
Laparoscopic Versus Open Surgery for Rectal Cancer in Elderly Patients

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Abstract: With the increase of life expectancy, surgical intervention for rectal cancer is more and more frequently performed in the elderly. It is well accepted that laparoscopic surgery is of advantage, but not widely recognized in old patients with rectal cancer. In order to assess laparoscopic surgery for rectal cancer in elderly patients, we performed this study. This retrospective study was designed to compare short-term outcomes between laparoscopic surgery and open surgery in elderly patients with rectal cancer, which may give some useful guidance in the clinical practice. Thirty-seven patients with rectal cancer aged 75 and older undergoing laparoscopic surgery were matched with 37 counterparts undergoing open surgery. Criteria of matching included general information and preoperative status. Patients in the laparoscopic surgery and open surgery groups were comparable for the matching criteria. Compared with the open surgery group, estimated blood loss ($P=0.048$) and intraoperative transfusion ($P=0.042$) were less in the laparoscopic surgery group. As to short-term postoperative outcomes, duration of postoperative hospital stay was shorter ($P = 0.039$) and overall complication ($P = 0.032$) and wound complication ($P = 0.038$) was less in the laparoscopic surgery group than in the open surgery group. In conclusion, considering the operative variables and short-term outcomes, laparoscopic surgery is safe and seems superior to open surgery in elderly patients with rectal cancer. However, further studies with more patients are needed to confirm the results and assess long-term results.

Keywords: Laparoscopic Surgery, Open Surgery, Elderly Patients, Rectal Cancer

1. Introduction

With the improvement in life quality and health care as well as advances in medicine, life expectancy continues to increase worldwide, leading to a higher old-aged population. For example, the life expectancy in China is about 75 years old [1]. And in America, the population over 80 years old is expected to reach 11.4 million, estimated by the US Bureau of Census [2]. Meanwhile, the incidence of colorectal diseases which need surgical intervention, especially colorectal cancer (CRC) usually increases with advancing age. As a matter of fact, about one half of patients with colorectal cancer (CRC) are over 70 years of age and CRC is the second leading cause of cancer death in this age group [3-5]. Most patients present with resectable disease [6, 7]. Surgeons usually give priority to colectomy for CRC surgical treatment in resectable cases and colectomy can be

performed as open colectomy and laparoscopic colectomy. Elderly patients are often regarded as high-risk patients for major abdominal surgery because of a lack of functional reserve and associated medical comorbidities such as cardiovascular and pulmonary diseases, which may play an important role on the outcomes of surgical treatment [8-10]. Thus, surgery for the elderly with CRC is a major medical care issue.

Many published studies reported on the comparison between laparoscopic surgery and open surgery for the elderly patients in aspect of both gastrointestinal cancer and benign disease such as inflammatory bowel disease and diverticular disease and the results showed that laparoscopic surgery were safe and maybe superior [11-14]. In de Campos-Lobato's study [11], the authors focused on 3 different disease conditions including colon cancer, Crohn's disease and diverticular disease, and found that disease

conditions did not matter the benefits of laparoscopy. Laparoscopic surgery is reported to be associated with milder immunologic and inflammatory response [15] and have decreased morbidity and mortality, faster recovery and shorter hospital stay [16, 17]. Decreased postoperative hospital stay duration always reflects faster postoperative recovery of intake of oral food, bowel function and physical activity [18-23]. As to CRC, similar results were found [24-26]. For example, in Issa's study [24], it comprised 93 patients aged 80 years and over who underwent colectomy for CRC between 2005 and 2008, and the result showed that hospital stay was shorter and complications were less in laparoscopic group. In Sklow's study [27], they further assessed the advantages of laparoscopic surgery for the elderly and the young and found that there was no significant difference in different age groups, showing the reliability of laparoscopic surgery in old patients. Similar study was performed by Frasson [14], who found that laparoscopy improved short-term postoperative outcome more in elderly than in younger patients. However, data about with rectal cancer specially is sparse [28, 29], let alone geriatric patients. To the best of our knowledge, no similar data contraposing Chinese population is available. Therefore, we conduct this study to compare the short-term outcomes of laparoscopic surgery and open surgery for elderly patients with rectal cancer.

2. Methods

2.1. Patients

Consecutive patients aged over 75 years who underwent radical laparoscopic surgery for rectal cancer from 2007 to 2013 in the Sixth Affiliated Hospital of Sun Yat-sen University and the First Affiliated Hospital of Guangzhou Medical University were included in this retrospective study and then matched with the same number of patients who underwent radical open surgery for rectal cancer during the same period. Thus, all the eligible patients were divided into two groups, the laparoscopic surgery (LS) group and the open surgery (OS) group. Data about the preoperative status, surgical variables and short-term post-operative outcomes were obtained by careful chart review. This study was approved by the institutional review board of the two hospitals.

Uniform exclusion criteria for both groups ruled out emergency cases, patients who'd got neoadjuvant therapy, patients with recurrent rectal cancer and cases without resection of rectal. Noteworthily, conversion of LS was excluded in our study as the surgical procedure was similar to neither LS nor OS.

As for the standard of matching, patients in the OS group were selected to match with the LS group according to general information and preoperative status including age, gender, body mass index (BMI), preoperative hemoglobin level, comorbid disease, previous abdominal surgery,

American Society of Anesthesiology (ASA) score. Comorbid disease included cardiovascular, respiratory, renal disease, hypertension and diabetes, which might have some effects upon the operation. Others such as cataract were not significant and were thus ignored. Among the variables mentioned above, BMI and preoperative hemoglobin level helped to assess the nutritional status, while comorbidity factors were evaluated by comorbid disease, previous abdominal surgery and especially ASA score. This matching standard could, to some extent, avoid unnecessary bias and confounder as this study mainly focused on the comparison of the two surgical procedures.

Our attention of comparison was the surgical and postoperative evaluation. Surgical variables included type of procedure performed (LS or OS), operative time (defined as the time from incision to closure), estimated blood loss, intraoperative transfusion. Short-term postoperative outcomes, such as intensive care unit (ICU) stay, duration of postoperative hospital stay, short-term complications and reoperation because of complications, were included.

2.2. Statistical Analysis

Data were analyzed using the Statistical Package for Social Science software version 17.0 (SPSS Inc. Chicago, IL, USA). For all variables, descriptive statistics were conducted, including means and standard deviations or medians and ranges for continuous factors, and frequencies for categorical factors. Student's t-tests or Wilcoxon rank sum tests were used to compare continuous factors and Chi-square or Fisher's exact probability tests (if expected cell counts were fewer than 5) for categorical variables, respectively. Differences were considered with statistical significance when the two-sided p value was less than 0.05.

3. Results

3.1. General Information

Totally, 74 patients were included into this study. 37 patients underwent LS for rectal cancer. Another 37 were selected into the OS group according to the matching criteria. Mean age was 77.9 years old in LS group and 79.1 in OS group ($P=0.116$), while gender ratio was similar between the two groups ($P=0.483$). Preoperative nutritional status was comparable in these two groups, with average BMI of 22.5 and 22.0 kg/m² ($P=0.609$), and average hemoglobin of 122.2 and 119.7 g/L ($P=0.603$) in LS group and OS group, respectively. As to preoperative comorbidity factors, 56.8% and 43.2% patients had comorbid disease ($P=0.245$) while previous abdominal surgery was similar ($P=0.394$). About one half (48.6% and 61.1% respectively) of the patients had an ASA score of 3 or 4. Overall, the LS group and OS group were comparable for the matched criteria. Table 1 showed the demographics and clinical characteristics of the enrolled patients, with the p values showing the assessment of matching.

Table 1. Demographics and clinical characteristics of the patients.

Variable	LS group	OS group	p value
No. of patients	37	37	-
Age (years)	77.9±2.5	79.1±3.8	0.116
Gender ratio, F/M	22/15	19/18	0.483
BMI (kg/m ²)	22.5±4.1	22.0±3.3	0.609
Hemoglobin (g/L)	122.2±18.2	119.7±20.3	0.603
Comorbid disease	21 (56.8%)	16 (43.2%)	0.245
Previous abdominal surgery	4 (10.8%)	2 (5.4%)	0.394
ASA score, I/II/III/IV	1/17/16/1	0/14/22/0	0.358
TNM stage, 1/2/3/4	7/13/14/3	6/13/15/3	0.905

LS= laparoscopic surgery, OS= open surgery, F= female, M= male, BMI= body mass index, ASA= American Society of Anesthesiology. Values are expressed as mean ± standard deviation or median (range), or as number (percentage).

3.2. Surgical Variables

Laparoscopic surgery was averagely 28 min longer than open surgery, without significant difference (235 vs. 207 min, P=0.139). In the LS group, estimated blood was significantly lower than the OS group (100 vs. 200 ml, P=0.048), so was the number of patients needing intraoperative transfusion (9.1% vs. 25.7%, P=0.042). Surgical variables were showed in Table 2.

Table 2. Surgical variables.

Variable	LS group	OS group	p value
Operative time (min)	235.4±83.8	207.7±67.9	0.139
Estimated blood loss (ml)	100 (30-1000)	200 (30-3000)	0.048*
Intraoperative transfusion	3 (9.1%)	9 (25.7%)	0.042*

LS= laparoscopic surgery, OS= open surgery. Values are expressed as mean ± standard deviation or median (range), or as number (percentage). *Result with statistical significance.

3.3. Postoperative Evaluation

The frequency of ICU stay was same between the two groups. Postoperative hospital stay duration (14.5 vs. 19.9 days, P=0.039) were significantly decreased in the LS group. The overall complication rates were 27.0% for LS and 51.4% for OS (P=0.032), and wound complication including wound infection and wound disruption occurred markedly more frequently in the OS group (0% vs. 8.1%, P=0.038). Complications other than wound complication were comparable between LS and OS. Seven patients (2 in LS group and 5 in OS group, P=0.2) required reoperation due to postoperative complications. The causes for reoperation included anastomotic fistula (n=1), intestinal obstruction (n=1), hernia (n=2), stoma failure (n=2) and secondary sutures for wound infection or disruption (n=1). Reoperation was similar between the two groups. Table 3 shows the evaluation of postoperative outcomes.

Table 3. Postoperative evaluation.

Variable	LS group	OS group	p value
ICU stay	10 (27.0%)	10 (27.0%)	1.000
Hospital stay (day)	14.5 (7-46)	19.9 (9-93)	0.039*
Complication			
Overall	10 (27.0%)	19 (51.4%)	0.032*
Wound	0 (0%)	3 (8.1%)	0.038*
Abdominal infection	2 (5.4%)	2 (5.4%)	1.000
Intestinal obstruction	2 (5.4%)	2 (5.4%)	1.000
Anastomotic fistula	1 (2.7%)	2 (5.4%)	0.556
Hernia	1 (2.7%)	2 (5.4%)	0.556
Cardiovascular	0(0%)	1 (2.7%)	0.314
Respiratory	1 (2.7%)	4 (10.8%)	0.165
Stoma	1 (2.7%)	1 (2.7%)	1.000
Reoperation	2 (5.4%)	5 (13.5%)	0.233

LS= laparoscopic surgery, OS= open surgery, ICU= intensive care unit. Values are expressed as mean ± standard deviation or median (range), or as number (percentage). *Result with statistical significance.

4. Conclusion

Considering the operative variables and short-term outcomes, laparoscopic surgery in old patients with rectal cancer turn out to be with less estimated blood loss, less need of intraoperative transfusion, shorter duration of postoperative hospital stay and less complications. Our study prove that laparoscopic surgery is safe and superior to open surgery in elderly patients with rectal cancer, which may provide some guidance in clinical practice. However, in the treatment of cancer, the oncologic results in term of long-term survival and recurrence are the most important, so further studies with more patients are needed to confirm the results and assess long-term results.

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