain relief of patients in both study groups showed statistical significance (P<0.05).

## Discussion

FTS has been widely applied in the clinical treatment of general surgery, orthopaedics and gynaecology. However, FTS is mainly a rehabilitation unit composed of surgeons, anaesthesiologists, responsible nurses and other personnel. Through their cooperation and mutual assistance, the degree of stress response of patients in perioperative period is minimized, and it is beneficial to promote postoperative rehabilitation of patients.[15,16] Relevant doctors and nurses should conduct psychological intervention in the perioperative period of patients, introduce the characteristics of diseases, prognosis and FTS process in detail for patients and help patients establish a positive treatment attitude. After surgery, patients should be guided to take appropriate exercise and food, and patients should be guided to actively cooperate with the nursing measures of various

treatments. Nursing is responsible for the health of patients and their compliance with daily life. Nursing is an extension of the arm of a health professional and a partner of care and support to help patients through active participation in the rehabilitation process. Nursing is responsible for the diagnosis, life interruption and rehabilitation of patients.[17]

The results of this study showed that there were significant differences in the first time of getting out of bed, the first time of anal exhaust and the first time of eating in the fast-recovery nursing group compared with the conventional nursing group ($P<0.05$). The colon cancer patients perioperative nursing required indwelling gastric tube and the traditional fast for the water. The existing research shows that preoperative gastrointestinal surgery without an indwelling gastric tube is safe and feasible.[18] This was consistent with the results in this study that there was no significant difference in perioperative pain score between patients with or without gastric tube in the observation group. However, the use of traditional mechanical enema will destroy the balance of electrolyte and liquid in the body of patients, resulting in oedema of intestinal wall and prolonging the recovery time of intestinal peristaltic ability of patients after surgery.[19] About 75% of colon cancer patients need to suffer from a large degree of pain after surgery, which can lead to increased heart rate, blood pressure and other complications, delaying the recovery of gastrointestinal function.[20]

While the traditional nursing group relied only on the pain relief according to patients' needs, the observation group provided multi-mode preventive analgesia measures. It was found that VAS scores of patients in the observation group at 6 hours, 12 hours, 24 hours and 48 hours after surgery were all lower than those in the control group. Moreover, the pain control and satisfaction with postoperative analgesia in the observation group were significantly higher than those in the control group. Traditional nursing uses tramadol and other drugs to relieve pain. Although the analgesic effect is strong, it will affect the gastrointestinal function of patients and is not conducive to recovery. Moreover, the administration mode is to give drugs as needed, which will increase the anxiety of patients.[21] The prophylactic analgesic administration can eliminate the pain caused by surgical trauma and increase the comfort of patients.

Multimodal rehabilitation, including preoperative information, reducing surgical stress response, optimizing dynamic pain relief, early mobilization and oral nutrition, can reduce the length of stay, morbidity and rehabilitation of colorectal surgery. In addition, the results of rapid colon surgery showed that the lung, cardiovascular and muscle functions were improved and body components were preserved.[22] The concept of multi-mode perioperative period (fast track operation) can reduce the incidence of general complications after selective colectomy, promote rehabilitation, and shorten the postoperative hospital stay. Some obstacles must be overcome when introducing this new clinical pathway.[23]

## Conclusion

The paper has explored the clinical application of fast-track rehabilitation nursing in the perioperative period of therapeutic laparoscopy of colon cancer patients. As a new surgical nursing mode, fast-track surgery mode has achieved remarkable results in the perioperative application of colon cancer patients. The colon cancer patients were taken as the research object and the patients were divided for traditional routine nursing and rapid rehabilitation nursing during the perioperative period. The results showed that the implementation of rapid rehabilitation nursing can promote the early movement, early anal exhaust, and early eating. In addition, the implementation of rapid rehabilitation nursing can reduce the degree of postoperative pain, increase the satisfaction of postoperative analgesia and accelerate the recovery of patients.

**Disclaimer:** I hereby declare that this research paper is my own and autonomous work. All sources and aids used have been indicated as such. All texts either quoted directly or paraphrased have been indicated by in-text citations. Full bibliographic details are given in the reference list which also contains internet sources. This work has not been submitted to any other journal for consideration.

**Conflict of Interest:** We declare that all contributing authors of this paper have no conflict of interest and all have contributed equally to this research work.

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