

Original Article

Application value and effect of comprehensive nursing intervention on tumor metastasis and postoperative and nosocomial infections in patients with colorectal cancer

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Received June 21, 2018; Accepted July 23, 2018; Epub December 15, 2018; Published December 30, 2018

Abstract: To assess the application value and effect of comprehensive nursing intervention on tumor metastasis and postoperative and nosocomial infections in patients with colorectal cancer. We retrospectively analyzed 204 patients with colorectal cancer, and 115 and 89 patients were included in the observation and control groups, respectively. Patients in the control group were given routine nursing care, whereas those in the observation group were given comprehensive nursing intervention based on routine nursing care. The occurrence of nosocomial infections, duration of antibiotic use, infection elimination time, incidence of complications, and tumor metastasis in the two groups were recorded. The WHOQOL-BREF was adopted to evaluate the quality of life of the patients after the intervention and to assess the satisfaction of all patients. The incidence of nosocomial infection was significantly lower in the observation group than in the control group ($P < 0.05$). The infection elimination time, incidence of complications, and duration of antibiotic use were significantly lower in the observation group than in the control group ($P < 0.05$). The WHOQOL-BREF scores and total satisfaction scores were significantly higher in the observation group than in the control group after the intervention. The satisfaction of patients was significantly higher in the group than in the control group ($P < 0.05$). Comprehensive nursing intervention can effectively reduce the incidence of nosocomial infection in patients, shorten the infection time, reduce the incidence of complications, effectively improve patient nursing satisfaction, and enhance the quality of life of patients and thus is worthy of clinical promotion.

Keywords: Comprehensive nursing intervention, colorectal cancer, nosocomial infection, tumor metastasis, quality of life score

Introduction

Colorectal cancer (CC) is the third most common malignant tumor in the world. Studies have shown that [1] > 1.2 million people are diagnosed with CC each year and that > 600,000 people die indirectly or directly from CC. The death rate is 8%, which is the fourth highest for malignant tumors. A survey shows that [2, 3] the incidence of CC in the world and the death toll from CC are gradually increasing, and the improvement of living standards and changes in eating habits may be the main reasons for this increase. However, there are no obvious clinical features in the early stages of CC, and there is a lack of effective detection methods. Most patients are admitted to the hospital for advanced disease owing

to late diagnosis. This seriously threatens the life and health of patients [4]. With the advancement of medical diagnostic techniques, the early diagnosis of CC is becoming more feasible through the improved detection rate of CC by imaging examination. The 5-year survival rate can be significantly improved by early treatment [5, 6].

With regard to the treatment of early stage CC, surgical treatment remains the main method [7]. Through the direct removal of the lesion, the condition of the patient is improved [8]. With the clinical development of laparoscopic techniques, these techniques are expected to replace traditional surgical methods. Compared with traditional surgery, laparoscopic techniques are characterized by less trauma,

Comprehensive nursing intervention in patients with colorectal cancer

less bleeding, and faster recovery and have gradually gained acceptance in CC radical resection [9, 10]. However, inappropriate postoperative nursing easily causes infection, possibly leading to open incisions in patients, and can even increase the patient's treatment time and economic burden on the patient's family. This will cause a variety of complications, thereby threatening the health of patients. Comprehensive nursing is a nursing method that standardizes the nursing program to greatly improve the level of nursing therapy [11]. Tumor metastasis is a common feature of malignant tumors. Controlling metastasis can help improve the prognosis of patients' tumors and reduce patient mortality. Studies have shown [12] that there is a significant improvement in the condition of patients with cancer through comprehensive care, although it is unclear whether there is affects the patient's tumor metastasis.

Therefore, in this study, we assessed the effect of comprehensive care on postoperative infection and tumor metastasis in patients with CC, providing a more scientific approach for clinical treatment and care.

Materials and methods

In this study, data of 204 CC patients admitted to Qianfoshan Hospital of Shandong Province were collected. The patients were divided into a control group and an observation group according to the method of care received. The 115 patients in the observation group comprised 62 men and 53 women, aged 45-78 years, with a mean age of 54.5 ± 8.1 years. The 89 patients in the control group comprised 49 men and 40 women, aged 52-81 years, with a mean age of 55.2 ± 7.2 years. All patients were diagnosed as CC patients through tissue biopsy. Clinical staging of patients was performed according to the AJCC published in 2010. This study was approved by the Medical Ethics Committee of Qianfoshan Hospital of Shandong Province. Both patients and their family members were informed about the study, and they provided signed informed consent. Every procedure was approved by the medical ethics committee of Qianfoshan Hospital of Shandong Province and was in conformity with the guidelines of National Institute of Health (No81004).

Eligibility criteria

Patients were selected based on the following inclusion criteria: patients did not have any relatives also enrolled in the study, had no family history of genetic disease, congenital defects and other diseases, did not undergo preoperative chemoradiotherapy, could cooperate with treatment and follow-up, and had complete clinical data.

Patients were excluded based on the following exclusion criteria: patients were < 18 years of age, were suffering from autism, memory impairment, hearing impairment, or an acquired disability, had preoperative cancer metastasis, or were suffering from an immunodeficiency disease.

Nursing method

The control group was administered routine perioperative care intervention, as follows: the patient's condition was observed every hour. According to the patient's condition, vital signs were measured. According to the doctor's advice, treatment and medication were administered. The patient's wound was kept clean and sterile, and cleaned up when bleeding occurs.

The observation group was administered comprehensive nursing based on the routine care administered to the control group, as follows: as part of preoperative care, disease knowledge was imparted to the patient, close communication was kept with the patient to understand the patient's thoughts and to address the patient's concerns, medical and surgical common sense was popularized, and the patient was informed of the surgical procedures and safety. As most patients have little knowledge of the disease, they will usually have negative emotions such as fear, anxiety, and palpitation, and as such, treatment compliance is low. Cathartic drugs were administered 1 day before the operation, enema was performed before and on the day of surgery, and amino acid intake was supplemented for patients with poor health. As part of intraoperative care, the operating room environment was comfortable to reduce the patient's anxiety during the operation, the patient's posture was ensured correct, and the patient's blood pressure, heart rate and vital signs were monitored for changes. As part of postoperative care, when the

Comprehensive nursing intervention in patients with colorectal cancer

Table 1. Clinical data of the two groups of patients [n (%)]

Group	Observation group (n=115)	Control group (n=89)	t/X ²	P value
Sex			0.026	0.871
Male	62 (53.91)	49 (55.06)		
Female	53 (46.09)	40 (44.94)		
Age (year)	54.5±8.1	55.2±7.2	0.642	0.522
BMI (kg/m ²)	21.6±1.3	21.9±1.5	1.528	0.128
Smoking history			0.026	0.871
Yes	62 (53.91)	49 (55.06)		
No	53 (46.09)	40 (44.94)		
Drinking history			1.684	0.194
Yes	25 (21.74)	13 (14.61)		
No	90 (78.26)	76 (85.39)		
History of hypertension			0.046	0.830
Yes	89 (77.39)	70 (78.65)		
No	26 (22.61)	19 (21.35)		
Diabetes history			2.891	0.089
Yes	55 (47.83)	32 (35.96)		
No	60 (52.17)	57 (64.04)		
TNM staging			0.002	0.961
I	50 (43.48)	39 (43.82)		
II	65 (56.52)	50 (56.18)		
Type of cancer			0.014	0.906
Colon cancer	72 (62.61)	55 (61.80)		
Rectal cancer	43 (37.39)	34 (38.20)		
Type of surgery			0.104	0.748
Laparoscopic surgery	100 (86.96)	76 (85.39)		
Open surgery	15 (13.04)	13 (14.61)		
Number of lesions	1.35±0.69	1.48±0.72	1.309	0.192

cleaned up in a timely manner to ensure smooth drainage, with regular observation of the color and traits of the drainage. When the patient had recovered and was able to perform normal urination, the catheter was pulled out, so that the patient could voluntarily urinate. The stomach tube was pulled out after the patient's gastrointestinal function had recovered. The two groups of patients were cared for 1 month.

Observation indicators

The main observation indicators were the incidence of nosocomial infection, duration of antibiotic use, infection elimination time, the incidence of post-infection complications (number of complications/total number × 100%), and tumor metastasis.

The secondary observation indicators were the scores based on the quality assessment scales pre- and post-care,

operation is complete, the patient was transferred back to the ward for recovery. The patient's limbs were moved every 2 hours and the patient's vital signs were monitored. The patient's postoperative pain was evaluated and managed accordingly. The patient and family were informed that food should not be ingested to allow for gastrointestinal function recovery; nutritional supplements such as intravenous infusion were used, and recovery was promoted by chewing gum. After recovery, the patient was given a small amount of liquid food to supplement nutritional intake. The patient was allowed to eat more frequent meals of smaller portions supplemented with high-protein and high-vitamin foods and was told to avoid ingesting gut-irritating foods. According to the status of the patient's physical recovery, rehabilitation training was carried out to promote the improvement of the patient's condition. The gastric tube and catheter of the patient were fixed and

which are divided into physical, mental, social, and environmental field. A higher score is indicative of a better quality of life of the patient. There are 3 grades for the scoring of nursing satisfaction: very satisfied, satisfied, and moderately satisfied. Overall satisfaction of each group was calculated as the percentage of the patients who indicated that they were very satisfied or satisfied [(number of patients who were very satisfied + number of patients who were satisfied)/total number × 100%].

Statistical analysis

In this study, SPSS20.0 was used to perform statistical analysis of the collected data. GraphPad Prism 7 was used to plot the data. The enumerated data were expressed as rate (%) using chi-square test and Fisher's exact test. The measurement data were expressed as

Table 2. Comparison of postoperative infection between the two groups [n (%)]

Group	Observation group (n=115)	Control group (n=89)	t/X ²	P value
Number of infections	13 (11.30)	21 (23.60)	4.605	0.032
Duration of antibiotic use (days)	4.52±1.98	6.54±2.84	5.979	0.000
Time to eliminate infection (days)	7.39±2.15	9.45±3.22	5.462	0.000

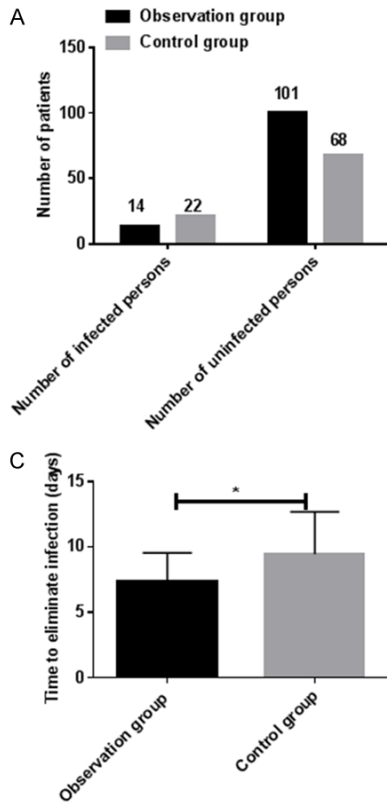


Figure 1. The infection rate of patients was significantly lower in the observation group than in the control group ($P < 0.05$) during nursing care. The duration of antibiotic use was significantly lower in the observation group than in the control group ($P < 0.05$). The time of elimination of infection was significantly higher in the control group than in the observation group ($P < 0.05$). *indicates a significant difference between the two groups ($P < 0.05$).

group than in the control group ($P < 0.05$, **Table 2**; **Figure 1**).

Postoperative tumor metastasis and complications in both the groups

We found that there was no difference in tumor metastasis between the control and observation groups ($P > 0.05$). The incidence of complications was significantly higher in the control group than in the observation group ($P < 0.05$, **Tables 3 and 4**; **Figure 2**).

WHOQOL-BREF scores before and after nursing intervention between both the groups

A comparison of the WHOQOL-BREF scores before and after treatment between the two groups of patients showed that there was no significant

mean \pm standard deviation (mean \pm SD). The t-test was used for analysis. Multiple groups were compared using analysis of variance. A P value of < 0.05 was considered statistically significant.

Result

Patient clinical data

We compared clinical data between the observation and control groups and found that sex, age, body mass index, smoking history, drinking history, hypertension history, diabetes history, and TNM staging were not significantly different ($P > 0.05$, **Table 1**).

Postoperative infections in both the groups

We found that the number of infections, duration of antibiotic use, and infection elimination time were significantly lower in the observation

difference in pre-care fields between the two groups ($P > 0.05$). After nursing, the score of each field was significantly higher than that before nursing ($P < 0.05$). After nursing, post-care physical, psychological, and social relationships and environmental fields were significantly lower in the control group than in the observation group (physiological field $t=15.326$, physiological field $P=0.000$; psychological field $t=17.772$, psychological field $P=0.000$; social relationship field $t=11.639$, social relationship field $P=0.000$; environmental field $t=11.034$, and environmental field $P=0.000$) (**Table 5**).

Comparison of the degree of satisfaction after treatment between the two groups

We found that the degree of patient satisfaction was significantly lower in the control group than in the observation group ($P < 0.05$, **Table 6**).

Table 3. Tumor metastasis after operation [n (%)]

Group	Observation group (n=115)	Control group (n=89)	X ²	P value
Number of patients with tumor metastasis	12 (10.43)	10 (11.24)	0.033	0.855

Table 4. Postoperative complications in patients [n (%)]

Group	Observation group (n=115)	Control group (n=89)	X ²	P value
Infection of incisional wound	4 (3.48)	6 (6.74)		
Pulmonary infection	5 (4.35)	8 (8.99)		
Ostomy infection	4 (3.48)	7 (7.87)		
Anastomotic leakage	3 (2.61)	4 (4.49)		
Amount to	16 (13.91)	26 (29.21)	7.184	0.007

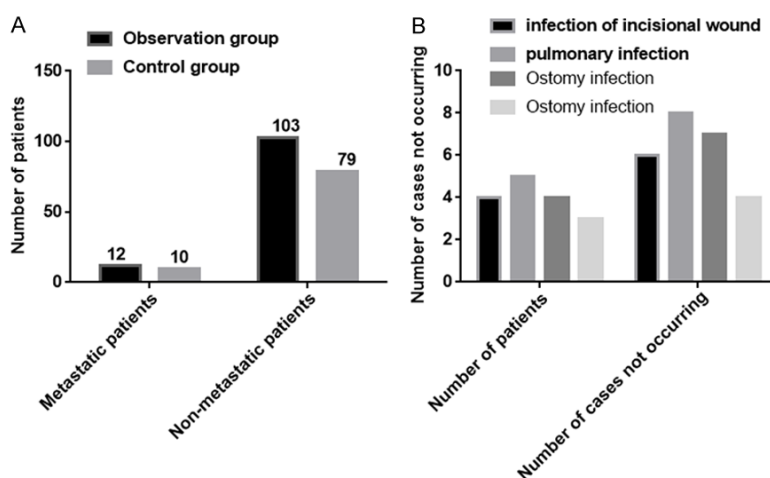


Figure 2. No difference in the number of patients with tumor metastasis in nursing care between the two groups ($P > 0.05$). A). Distribution of complications in group (B).

Discussion

CC is a common malignancy of the digestive system. With the improvement in living standards, the incidence of CC has increased. The 2016 US cancer statistics show that 47,300 CC patients accounting for 15.5% of digestive tract tumors [13]. The treatment of early CC is still mainly dependent on surgery to remove lesions. Although surgical treatment can improve the patient’s condition significantly, surgery brings great physical injury and more postoperative complications, which have a huge influence on the patient’s recovery [14, 15]. Laparoscopy is a minimally invasive technique that has been widely used since its introduction, and it has made CC radical resection possible [16]. Compared with traditional surgery, laparoscopic CC radical surgery has the advantages of a smaller wound surface, more rapid prognosis,

and fewer complications. However, this operation requires a high level of technical skill on the part of the operator and a higher quality of care [17, 18].

Comprehensive nursing is an evidence-based nursing model. According to the patient’s condition, it can provide more refined and better nursing care. Comprehensive nursing can reduce the psychological and physical barriers to recovery and minimize the complications experienced by patients. It can effectively shorten the recovery time of patients and reduce unnecessary loss of patients [11, 19]. Comprehensive nursing mainly includes preoperative, intraoperative, and postoperative care through popularizing preoperative knowledge to the patient, proper dietary guidance, correct psychological intervention,

intraoperative observation of the patient’s symptoms and surgical cooperation, postoperative rehabilitation guidance, nutritional support, and promoting postoperative recovery in patients [20]. Therefore, in this study, we explore the effect of comprehensive care on postoperative recovery of CC patients, providing a more scientific approach to clinical care.

In this study, we used different nursing methods on two groups of patients. The postoperative infection and complication rates in the observation group, which received comprehensive care, was significantly lower than those in the control group, which received conventional care, indicating that comprehensive care can reduce postoperative infection and complications. In the study of Ommundsen et al. [21], it was shown that comprehensive care for patients with CC can significantly reduce

Comprehensive nursing intervention in patients with colorectal cancer

Table 5. Comparison of the World Health Organization quality of Life scale between the two groups before and after the treatment

Group	Observation group (n=115)		t	P value	Control group (n=89)		t	P value
	Before nursing care	After nursing care			Before nursing care	After nursing care		
Physiological field	58.54±4.25	75.28±5.22	23.461	0.000	59.21±4.72	87.35±5.84*	40.188	0.000
Psychological field	56.54±5.84	72.66±4.88	19.982	0.000	57.38±5.21	83.61±3.92*	43.142	0.000
Social relationship field	63.75±4.33	74.62±4.75	15.955	0.000	62.84±4.58	81.92±4.19*	32.962	0.000
Environmental field	65.81±6.25	76.24±4.28	12.990	0.000	66.15±5.76	83.22±4.63*	24.770	0.000

Note: *indicates that there is a statistical difference between the control and observation groups after nursing care (P < 0.05).

Table 6. Nursing satisfaction of the two groups of patients [n (%)]

Group	Very satisfied	Satisfied	Same as	X ²	P value
Control group (n=89)	23 (25.84)	34 (38.20)	32 (35.96)	11.177	0.001
Observation group (n=115)	59 (51.30)	38 (33.04)	18 (15.65)		

the incidence of postoperative complications and infection, which supports our findings. Malignant tumors can easily metastasize. The main methods of metastasis include tumor cell invasion, lymphatic metastasis, hematogenous metastasis, and planting. In this study, we found through analysis that there was no difference in tumor metastasis between the control group and the observation group. This shows that the nursing mode had no effect on the tumor metastasis. WHOQOL-BREF is a survival scale to measure an individual's health with a high degree of credibility and validity [22]. By comparing the scores of the two groups, we found that there was no significant difference in pre-care scores of each field between the two groups, but the scores in various fields after going through different nursing models increased significantly, indicating that the two nursing models had an effect on the scores of the patients. The scores in the control group were significantly lower than those in the observation group, which indicates that comprehensive nursing had a significant effect in improving scores compared with routine care. The observed improvement of patient scores indicate an increase in the quality of life of the patients. In the study of Luan et al. [23], the WHOQOL-BREF score of postoperative patients with tongue cancer was significantly improved through comprehensive nursing, indicating that comprehensive nursing care can also be applied to other diseases. At the end of the study, we asked the patients to score for nursing satisfaction. The satisfaction of patients was significantly lower in the control group than in the observation group, indicating that com-

prehensive nursing can also improve patient satisfaction and promote the relationship between doctors and patients.

However, this study had some limitations. Our study was conducted through retrospective data analysis. The results may be biased without randomized controlled trials. Secondly, we had a small sample size and did not perform long-term follow-up on patients. We hope to conduct randomized controlled trials in future studies to increase the sample data and reduce the bias of our results. We also aim to conduct follow-up visits to observe the patients' condition after nursing.

In summary, comprehensive nursing intervention has no impact on tumor metastasis. However, it can effectively reduce the incidence of nosocomial infections in patients, shorten the infection time, reduce the incidence of complications, effectively improve patient nursing satisfaction, and enhance patient quality of life, and hence, is worthy of clinical promotion

Disclosure of conflict of interest

None.

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Comprehensive nursing intervention in patients with colorectal cancer

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