Effects of fine nutritional support nursing on the postoperative recovery, nutritional status, and life quality of patients undergoing laparoscopy-assisted colorectal tumor surgery

Yuxiu Pu[a*], Mingying Yang[b], Ke Lin[c], Yueying Tan[d]

Abstract:

Objective: To explore the effects of fine nutritional support nursing on the postoperative recovery, nutritional status, and life quality of patients undergoing laparoscopy-assisted colorectal tumor surgery.

Methods: Patients who underwent laparoscopy-assisted colorectal tumor surgery in our hospital were selected and assigned to a control group under routine preoperative nutritional rehabilitation nursing and a combined experimental group under fine postoperative nutritional rehabilitation nursing using the random number table method, and the nutritional indexes of the two groups before and after surgery were compared.

Results: Before surgery, there was no significant difference in body mass index, albumin content, and contents of other proteins between the experimental group and the control group, and at the 7th day after surgery, the overall nutrition balance index of the experimental group was significantly better than that of the control group during the same period, and the recovery of immune function of the experimental group was significantly faster than that in the control group. In addition, the incidences of adverse reactions and early complications in the experimental group were significantly lower than those of the control group at the 7th day after surgery, and there was significant difference between the two groups in the recurrence rate of local tumor and metastasis rate of distal tumor. However, there was no significant difference between them in the 2-year prognosis.

Conclusion: For patients undergoing laparoscopy-assisted colorectal tumor surgery, refined nutrition management support nursing is beneficial to promoting the postoperative physical recovery of the patients, optimizing their overall nutritional support status, and improving their life quality.

Keywords: Fine nutritional support nursing, laparoscopy-assisted colorectal tumor surgery, postoperative recovery, nutritional status, life quality

Introduction

According to the morality statistics released by the World Health Organization (WHO) every year, in the period from 2006 to the end of 2016, among 17.2 million new patients with early cancer, 8.92 million patients died of cancer, and the male

[a]Department of Gastrointestinal Surgery, The Second Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
[b]Department of Nursing, The Second Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
[c]Operating Room, The Second Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
[d]ICU, The Second Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
*Corresponding Author: Yuxiu Pu
Email: fyx1230@21cn.com

deaths account for 5.04% of all deaths, and female deaths account for 4.26%. The distant metastasis rate of early colorectal cancer was approximate 20%, and effective screening, prevention, and treatment measures for early colorectal cancer do not significantly lower the incidence rate and mortality of early colorectal cancer. Moreover, as time goes on, the death toll for colorectal cancer will probably continue to increase significantly. The incidence of colorectal cancer is different in each country every year, and countries with relatively backward economic development tend to have a high incidence (Siegel et al.,2018). In addition, in the early development and evolution of colorectal cancer, age, heredity, and living environment play critical roles. Early syndrome of hereditary

colorectal cancer mainly includes Lynch syndrome and familial adenomatous polyposis with incidence accounting for about 5% of incidence of early colorectal cancer, and mutyh-associated polyposis (Finlay et al.,2018). It has been found that there are many other risk factors related to chronic colorectal cancer, including ulcerative colitis (Bopanna et al.,2017), crohn's disease (Clarke and Feuerstein,2018), obesity-inducing diet, long-term sedentary daily life (Ahechu et al.,2018), red meat and processed red meat(Nadine et al.,2020), renal transplant-related immunosuppressive drugs (Balhareth et al.,2018), and cholecystectomy(Chen et al.,2020).

In the 1990s, laparoscopy became the alternative to open surgery for rectal and colon lesions (Phillips et al.,1992). Like other alternatives to open surgery, laparoscopy developed into a standard alternative treatment and rehabilitation method for colorectal cancer due to its advantages that it can shorten the hospitalization time, accelerate recovery, significantly reduce the wound infection rate, and effectively alleviate pain (Sheng et al.,2018). In addition, in the process of postoperative nutritional rehabilitation nursing for patients with colorectal cancer, nutrition loss has become a key factor and index for postoperative recovery. Malnourished patients with colorectal cancer need longer postoperative nutritional rehabilitation nursing, so they require longer hospitalization time, and they may suffer from severe complications after surgery during the long hospitalization and even die of them in severe cases (Klek,2013). Due to the excessive consumption of the body, rapid decomposition of collagen in connective tissues, and disorders of water and electrolyte metabolism of cancer patients before surgery for tumor in the body, cancer patients face a significantly higher risk of suffering from complications after surgery, which seriously hinders the postoperative rehabilitation and affects the therapeutic effect on them (Mcclave et al.,2016). Therefore, nutritional rehabilitation nursing is crucial for the postoperative rehabilitation of patients.

In this study, we made an overall evaluation on the effects of fine nutritional support nursing and routine nutritional support nursing on the postoperative nutritional recovery, nutritional life quality index, and survival prognosis of patients with malignant colorectal cancer undergoing laparoscopy-assisted colorectal tumor surgery in two groups, so as to further explore the direct

impact of fine nutritional support nursing on the postoperative recovery, nutritional status, and life quality of the patients.

1 Materials and methods
1.1 Research objects

A total of 105 patients undergoing laparoscopy-assisted colorectal tumor surgery from December 2017 to December 2018 were prospectively analyzed, and divided into an experimental group (n = 60) and a control group (n=45) using the random number table method. The experimental group consisted of 39 males and 21 females between 40 and 81 years old, with an average age of (55.36±2.74) years, while the control group consisted of 27 males and 18 females between 41 and 82 years old, with an average age of (55.70±2.84) years.

1.2 Methods

Patients in the experimental group were given fine nutritional support nursing, while patients in the control group were given routine nutritional support nursing. A scheme of fine nutritional support nursing was developed for patients in the experimental group as follows: (1) A fine nutritional support nursing team was established for the experiment group mainly by a chief surgeon, nurse practitioner and fine nutritionist, and each member of the group was trained in terms of the contents of fine nursing and relevant practical and professional knowledge on nutritional support for patients. The nutritionist was responsible for drawing up a table of nursing intervention for patients undergoing laparoscopy-assisted colorectal tumor surgery, and team members were required to carry out fine nutritional support nursing for each patient in strict accordance with the requirements. (2) A comprehensive nutritional examination and assessment was carried out to each patient at admission and after surgery, respectively, and an individualized and fine nutritional support nursing scheme was developed and carried out strictly for the patient. In addition, nursing staff were arranged to actively communicate with the patient before surgery, explain and introduce knowledge of preoperative nutrition in detail for him/her, actively lead the patient to get familiar with the hospital and the surgery environment, and make a simple introduction about the hospital and environment to relieve the anxiety and other adverse emotions of the patient before surgery. (3) Before surgery: The nursing staff were arranged to give guidance about daily diet to the patient and his/her family members, and provide psychological nursing for the patient, and the staff were also asked to clearly require the patient and his/her families to prepare various foods including milk, protein powder, nutrition homogenate that can enter the gastrointestinal tract for the patient, and require to

the patient to eat in a fixed way 2-3 days before the surgery, so that the patient's stomach and intestine can fully adapt to this diet. Moreover, the nursing staff were arranged to guide the patient in expressing his/her wishes through correct body language and written expression, and require the patient to fast for solids and liquids one day before surgery. Furthermore, various nutrients required for nasal feeding before the surgery were prepared for the patient. (3) During surgery, a gastric tube was inserted into each patient through vein at 1 h before surgery to establish a venous channel for gastric tube insertion. (4) After surgery, first gastrointestinal intubation was carried out to each patient according to scientific and conventional methods, and enteral rehabilitation nutrition support was given to the patient according to planned steps. The nursing staff were arranged to observe the enteral nutrition status of the patient and the complications of him/her that may occur during treatment, such as intestinal intolerance. At 2-6 days after surgery, the nursing staff were arranged to carefully evaluate the intestinal tolerance of the patient, properly adjust the dosage of nutrient solution, and timely treat adverse reactions on the patient, and the nursing staff were also arranged to instruct the patient to take more intensive rehabilitation training and postoperative

exhaust, and develop a diet plan for the patient. At the 7th d after surgery, the nursing staff were arranged to develop a diet and rehabilitation plan for the patient after discharge.

1.3 Outcome measures

The body mass of the two groups of patients before nursing and at the 7th day after surgery were compared, and 5 mL fasting venous blood was sampled from each patient, and stored in heparin-containing anticoagulant tubes. The sampled blood was centrifugated to take serum, and the levels of albumin, transferrin, retinol binding protein, prealbumin, and hemoglobin in the serum were determined using an automatic biochemistry analyzer (TBA-40FR, HITACHI). In addition, the levels of three important factors of stress response and immune regulation (interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α), and C-reactive protein (CRP)) in the serum were determined. Postoperative complications, recurrence rate of local tumor, metastasis rate of distal tumor, and prognosis of the two groups were evaluated, and the life quality of the two groups was evaluated using the EORTC colorectal cancer-specific quality of life questionnaire module (QLQ-CR38)(Kong et al.,2012).

Table 1. **General data**

	Experimental group (n=60)	The control group (n=45)	χ^2/t	P-value
Sex			0.2753	0.5998
Male	39 (65)	27 (60)		
Female	21 (35)	18 (40)		
Age	55.36±2.74	55.70±2.84	0.6194	0.5370
BMI	22.30±2.35	21.92±2.46	0.8037	0.4234
TNM staging			0.2340	0.8896
Stage I	8 (13.33)	5 (11.11)		
Stage II	36 (60.00)	29 (64.44)		
Stage III	16 (26.67)	11 (24.45)		
Alcohol abuse history			0.2357	0.6273
Yes	20 (33.33)	13 (28.89)		
No	40 (66.67)	32 (71.11)		
Smoking history			0.3090	0.5783
Yes	19 (31.67)	12 (26.67)		
No	41 (68.33)	33 (73.33)		
Complications (diabetes mellitus or hypertension)			0.1094	0.7409
Yes	15 (25)	10 (22.22)		
No	45 (75)	35 (77.78)		
SDS score before nursing	55.35±8.21	53.56±8.93	1.0647	0.2894
SAS score before nursing	58.14±9.15	56.52±9.02	0.9033	0.3685

1.4 Statistical analysis

Experimental data were expressed as the mean± standard deviation from at least three independent

experiments, and statistically analyzed using SPSS 18.0 (SPSS Inc, Chicago, IL, USA). Data comparison between groups was carried out using the t test. Enumeration data were analyzed using the chi-square test, and effects on the prognosis of patients with colorectal cancer were analyzed using the Kaplan-Meier method. $P<0.05$ indicates a significant difference. Data were visualized into figures using GraphPad Prism 5.

2. Results
2.1 Comparison of nutritional status between the two groups before and after surgery

The comparison of basic body mass and nutritional status between the experimental group and the control group before surgery and at the 7th day after surgery preliminarily revealed that before surgery, there was no significant difference between the two groups in basic body mass and various nutritional indexes, which were highly comparable, while at the 7th day after surgery, the experimental group nursed under the fine nutritional support nursing mode experienced significantly less body mass loss and showed significantly better nutritional indexes than the control group.

Table 2. **Changes of nutritional indexes in the two groups before and after surgery**

		The experimental group (n=60)	The control group (n=45)	χ^2/t	P-value
Body mass	Before surgery	59.7±1.3	59.1±1.2	2.4181	0.0173
(kg)	After surgery	58.2±1.0	56.5±1.1	8.2581	<0.0001
Albumin	Before surgery	39.5±3.9	39.2±3.8	0.3944	0.3941
(g/L)	After surgery	35.6±4.5	33.7±3.6	2.3275	0.0219
Prealbumin	Before surgery	201.6±27.9	204.1±28.9	0.4475	0.6555
(mg/L)	After surgery	195.2±20.2	159.3±16.2	9.7891	<0.0001
Hemoglobin	Before surgery	132.1±19.6	133.1±21.5	0.2482	0.8045
(g/L)	After surgery	130.2±20.1	116.2±15.9	3.8534	0.0002
Transferrin	Before surgery	1.91±0.48	1.92±0.31	0.1219	0.9032
(g/L)	After surgery	1.90±0.35	1.51±0.26	6.2839	<0.0001
Retinol binding	Before surgery	32.3±8.1	31.2±7.9	0.6959	0.4880
protein (mg/L)	After surgery	31.2±7.1	25.2±6.5	4.4416	<0.0001

2.2 Comparison of inflammatory stress indexes between the two groups before and after surgery

Before surgery, there was no significant difference in inflammatory stress indexes (TNF-α, IL-6, and CRP) between the two groups, while at the 7th day after surgery, the levels of the three indexes in the control group were significantly higher than those in the experimental group (all *P*<0.01).
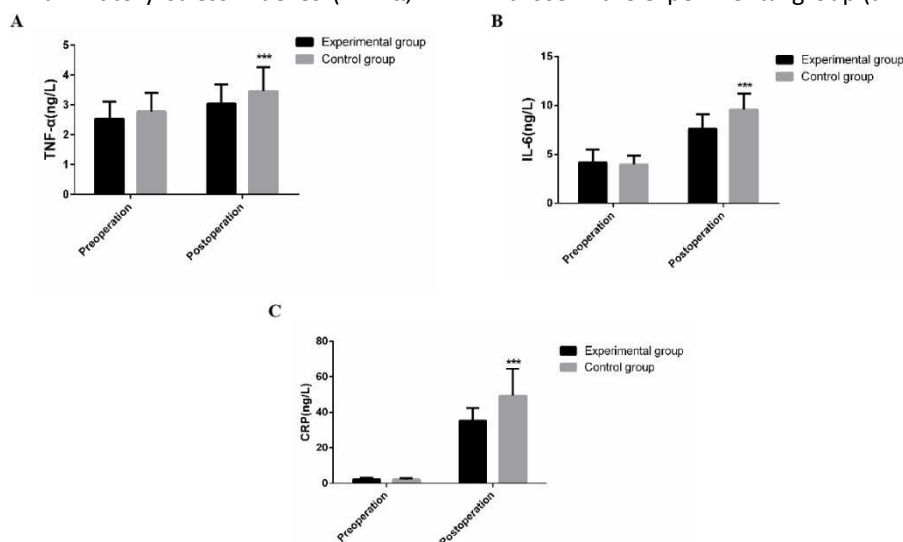

Figure 1. **Changes of inflammatory stress indexes between the two groups before and after surgery**

2.3 Comparison of postoperative recovery-related indexes between the two groups

Patients in the experimental group who had undergone long-term fine nutritional support nursing experienced significantly faster

postoperative recovery than those in the control group. The first time of exhaust, defecation, and eating after surgery of the experimental group was

significantly earlier than that of the control group, and the experimental group experienced

significantly earlier time of getting out of bed for the first time and significantly shorter hospitalization time than the control group. In addition, the comprehensive scores of life quality and postoperative nutrition recovery of the experimental group were significantly higher than those of the control group.

Table 3. **Comparison of postoperative recovery-related indexes between the two groups**

	First exhaust time (h)	First defecation time (h)	First eating time (h)	Time of getting out of bed for the first time after surgery (h)	Hospitaliz ation time (d)	Life quality score
The experimental group (n=60)	53.2±13.5	67.3±16.2	47.3±10.2	21.2±3.51	15.5±2.12	17.8±1.25
The control group (n=45)	68.9±14.9	82.3±20.3	61.3±12.3	30.3±5.62	25.3±6.25	14.1±2.12
χ^2/t	5.6403	4.2104	6.3696	0.1041	9.0124	13.1192
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

2.4 Comparison of postoperative adverse reactions and scores between the two groups

The incidences of adverse reactions and complications in the experimental group were lower than those in the control group, and the self-

rating depression scale (SDS) score and self-rating anxiety scale (SAS) score of both groups were decreased after surgery, and the decrease in the experimental group was more significant than that in the control group.

Table 4. **Comparison of postoperative adverse reactions and scores between the two groups**

	Urinary retention	Aspiration pneumonia	Hypoprotei nemia	Incision infection	Pain	Abdominal distension and vomiting	SDS score	SAS score
The experimental group (n=60)	1 (1.67)	3 (5)	4 (6.67)	1 (1.67)	6 (10)	2 (3.34)	43.6±7.06	45.6±7.02
The control group (n=45)	5 (11.2)	9 (20)	10 (22.2)	6 (13.3)	11 (24.4)	8 (17.8)	50.1±7.35	52.3±7.52
χ^2/t	4.257	5.716	5.544	5.625	3.954	6.226	4.587	4.694
P-value	0.039	0.017	0.019	0.018	0.047	0.013	<0.0001	<0.0001

2.5 Recurrence rate and prognosis analysis of the two groups

As shown in Figure 2, there was no significant difference in the recurrence rate of local tumor and metastasis rate of distal tumor between the two groups within one year of follow-up, but the

recurrence rate and metastasis rate of the experimental group were significantly lower than those in the control group within two years of follow-up. However, there was no significant difference in overall survival rate between the two groups.
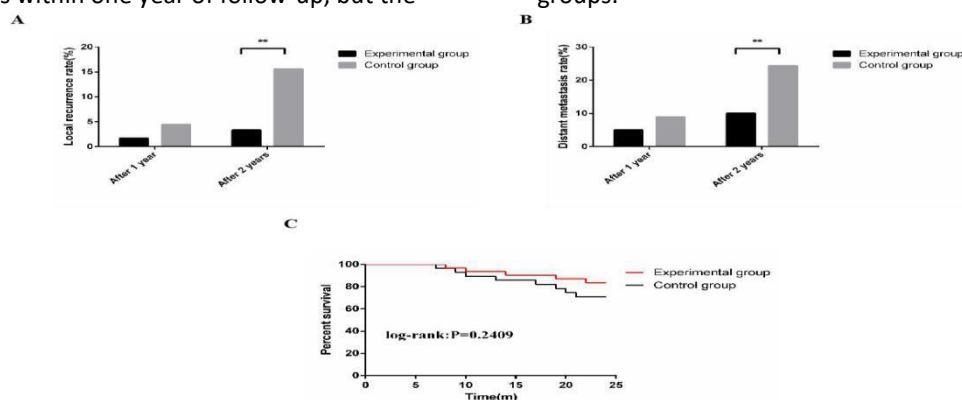
Figure 2. **Analysis of the prognosis about distal metastasis of the two groups**

Discussion

At present, the main effective clinical treatment for recurrent colorectal cancer is still surgical operation at an early stage. According to practice

research guidelines, preoperative nutritional support and prevention of risk factors should be carried out for cancer patients who will receive surgical operation so as to effectively reduce the risk of recurrence due to malnutrition(Arends et al.,2017; Weimann et al.,2017). Therefore, for patients with colorectal cancer, we should provide preoperative nutritional support and carry out risk screening to ensure appropriate nutrition of them and find risk factors as early as possible, which can effectively lower the risk and incidence of postoperative adverse reactions and postoperative complications of cancer patients, improve the success rate of surgical treatment and the quality of postoperative life of the patients, and can also effectively lift the satisfaction of the patients towards postoperative nursing(Manabu et al.,2019; Lin et al.,2017).

In this study, we adopted fine nutritional nursing and routine nutritional nursing to two groups of colorectal cancer patients, respectively, and analyzed the nutritional indexes, number of complications, incidence of complications, and prognosis of rehabilitation treatment of the two groups. According to the results of statistical analysis of data, the levels of nutritional indexes including albumin, hemoglobin, CRP, transferrin, and retinol binding protein in the experimental group nursed under fine nutritional support nursing were significantly better than those in the control group nursed under routine nursing, indicating that the nutritional status of the experimental group was good. In addition, the levels of inflammatory stress indexes including TNF-α, IL-6, and CRP in the experimental group were significantly lower than those in the control group, indicating that the fine nutritional support nursing improved the immune function of the patients, and reduced the stress response of the body. Moreover, the recurrence rate of local tumor and metastasis rate of distal tumor of the experimental group were significantly lower than those of the control group, but there was no significant difference between the two groups in prognosis. Nutritional status is a key predictor of postoperative recurrence rate and mortality(Wang et al.,2018). Cancer patients are unable to cope with tissue damage due to immune system damage and slow healing. Blood loss, systemic inflammatory reaction, and malnutrition all lead to anemia, increase of CRP, and decrease of albumin(Egenvall et al.,2017). Fine nutritional

support nursing can improve the immune ability of malnourished patients, increase the blood flow in gastrointestinal tract of the patients, stimulate the intestinal endocrine system, promote gastrointestinal peristalsis, and maintain the integrity and functionality of gastrointestinal mucosa, accelerate gallbladder contraction, thus further promoting intestinal absorption of nutrition and reducing the incidence of hepatobiliary complications, so it is beneficial to postoperative recovery (Kumpf,2006). In early enteral nutrition support, nutrients will be absorbed by gastrointestinal tract and transported to the liver, during which blood circulation of the hepatic venous system will be promoted, thus promoting metabolism and protein synthesis of the body(Sakine et al.,2016). In terms of postoperative infection, enteral nutrition support can effectively maintain the structural integrity of intestinal mucosa and protect its barrier function, thus inhibiting the growth and reproduction of bacteria and reducing the possibility of infection. Some studies have shown that serum albumin level can also be adopted as one of the prognostic indicators for colorectal cancer patients, but because serum albumin is synthesized in the liver, its level is not only affected by nutritional status, but also affected by liver function (Shibutani et al.,2016). In addition, previous studies have suggested that fine nutrition support nursing can improve the life quality of patients after surgery (Vashi et al.,2014), which is also verified in our study.

In general, for patients undergoing laparoscopy-assisted colorectal tumor surgery, fine nutritional support nursing can accelerate postoperative recovery, optimize nutritional status, reduce the incidence of postoperative complications, improve the postoperative life quality, and enhance the postoperative immunity, so it is worthy of clinical application.

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