

# Effects of high quality nursing combined with fat emulsion parenteral nutrition support on nutritional status and lipid metabolism of elderly colon cancer patients

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**Abstract.** Colon cancer has become a significant risk factor for human health. In this study, we demonstrated that high-quality nursing combined with fat emulsion parenteral nutrition support can significantly improve the nutritional status and lipid metabolism of elderly patients with colon cancer. The incidence of hunger and thirst in the observation group was significantly lower than that in the control group. After the operation, the time of exhaust, defecation, feeding and hospitalization in the observation group were significantly shorter than those in the control group. Serum levels of pre-albumin and albumin, triglyceride, cholesterol and complication rate in the observation group were significantly lower than those in the control group.

**Key words:** High-quality nursing; fat emulsion; nutrition status; lipid metabolism

## Introduction

Colorectal cancer is the third most common cancer in males and females in the United States after prostate cancer in male and breast and lung cancer in females (1). Of all colorectal cancers, approximately 41% occur in the proximal colon, approximately 22% in the distal colon, and 28% in the rectum (2). Although environmental and genetic factors play an essential role in the development of colon cancer, a large number of studies have shown that nutrition may play a causal and protective role in the development of colon cancer (3). Due to the special physiology of the elderly and the high consumption of tumors, elderly patients with colon cancer will have different degrees

of malnutrition before and after surgery. The high metabolic state of the body during surgical trauma will worsen malnutrition and affect the postoperative restore. Therefore, nutritional support is essential for the rehabilitation of colon cancer. Parenteral nutrition (PN) support therapy is one of the significant advances in modern surgery in the last 30 years (4, 5). Fat emulsion is currently considered to be an ideal intravenous preparation, containing essential fatty acids (essential fatty acids, EFA) providing enough calories for the body. It also provides biofilms and polyunsaturated fatty acids required for the metabolism of biologically active substances. Moreover, it has nitrogen saving effect on the body, and it also has the advantages of improving the nutritional status of perioperative patients,

improving the operation rate, reducing complications, dissolving fat-soluble vitamins, and preventing liver steatosis. Currently, it has been routinely used as the composition of PN in clinical practice (6, 7).

At present, the preferred treatment for colon cancer is surgical resection (8). However, there are many complications in patients after surgery, among which the quality of life of patients is seriously affected by gastrointestinal dysfunction of different degrees (9) or poor nutritional status (10). Therefore, the quality of clinical nursing is crucial for patients after the operation. High-quality nursing provided patients to improve desired health outcomes. Compared to normal nursing, high-quality care is the extent to which health care services provided to individuals and patient populations improve desired health outcomes. In order to achieve this, health care must be safe, effective, timely, efficient, equitable and people centered. Scientific and reasonable postoperative nursing interventions can improve the clinical effect, shorten the treatment time, and have essential value for improving the gastrointestinal function of patients after the operation.

In this study, we aimed to investigate the effect of high-quality nursing combined with fat emulsion parenteral nutrition support on nutritional status and lipid metabolism of elderly colon cancer patients.

## Materials and Methods

### *General information*

A total of 226 elderly patients with colon cancer admitted to our hospital from 2017 to 2019 years were selected, including 91 male and 135 female patients with an average age of 65.7 years. There were 75 cases of rectal cancer (46 cases of Miles operation and 29 cases of Dixon operation), 60 cases of ileocecal carcinoma and 42 cases of ascending colon cancer (all underwent right hemicolectomy), 35 cases of transverse colon cancer (all underwent radical resection of transverse colon cancer), 8 cases of flexural carcinoma of the colon and 6 cases of sigmoid cancer (all underwent left hemicolectomy). Preoperative intestinal preparation of all patients was carried out according to the routine. That is, three days before the operation, low-residue

diet, oral administration of intestinal antibiotics and liquid paraffin, intramuscular injection of vitamin K1, enema one time every night, oral administration of senna on the day before the operation, and postoperative night and morning intestinal lavage. All the patients had without hyperlipidemia, diabetes mellitus, severe infection, shock, and other severe complications before the operation, and no abnormal liver function and other biochemical indicators before the operation. Preoperative diagnosis was confirmed by fiber colonoscopy and pathological biopsy. The patients were randomly divided into the control group and the observation group. The Control group consists of 113 cases, including 75 male cases, 38 female cases. The age was  $66.8 \pm 4.8$  years. The observation group consists of 113 cases, male 60 cases, female 53 cases. The age was  $64.5 \pm 4.1$  years. There was no significant difference in age, gender composition, preoperative nutritional status, and lipid metabolism between the two groups, which is comparable.

### *Nursing methods*

Patients in the control group received routine nursing interventions, mainly including analgesia, hemostasis, health education, routine nutrition support, etc. Vital signs are monitored according to the doctor's advice and give nursing care, such as fasting and infusion.

Patients in the observation group received quality nursing based on routine nursing interventions. Health education was conducted after the diagnosis and before the operation, and the knowledge of diseases and operation was introduced to the patients. The patient's vital signs were monitored every 30 minutes after the operation to prevent infection and observe drainage and nursing work. To prevent venous thrombosis, nurses position the patient's limbs. In order to make the patient's peritoneal exudate flow out smoothly, the nursing staff assisted the patient in the semi-sitting and lying position. At the time of discharge, patients were given ostomy care and dietary guidance.

### *Parenteral nutrition support methods*

Patients were given PN support with 30% intralipid (IL) fat emulsion, provided by warui pharma-

ceutical co., LTD. (SSPC). Patients in the observation group received PN support treatment on the first day after surgery. Subclavian venipuncture or peripheral venipuncture was performed on the first day of surgery, and the continuous and uniform infusion was performed 1 to 7 days after surgery. Fat emulsion formula includes 50% glucose, 30% fat emulsion, 7% compound amino acid, trace elements, etc. Insulin was added to the nutrient solution at the rate of 1IU/5g glucose.

### Monitoring items

Fasting venous blood was collected from the two groups one day before surgery, three days after surgery, and seven days after surgery in the morning. After centrifugation, it was detected by an automatic blood biochemical analyzer. Nutritional status indicators: serum albumin (ALB) and pre-albumin (PALB). Blood lipid indexes: triglyceride (TG), cholesterol (CHOL), apolipoprotein A (apoA), and apolipoprotein B (apoB) and their ratio (apoA: apoB).

### Statistical methods

SPSS22.0 was used to analyze and process the data. The measurement data conformed to the normal distribution were expressed in  $\bar{x} \pm s$ . The enumeration data were expressed in % using the  $\chi^2$  test.  $P < 0.05$  was considered statistically significant.

## Results

### Comparison of general indicators before and after surgery between the two groups

On the day of operation, more patients in the observation group performed normally. The incidence of hunger and thirst in the observation group was much lower than that in the control group (19.47% vs 44.25% and 11.50% vs 36.28%, respectively. Figure 1). After the operation, the duration of exhaust, defecation, eating, and hospitalization in the observation group were significantly shorter than those in the control group ( $P < 0.01$ ), indicating the combination of

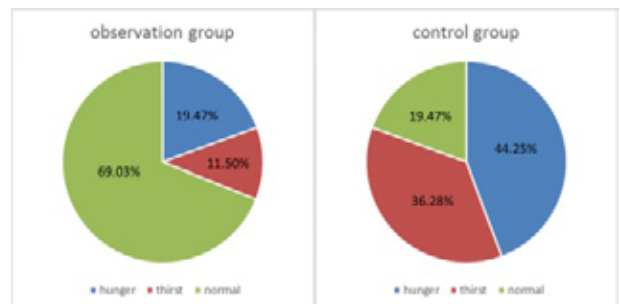
high-quality nursing and fat emulsion parenteral nutrition support significantly improved the recovery of patients (Table 1).

### Comparison of serum nutritional indexes between the two groups before and after surgery

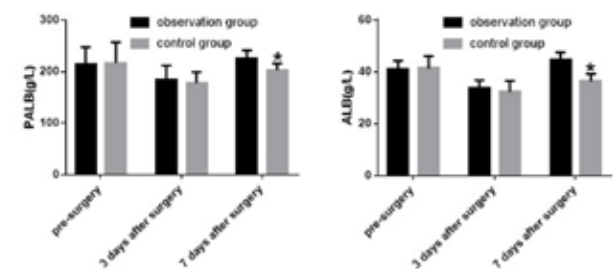
As shown in Figure 2 and Table 2, before the operation and three days after the operation, the serum pre-albumin and albumin maintain similar levels between the two groups ( $P > 0.05$ ). On the 7th day after the operation, both pre-albumin and albumin levels in the observation group were significantly higher than those in the control group ( $P < 0.05$ ), suggesting the long-term application of high-quality nursing and fat emulsion parenteral nutrition support significantly increase pre-albumin and albumin levels.

### Comparison of lipid metabolism before and after operation between the two groups

Before the operation, the levels of triglyceride, cholesterol, apolipoprotein A, and apolipoprotein B remained similar in two groups ( $P < 0.05$ ). After the



**Figure 1.** Incidence of hunger and thirst of control and observation group.

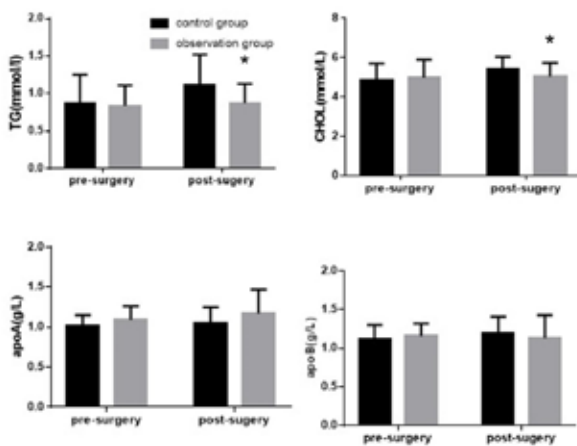


**Figure 2.** Comparison of serum PALB(A) and ALB(B) before and after operation between the two groups. \* refers to  $P < 0.05$ .

operation, no significant differences of apolipoprotein A and apolipoprotein B levels were observed between the two groups ( $P>0.05$ ). However, levels of triglyceride and cholesterol were significantly lower in the observation group compared to the control group ( $P<0.05$ ) (Figure 3).

#### *Comparison of postoperative complications between the two groups*

As shown in Figure 4, the complication rate in the observation group was 5.31% (6/113), including two and four cases of incision infection and pulmonary infection, respectively. The proportion was significantly lower than that the control group (21.24%, 24/113), with ten, seven, and seven cases of incision infection, pulmonary infection, and intestinal obstruction, respectively.



**Figure 3.** Comparison of TG(A), CHOL(B), apoA(C) and apoB(D) level before and after operation in two groups. \* refers to  $P<0.05$ .



**Figure 4.** Postoperative complications were compared between the two groups.

## Discussion

Colon cancer has become a significant risk factor for human health. In 2017, the number of colorectal cancer cases in the United States was 135,430, and 50,260 people died from colorectal cancer (11). Due to effective screening measures, early intervention and better treatment options, the mortality rate of colorectal cancer decreased by about 35% from 1990 to 2007. The current mortality rate has been reduced by about 50% compared with the highest rate (12). However, colon cancer still deserves people's attention and concern. In recent years, due to the aggravation of population aging, the number of elderly patients with colon cancer complicated with various complications has increased (13). At present, the primary approach of clinical treatment of colon cancer is surgical treatment. However, due to the apparent decline of various body functions in the elderly, as well as worries about diseases and treatment results, more complications are likely to occur, so more high-quality nursing and nutritional support methods are needed (14, 15).

The carbohydrate can provide the body with the necessary energy, but the long-term use of monosaccharide intravenous injection has the risks of insulin secretion disorders, abnormal glucose metabolism, and liver fatty degeneration. The fat emulsion is currently considered to be an ideal intravenous preparation that provides energy and essential fatty acids. Its functional characteristics include high-calorie content and is suitable for patients with limited fluid intake. It can provide collectively necessary fatty acids and triacylglycerol. It is beneficial to the absorption of fat-soluble vitamins and reduces the oxidation of fat-soluble vitamins. Moreover, it exhibited no diuretic effect. The fat emulsion can provide essential fatty acids and energy for patients with colon tumors. The postoperative humoral immune function has an improvement effect. On the one hand, it may be rich in a large amount of biologically active  $\alpha$ -tocopherol, which can effectively reduce lipid peroxidation and inflammatory factor production, reduce the inflammatory response, and regulate immune response. It can not inhibit the function of lymphocytes in vitro, and can selectively participate in the regulation of immune response, maintain

the body's immune function, and reduce the incidence of postoperative infectious complications.

In this study, patients in the observation group were given quality care and parenteral nutrition support with fat emulsion. Studies have shown that quality nursing intervention for patients undergoing radical resection of colon cancer can effectively improve nursing satisfaction (16). Many studies have shown that preoperative TPN has no benefit. Thompson et al. (17) conducted a prospective randomized trial of preoperative TPN in patients with gastrointestinal tumors. The average of 5 days before surgery was TPN. In the control group, 20 patients had no weight loss. There was no significant difference in the incidence of postoperative complications between the two groups. However, studies have found that the ability to provide nutrients through parenteral nutrition (PN) significantly improved the prognosis of intestinal failure in infants (18, 20). In this study, parenteral nutrition after colon cancer reduced the incidence of hunger and thirst on the day of surgery ( $P < 0.05$ ). This is related to the improvement or postoperative water-electrolyte disorder (21, 22). Parenteral nutrition support of fat emulsion improved electrolyte disorder and relieving thirst symptoms in patients (23-25).

Albumin and pre-albumin can be used as indicators to measure the nutritional status of the body (26, 27). In this study, serum levels of pre-albumin and albumin in the observation group 7 days after surgery were significantly higher than those in the control group. Besides, the levels of triglyceride, cholesterol, and complication rate in the observation group were significantly lower than those in the control group, which also sufficiently indicated that the lipid metabolism in the observation group was improved (28-30). In summary, high-quality nursing combined with fat emulsion parenteral nutrition support can significantly improve the nutritional status and lipid metabolism of elderly colon cancer patients.

In addition, the levels of triglyceride, cholesterol, and complication rate in the observation group were significantly lower than those in the control group, which also sufficiently indicated that the lipid metabolism in the observation group was improved (28-30). However, serum apoA and apoB levels did not change significantly. The ratio of serum apoA to apoB can re-

flect the expression level of apolipoprotein in the body, and can also be used to judge and predict cardiovascular diseases, which has essential diagnostic and preventive significance. In this study, there was no significant difference in serum apoA and apoB levels, suggesting that quality care combined with fat emulsion parenteral nutrition support did not affect the incidence of postoperative cardiovascular disease in colon cancer patients.

In summary, high-quality nursing combined with fat emulsion parenteral nutrition support can significantly improve the nutritional status and lipid metabolism of elderly colon cancer patients and reduce complications. The impact of the current study will not be limited to colon cancer, as the results have a broader significance, and this study provides the foundation and reference for high-quality nursing combined fat emulsion parenteral nutrition support on other diseases.

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