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Clinical Effects of Laparoscopic Radical Colon Cancer Treatment with Complete Mesocolic Resection for Colon Cancer

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Abstract: Objective: This paper aims to evaluate the effect of laparoscopic complete mesocolic resection on the efficacy and survival of patients with colon cancer. Methods: 80 colon cancer patients were included in this study, 40 of whom were treated with traditional radical colon cancer surgery as the control group, and the other 40 were treated with laparoscopic complete mesocolic resection radical colon cancer surgery as the observation group. The study period lasted from April 2022 to April 2023, and the surgical indexes, postoperative recovery, quality of life, and the occurrence of complications of the two groups were monitored throughout the whole process and compared and analyzed. Results: The therapeutic effect of the observation group was better than that of the control group ($P < 0.05$). The operation time, bleeding volume and postoperative hospitalization time of the observation group were significantly lower than those of the control group, and the number of lymph node dissection was significantly higher than that of the control group, with highly significant differences (all $P < 0.001$). The postoperative recovery of the observation group (time of first anal defecation, time of first solid food intake, and time of wound healing) was significantly better than that of the control group (all $P < 0.001$). The quality of life of the observation group was significantly improved with a highly significant correlation ($P < 0.001$), and the complication rate was significantly lower than that of the control group ($P < 0.05$). Conclusion: Laparoscopic radical colon cancer surgery with complete mesocolic resection for colon cancer shows better clinical effects and advantages in the treatment of colon cancer, which is worth further promotion and application in clinical practice.

Keywords: Colon cancer; Traditional radical surgery for colon cancer; Laparoscopic complete mesocolic resection for colon cancer

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1. Introduction

Colon cancer is a common malignant tumor of the digestive tract, and its incidence has been gradually increasing in recent years. This cancer has a certain degree of invisibility, and there are often no obvious symptoms in the early stage, which is easy to neglect and delayed treatment [1]. With the improvement of people's living standards and the change in dietary structure, the incidence trend of colon cancer is on the rise,

which poses certain threats to people's health. Therefore, it is crucial to strengthen awareness, early screening, and standardized treatment of colon cancer, which can effectively improve the cure rate and survival quality of patients [2]. Although traditional direct-vision open radical surgery for colon cancer can ensure complete removal of the lesion, the trauma during surgery is large, postoperative complications are more common, and patient recovery is slow, all of which may affect the overall outcome of the surgery and the quality of life of patients [3]. Therefore, colon cancer patients must find safer and more effective treatment modalities. With the continuous development and promotion of minimally invasive technology, laparoscopic surgery plays an increasingly important role in the treatment of colon cancer. Laparoscopic surgery utilizes advanced microscope equipment to assist in the operation, which avoids the abdominal incision necessary for traditional direct-vision open surgery and significantly reduces trauma and damage to the surrounding organs during the operation. At the same time, due to the more delicate surgical interventions, the chances of postoperative complications are also relatively low, favoring faster and better recovery for patients [4,5]. The application of this minimally invasive technique brings a new treatment option for colon cancer patients and improves the surgical effect while reducing the risks and discomfort associated with surgery, providing a more reliable guarantee for patients' health recovery. The purpose of this paper is to discuss the clinical effect of laparoscopic radical colon cancer treatment with complete mesocolic resection for colon cancer.

2. Data and methods

2.1. General information

80 patients diagnosed with colon cancer were included in this study and were randomly divided into a control group and an observation group. Inclusion criteria: (1) diagnosed by colonoscopy and confirmed by pathological examination; (2) patients with different degrees of colon cancer symptoms; (3) patients with carcinoma in situ and not yet metastasized, and need to sign the informed consent. Exclusion criteria: (1) patients with a history of pelvic surgery, (2) coagulation disorders, (3) inability to tolerate the treatment regimen of this study, (4) organ failure, combined with other malignant tumors, (5) patients with audio-visual disorders that prevent normal communication.

2.2. Methods

The control group undergoes traditional radical surgery for colon cancer, which is usually carried out under general anesthesia, and the main steps include:

(1) Open abdominal exploration: the doctor will first carry out abdominal exploration to understand the size, location, invasion range and whether there is any metastasis of the tumor.

(2) Free the intestinal canal: according to the location of the tumor, free the intestinal canal and corresponding blood vessels and lymph nodes that need to be resected.

(3) Resection of the intestinal canal: resect the intestinal segment where the tumor is located and a certain range of normal tissues around it.

(4) Lymph node clearance: clear the lymph nodes around the tumor to remove possible tiny metastases.

(5) Intestinal reconstruction: anastomose the two ends of the resected intestine to restore the continuity of the intestine.

(6) Placement of drainage: after the operation, the surgeon will place a drainage tube in the abdominal cavity to drain the fluid from the operation area.

The observation group was treated with laparoscopic radical colon cancer surgery with complete mesocolic resection of the colon. During the colon cancer surgery, firstly, patients will be given general anesthesia to

ensure comfort and safety during the surgery. The surgeon then creates a small pneumoperitoneum, which is a small hole in the abdominal wall that is filled with carbon dioxide gas to provide room for the operation. A laparoscope and surgical instruments are placed through these holes to allow precise exploration of the tumor's location, size, and relationship to the surrounding tissue, as well as to check for metastases. With a clear understanding of the tumor, the surgeon will delicately free the colonic mesentery, carefully separating it from the surrounding tissue and performing lymph node dissection if necessary. The segment of the bowel containing the tumor, as well as the associated lymph nodes and mesentery, is precisely resected, removing the lesion for the patient. This is followed by an intestinal reconstruction phase where the remaining healthy bowel segments are anastomosed to restore bowel continuity. Tumors and surrounding tissues removed during surgery will be removed and sent for pathology to evaluate the surgical outcome and subsequent treatment plan. Small holes in the abdominal wall will be carefully sutured to mark the end of the surgical procedure.

2.3. Observation indicators

2.3.1. Therapeutic effect

Apparent effect: patients' colon cancer lesions are completely resected after surgery, postoperative symptoms are significantly improved, there is no residual lesion around the lesion, postoperative recovery is fast, and postoperative complication rate is low.

Effective: after surgery, the patient's colon cancer lesions are controlled, the larger part of the lesions is removed, the postoperative symptoms are improved, the postoperative recovery is better, and there is no sign of recurrence or metastasis within a certain period of time.

Ineffective: patients' colon cancer lesions are not effectively controlled after surgery, the disease recurs or continues to develop after surgery, more postoperative complications, slow postoperative recovery, signs of recurrence or metastasis.

2.3.2. Surgical indicators

Surgical time: Measure the total time from the beginning of the incision to the completion of the suture.

Bleeding amount: Record the amount of blood loss during surgery to assess the fineness of surgery and the impact on the patient.

Number of lymph nodes cleared: Count the number of lymph nodes removed during surgery as an indicator to assess the thoroughness of surgery.

Postoperative hospitalization time: Record the average hospitalization days from the end of surgery to discharge, reflecting the patient's recovery and the use of hospital resources.

2.3.3. Postoperative recovery

Time of the first anal gas evacuation: The time of the first postoperative gas evacuation, reflects the speed of the recovery of intestinal function.

Time of first solid eating: The time from the start of solid eating after surgery, indicating the recovery of digestive tract function.

Wound healing time: Record the time of complete healing of postoperative incision, and assess the quality of postoperative recovery.

2.3.4. Quality of life assessment

A self-developed quality-of-life assessment form of the hospital was used, covering the following four dimensions, with a total score of 100 for each item.

Physiological function score: To assess the patients' physiological function recovery after surgery.

Psychological state assessment: To understand the patient's psychological adaptation state and emotional changes such as depression and anxiety after surgery.

Social function recovery: To evaluate the recovery of patients' ability to return to work or daily social activities after surgery.

Pain management: Record the postoperative pain feelings and their impact on the quality of life, and evaluate the effectiveness of analgesic measures.

2.3.5. Occurrence of complications

Record the specific types of postoperative complications in patients, such as wound infection, urinary tract infection, intestinal obstruction, etc. Count the frequency of each complication in the patient group.

2.4. Statistical methods

Data were statistically analyzed using SPSS 26.0, count data were expressed as [n (%)], and measurement data were demonstrated as mean ± standard deviation (SD), with t-test or chi-square test. $p < 0.05$ indicated that the difference was statistically significant.

3. Results

3.1. Comparison of general information

The general data (including gender, average age, and average body mass) of the two groups of patients were not statistically significant (all $P > 0.05$). See Table 1.

Table 1. Comparison of general information of patients in the two groups

Groups	Sex		Mean age (mean ± SD, years)	Mean body mass (mean ± SD, kg)
	Male	Female		
Control group (n = 40)	22	18	60.51 ± 5.40	65.43 ± 6.63
Observation group (n = 40)	20	20	62.59 ± 5.37	66.76 ± 6.84
χ^2/t-value	0.201		1.727	0.883
P-value	0.654		0.088	0.380

3.2. Comparison of the treatment effect of the two groups of patients

The total effective rate of the treatment effect of the observation group was significantly higher than that of the control group, which was 90.00% and 65.00%, respectively. After the χ^2 test, the calculated χ^2 value was 7.169, corresponding to a P value of 0.007, which was lower than the traditional significance threshold of 0.05, and the difference was statistically significant. See Table 2.

Table 2. Comparison of treatment effects between the two groups of patients [n (%)]

Groups	Apparent effect	Effective	Ineffective	Overall effective rate
Control group (n = 40)	16 (40.00%)	10 (25.00%)	14 (35.00%)	26 (65.00%)
Observation group (n = 40)	21 (52.50%)	15 (37.50%)	4 (10.00%)	36 (90.00%)
χ^2-value	-	-	-	7.169
P-value	-	-	-	0.007

3.3. Comparison of surgical indexes between the two groups of patients

The surgical indexes of patients in the observation group (including operation time, bleeding volume, and postoperative hospitalization time) were significantly lower than those of patients in the control group, and the number of lymph nodes cleared in patients in the observation group was much higher than that in the control group, and the differences all showed highly significant correlation (all $P < 0.001$). See Table 3.

Table 3. Comparison of surgical indexes between the two groups of patients (mean ± SD)

Groups	Operative time (min)	Bleeding (mL)	Number of lymph nodes cleared (pcs)	Postoperative hospitalization (days)
Control group (n = 40)	176.68 ± 20.38	140.37 ± 15.16	18.24 ± 2.34	15.07 ± 3.17
Observation group (n = 40)	135.24 ± 15.67	82.97 ± 13.49	24.17 ± 3.87	10.25 ± 2.15
t-value	10.195	17.889	8.293	7.959
P-value	< 0.001	< 0.001	< 0.001	< 0.001

3.4. Comparison of postoperative recovery of patients in the two groups

The postoperative recovery of patients in the observation group (including the time of the first anal exhaustion, the time of the first solid food intake and the time of wound healing) was significantly lower than that of the control group, and the differences all showed highly significant correlations (all $P < 0.001$). See Table 4.

Table 4. Comparison of postoperative recovery of patients in the two groups (mean ± SD)

Groups	Time to first anal defecation (days)	Time to first solid meal (days)	Time to wound healing (weeks)
Control group (n = 40)	3.58 ± 0.43	4.34 ± 0.56	4.74 ± 0.84
Observation group (n = 40)	2.21 ± 0.31	2.97 ± 0.49	2.71 ± 0.67
t-value	16.346	11.644	11.949
P-value	< 0.001	< 0.001	< 0.001

3.5. Comparison of quality of life assessment of patients in two groups

Before surgery, the difference in the quality of life (including physiological function score, psychological state assessment, social function recovery and pain management) between the two groups was not statistically significant (all $P > 0.05$). After surgery, compared with the control group, the quality of life comparison of the observation group all increased, and the differences all showed highly significant correlation (all $P < 0.001$). See Table 5.

Table 5. Comparison of quality of life assessment between the two groups (mean ± SD)

Groups	Physiological function scoring		Psychological assessment		Recovery of social functioning		Pain management	
	Before Surgery	After Surgery	Before Surgery	After Surgery	Before Surgery	After Surgery	Before Surgery	After Surgery
Control group (n = 40)	48.51 ± 5.48	56.62 ± 5.01	50.25 ± 4.74	73.04 ± 6.19	43.38 ± 4.59	68.17 ± 5.42	50.87 ± 4.27	61.28 ± 5.18
Observation group (n = 40)	48.69 ± 5.31	65.81 ± 5.32	50.20 ± 4.86	80.84 ± 6.74	43.51 ± 4.33	75.43 ± 6.20	50.67 ± 4.34	70.38 ± 5.32
t-value	0.149	7.954	0.047	5.391	0.130	5.576	0.208	7.751
P-value	0.882	< 0.001	0.963	< 0.001	0.897	< 0.001	0.836	< 0.001

3.6. Comparison of the complication rate of patients in the two groups

The complication rate of the observation group was lower than that of the control group ($P < 0.05$). See Table 6.

Table 6. Comparison of the complication rate of patients in the two groups [*n* (%)]

Groups	Incisional infections	Urinary tract infection	Bowel obstruction	Total adverse reactions
Control group ($n = 40$)	3 (7.50%)	3 (7.50%)	2 (5.00%)	8 (20.00%)
Observation group ($n = 40$)	1 (2.50%)	0 (0.00%)	0 (0.00%)	1 (2.50%)
χ^2-value	-	-	-	4.507
P-value	-	-	-	0.034

4. Conclusion

Colon cancer is an insidious disease with atypical early symptoms, so many patients are often diagnosed only when the disease has progressed to the middle or late stage, resulting in patients missing the best time for treatment, and the survival rate of patients with advanced colon cancer is less than 30% [6,7]. Therefore, early diagnosis and treatment are crucial for improving the survival rate of patients. Through early detection and early intervention, the survival time of patients can be effectively prolonged and the therapeutic effect can be improved to gain more chances of survival for patients. Surgery is one of the most direct and effective methods for treating colon cancer, and radical colon cancer surgery aims to prevent further spreading and metastasis of cancer cells to other parts of the body by removing the affected intestinal segment and related tissues [8]. In the past, conventional open radical colon cancer surgery was usually performed, in which a large abdominal incision is required and prolonged exposure of the abdominal organs to air significantly increases the risk of infection, leading to a higher incidence of postoperative complications [9]. Laparoscopic complete mesenteric resection is an innovative method for the treatment of colon cancer, by completing a series of surgical operations in the abdominal cavity, without the need for substantial opening of the abdomen, this surgical method has the advantages of small incisions, low bleeding, and fast operation, and at the same time can effectively remove the deep mesentery and lymph nodes, ensuring the thoroughness of lymph node removal, thus effectively preventing the risk of postoperative recurrence [10]. This study suggests that after treatment with laparoscopic complete mesenteric resection for radical colorectal cancer, the surgical effect is significantly better than that of the traditional method, surgical time, bleeding, and postoperative hospitalization time are reduced, and the number of lymph nodes cleared is increased. Postoperative recovery (time to first anal defecation, time to first solid meal, and time to wound healing) was significantly shorter, quality of life was significantly improved, and the complication rate was significantly reduced. The results of this study show that this method has obvious advantages in the treatment of colon cancer.

In conclusion, laparoscopic complete mesocolic resection is a superior method for the treatment of colon cancer, showing good clinical efficacy and obvious advantages. The procedure can effectively eradicate colon cancer by complete resection of colonic mesentery through laparoscopic technique. The operation is safe, with less intraoperative bleeding, mild postoperative pain, small incision, fast recovery, and low postoperative infection rate. Patients have rapid postoperative recovery and significantly improved quality of life. Therefore, it is worthy of further promotion and application in clinical practice to provide safer and more effective treatment options for colon cancer patients.

Disclosure statement

The authors declare no conflict of interest.

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