

# Clinical Application of Laparoscopy in Radical Operation of Rectal Cancer

Guangwei Gong<sup>1</sup>, Shengwen Li<sup>1</sup>, Li Luo<sup>1</sup>, Dan Zhao<sup>1</sup>, Jun Wei<sup>1</sup>, Yue Qiu<sup>1</sup>, Lei Ji<sup>1</sup>, Kun Yang<sup>1</sup>,  
Xiongshan Shen<sup>1</sup>, Weimin Li<sup>1</sup>, Jinjun Li<sup>2\*</sup>

<sup>1</sup>Department of general surgery, Xiaogan Central Hospital Affiliated to Wuhan University of Science and Technology, Xiaogan, Hubei, China

<sup>2</sup>Medical College of Wuhan University of Science and Technology, Wuhan, China

\*Corresponding author: entry2003@126.com

**Abstract Objective:** Analyze the clinical value of laparoscopic used in the colorectal cancer surgery. **Methods:** A total number of 371 clinical cases, from January 2012 to October 2014 in our hospital, were analyzed which covered 198 patients underwent the laparoscopy in radical resection and 173 cases in open radical resection. A retrospective analysis was proceeded by comparing the general information, surgery performance, pathologic data, postoperative recovery and complications as well as long-term survival to investigate the diversity of immediate and long-term clinical outcomes of laparoscopic radical operation. **Results:** All patients have successfully completed the surgery, which includes 198 cases of laparoscopic rectal resection, 173 cases in open radical resection. There were no statistically significance differences between gender, age, height, BMI, staging and associated with other diseases in two groups. The operative time of rectal resection under the Laparoscopic was shorter than open radical resection ( $120\pm 30$ min vs  $105\pm 39$ min), with no statistical significance ( $P > 0.05$ ). In the laparoscopy surgery, the amount of bleeding is less than open surgery ( $50\pm 20$ ml VS  $200\pm 25$ ml), and the difference was statistically significant. In the laparoscopy surgery, the length of incision is shorter than open surgery ( $5.1\pm 0.23$ cm VS  $13.5\pm 1.34$ cm), and the difference was statistically significant. The hospitalization length in laparoscopy surgery and open surgery was significant difference ( $P < 0.01$ ). **Conclusion:** In contrast to open surgery group, the laparoscopy surgery group experienced less bleeding, shorter incision and hospitalization length. The incident rate of perioperation complications in laparoscopy surgery and open surgery groups were not significant different. The colorectal cancer resection with laparoscopic has less trauma and can recover quickly, so it can achieve the same radical effect just like laparotomy and worth to be promoted in the Clinical application.

**Keywords:** Colorectal cancer Laparoscopic, open, surgery, Complication

**Cite This Article:** Guangwei Gong, Shengwen Li, Li Luo, Dan Zhao, Jun Wei, Yue Qiu, Lei Ji, Kun Yang, Xiongshan Shen, Weimin Li, and Jinjun Li, "Clinical Application of Laparoscopy in Radical Operation of Rectal Cancer." *Journal of Cancer Research and Treatment*, vol. 4, no. 3 (2016): 49-51. doi: 10.12691/jcrt-4-3-3.

## 1. Introduction

It has been estimated that 1.4 million new cases of colorectal cancer are diagnosed worldwide and nearly 0.7 million colorectal cancer-related deaths occur, of which about 33% are due to rectal cancer [1]. With the development of laparoscopic techniques and the improvements of equipment, laparoscopic is used more widely in the gastrointestinal tumor surgery [2,3]. We summarize 198 cases of laparoscopic rectal resection and 173 cases in open radical resection of clinical data of rectal neoplasms laparoscopic surgery in our hospital from January 2012 to October 2014 to evaluate its safety and efficacy.

## 2. Clinical Data and Methods

January 2012 to October 2014, a series of 371 patients with rectal cancer underwent surgery with curative intent (198 patients via laparoscopic surgery and 173 patients via

open surgery). All patients have been diagnosed by endoscopy and pathology with rectal adenocarcinoma.

A retrospective analysis was proceeded by comparing the general information, surgery performance, pathologic data between laparoscopic radical operation and conventional operation.

Table 1. baseline characteristics

	Laparoscopic	Open	P value
Gender			
Male	110	99	$P > 0.05$
Female	88	74	$P > 0.05$
Age(yr, mean $\pm$ SD)	$63\pm 10$	$67\pm 9$	$P > 0.05$
BMI(kg/m <sup>2</sup> )	$22.325\pm 2.562$	$22.654\pm 2.326$	$P > 0.05$
Staging			
Duke's A	15	17	$P > 0.05$
Duke's B	131	125	$P > 0.05$
Duke's C	52	59	$P > 0.05$
Other diserse	32	35	$P > 0.05$

### 2.1. Laparoscopic Surgical Approach

Laparoscopic anterior resection for rectal is 132 cases, laparoscopic abdominal perineal resection for colorectal

cancer is 66 cases. In the surgery the patients are in the lithotomy position, by using the five-hole method, we do the 10mm observation holes on the 1cm umbilical, and do four operations holes in the 2cm inside of the front left and right iliac spine and anterior superior iliac spine and in the 1/3 with the umbilical connection, the main operating holes are on the 2cm inside of the front right iliac spine, which goes across the center and then cut right rectum into the Toltditch, and is separated to the root upwards of the inferior mesenteric artery, sweeping the surrounding lymph node, ligature and cut off at 1 cm the root of inferior mesenteric artery, continue to separate and ligature the inferior mesenteric vein, along with the Toltd gap entering the gap and separating the rectum, we should pay attention to the protection of the ureter and upper hypogastric plexus, along with the rectum gap continued to do the tunnel separation, cut the rectal lateral ligament, open peritoneum at 1cm of the peritoneal fold, along the front of the Deng's rectum fascia separate the front rectum gap, bare the rectum, and the entire process of separation is completed by the ultrasonic knife. People who has done the rectal resection, at the distance of 2-3cm to the tumor, we use the linear cutting stapler to cut off the rectum, in the left of the lower quadrant we do 3cm of incision. The incision protective sleeve is used to protect the incision after removing the intestine, cut the sigmoid colon at the edge 10-15cm of the tumor, and the proximal intestine tube is put into the stapler staples seat to restore the abdominal, re-establish the pneumoperitoneum, under the laparoscopic we do the rectal anastomosis. To those people who has done the line colorectal cancer abdominal perineal resection, we should continue to separate the coccyx tip along the back and sides of the rectum gap, after revealing the pelvic floor muscles, the front rectum gap is separating to the vagina before the middle of the rear wall (female) or revealing prostate (men), cut off the sigmoid colon at 10-15cm above the tumor. And make a 3cm incision in the left lower abdomen, makes the sigmoid colon extract from the left to the left abdominal peritoneum to do incision. Perineal surgery and the traditional surgical approach, get the surgical specimens from the perineum, place the drainage tube and suture the perineal incision. Re-establish the pneumoperitoneum, under the laparoscopic stitch the pelvic peritoneal, and end the surgery.

## 2.2. Statistical Analysis

Statistical analysis was performed using the program SPSS for Windows version 17.0 (SPSS, Chicago, IL). Demographic data for the 2 groups were compared using the Student *t* test for continuous data and  $\chi^2$  test for categorical data. The survival rate was calculated with the Kaplan-Meier method, and the differences in survival were compared by the long-rank test. Differences between the 2 groups were considered statistically significant if the *P* value was <0.05.

## 3. Results

### 3.1. Patient

In this study, 198 patients underwent the laparoscopy in radical resection and were matched with 173 patients who underwent open radical resection. Patients' demographics

and preoperative evaluation are summarized in Table 1. There were no statistically significant differences between gender, age, height, BMI, staging and associated with other diseases.

**Table 2. surgery index**

	laparoscopic	Open	P value
Surgery duration	120±30min	105±39min	P>0.05
surgery bleeding	50±20ml	200±25ml	P<0.01
maximum incision	5.1±0.23cm	13.5±1.34cm	P<0.01
complication	3	8	P>0.05
Hospitalization length	8±6	10±7	P<0.01

### 3.2. Comparison of the Operations

All patients have successfully completed the surgery. The operative time of rectal resection under the Laparoscopic was shorter than open radical resection (120±30min vs 105±39min), with no statistical significance (P>0.05). In the laparoscopy surgery, the amount of bleeding is less than open surgery (50±20ml VS 200±25ml), and the difference was statistically significant. In the laparoscopy surgery, the length of incision is shorter than open surgery (5.1±0.23cm VS 13.5±1.34cm), and the difference was statistically significant. The hospitalization length in laparoscopy surgery and open surgery was significant difference (P<0.01).

### 3.3. Complication

There were 3 cases complications in laparoscopy surgery and 8 cases complications in open surgery. In laparoscopy surgery, anastomotic leakage is 2 cases, they respectively occurred on the sixth day and seventh after surgery, one has done the end ileostomy and peritoneal lavage and drainage, one has done the conservative treatment. One case is intestinal obstruction, the conservative treatment symptoms has little effect, after laparotomy we confirmed that the small intestine was incarcerated in the pelvic peritoneum gap, also restored the small intestine, stitched the pelvic peritoneum gap. In open surgery, anastomotic leakage is 4 cases, 1 case is intestinal obstruction, 1 case is ureteral injury, in the surgery we found that doing the ureteral anastomosis and double J tube supporting drainage, 2 cases of wound infection, and all patients have recovered after the treatment. The incident rate of perioperation complications in laparoscopy surgery and open surgery groups were not significant different (P>0.05).

**Postoperative follow-up:** All patients have got the follow-up. Time is 2 to 36 months, one case of colorectal cancer is with the low anal, has to do the reoperation because of the recurrence of the anastomotic, one case has occurred extensive abdominal metastases after surgery in six month and died, and the 196 cases of follow-up patients have not been found distant metastasis.

## 4. Conclusion

There were no statistically significant differences between gender, age, height, weight, staging and associated with other diseases in two groups. In contrast to open surgery group, the laparoscopy surgery group experienced less bleeding, shorter incision and hospitalization length. The incident rate of perioperation complications in laparoscopy surgery and open surgery groups were not significant different.

## 4. Discussion

Colorectal cancer is the common malignant tumors in our country, the total mesorectum excision is the surgery norm of colorectal cancer. In 1990, Jacobs in the United States, has done the world's first laparoscopic right colon resection, and in the same year, Flower has conducted the laparoscopic sigmoid resection. Since then, laparoscopic has been gradually applied into the traditional colorectal surgery, but the speed of the application's development in the colorectal cancer is much less than the other laparoscopic surgery. In recent years, many scholars have carried out the studies of laparoscopic rectal surgery, after twenty years of research, laparoscopic resection of colorectal cancer has been maturing [4,5], as laparoscopic is able to reach a narrow pelvis, and enlarged the partial surgical field, so it makes the anatomy become easier to identify, which helps to identify the gap separation, and can accurately identify and protect the anterior sacral vein, pelvic autonomic, at the same time, ensure the integrity of TME at the greatest possibility, as a result the TME surgery is completed [6,7]. Numerous studies show that laparoscopic colorectal cancer resection has advantages of less trauma and less pain, recover faster [8,9], patients in this group in the operative time, blood loss, recovery time of the bowel function, hospital stay are better than the traditional surgery.

Anastomotic leakage is one of the most serious complications of colorectal cancer, several abroad RCT studies show that rate of anastomotic leak was 3.0-10.6% after radical prostatectomy of laparoscopic colorectal cancer [10,11], in this group the rate of anastomotic fistula was 1.1%, causes of anastomotic leakage have something to do with the tumor location, tumor size, anastomotic blood supply, tension; in the group 2 cases of anastomotic leakage has occurred in the sixth and seventh day after surgery, so to the low rectal cancer after cleaning the inferior mesenteric artery lymph nodes, we should ligature at the root of the rectal artery and keeps the inferior mesenteric artery and the left colic artery, in order to ensure blood supply to the anastomotic. Typically, the amount of fistula of anastomotic fistula at the late period of the surgery is small, while the inflammation is often limited to the pelvic cavity, the symptom of peritonitis is light, across the peritoneal drainage tube suction's flushing it can be cured, anastomotic leakage that occurred in the early postoperative inflammation is difficult to limit, if the symptom of peritonitis is serious, we need transverse or do colostomy at the end of the ileum [12].

For the patients who have colorectal cancer for abdominal perineal resection under the laparoscopic, whether the pelvic peritoneum is closed, there are different views among the scholars, in surgery we routinely close the pelvic peritoneum, which mainly based on the following two considerations: 1 without the protection of the peritoneal, the small intestine is easy to fall into the pelvic floor and also form extensive adhesion along with the pelvic adhesions which may cause intestinal obstruction. 2. Perineal surgery is a contaminated surgery, once the perineal has got wound infection after open incision, the abdominal cavity is connected with the outside world, which will increase the chance of abdominal infections and intestinal adhesion. In the group,

one patient has got mechanical obstruction after surgery, after the intraoperative exploration we found that the small intestine was incarcerated in the pelvic peritoneum closed the gap, restore the small intestine in the abdominal cavity and also close the gap of the pelvic peritoneum, patients have got smoothly recovered, to this patient it is mainly due to during the early time in laparoscopic surgery, endoscopic suture technology was not mature, now we use the free knotted sutures to close the pelvic peritoneum, and effectively avoid the occurrence of such complications, while we also shorten the operation time.

Many researches show that the radical surgery of laparoscopic colorectal cancer and from the long-term effect is just the same with laparotomy [13,14], according to the follow-up patients in this group, it shows that the long-term results is very good.

In a word, the radical surgery of laparoscopic colorectal cancer has small trauma, recover rapidly after surgery, and has fewer complications, which can achieve the same effect with laparotomy on the radical tumors, so it is worth to be promoted.

## References

- [1] Huang C, Shen JC, Zhang J, et al. Clinical comparison of laparoscopy vs open surgery in a radical operation for rectal cancer: A retrospective case control study [J]. *World J Gastroenterology*, 2015, 21(48):13532-13541.
- [2] Guo C, Zhang Z, Ren B, et al. Comparison of the long-term outcomes of patients who underwent laparoscopic versus open surgery for rectal cancer [J]. *J BUON*, 2015, 20(6):1440-1446.
- [3] Pascual M, Salvans S, Pera M, et al. Laparoscopic colorectal surgery: Current status and implementation of the latest technological innovations [J]. *World J Gastroenterol*, 2016, 22(2): 718-726.
- [4] Vennix S, Pelzers L, Bouvy N, et al. Laparoscopic versus open total mesorectal excision for rectal cancer [J]. *Cochrane Database Syst Rev*, 15(4):pub3.
- [5] Zaharie F, Ciorogar G, Zaharie R, et al. Laparoscopic rectal resection versus conventional open approach for rectal cancer - a 4-year experience of a single center [J]. *J BUON*, 2015, 20(6):1447-1455.
- [6] Buia A, Stockhausen F, Hanisch E. Laparoscopic surgery: A qualified systematic review [J]. 2015, 5(4):238-254.
- [7] Nakamura H, Uehara K, Arimoto A, et al. The feasibility of laparoscopic extended pelvic surgery for rectal cancer [J]. *Surg Today*, 2015, 22(10): p1-7.
- [8] Aziz O, Constantinides V, TEKKIS PP, et al. Laparoscopic versus open surgery for rectal cancer: ameta-analysis [J]. *Ann Surg Oncol*, 2006, 13 (3) :413-424.
- [9] Bruch HP, Esnaashari H, Schwandner O. Current status of laparoscopic therapy of colorectal [J]. *Dig Dis*, 2005, 23(2): 127-134.
- [10] Park JJ, Choi CS, Lim KH, et al. Laparoscopic resection of extraperitoneal rectal cancer: a comparative analysis with open resection [J]. *Surg Endosc*, 2009, 23(8):1818-1824.
- [11] Braga M, Frasson M, Vignali A, et al. Laparoscopic resection in rectal cancer patients: outcome and cost-benefit analysis [J]. *Dis Colon Rectum*, 2007, 50(4):464-471.
- [12] Katsuno H, Shiomi A, Ito M, et al. Comparison of symptomatic anastomotic leakage following laparoscopic and open low anterior resection for rectal cancer: a propensity score matching analysis of 1014 consecutive patients. *Surg Endosc*, 2015, 20(10): p1-9.
- [13] Baik SH, Ginchermaa M, Mutch MG. Laparoscopic vs open resection for patients with rectal cancer: comparison of perioperative outcomes and long-term survival [J]. *Diseases of the Colon & Rectum*, 2011, (01):6-14.
- [14] Tao, Sun Jing, Qiu Zhengjun. "The Long-term efficacy of laparoscopic and open surgery for colon cancer" [J]. *Journal of Fudan University (Medical Sciences)*. 2011, (03): 211-215.