
Surgery for Elder Patients with Colorectal Cancer and Risk Factors for Postoperative Complication

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Abstract: With the increase in life expectancy and medical advance, surgical intervention for elderly patients with colorectal cancer is more and more frequent. In this retrospective study, this study mainly focused on surgery for elderly patients with colorectal cancer. In this study, the characteristics of preoperative, surgical and postoperative variables were described and risk factors for postoperative complication were analyzed. Totally, 221 patients were included in this study. The average age of patients was 78.84 years old and the preoperative nutritional status was roughly normal. 125 (56.56%) patients had comorbid diseases and 146 (67.59%) patients had an ASA score of 3 or 4. Emergency surgery was performed in 12 (5.43%) patients. 125 patients received open surgery while 96 received laparoscopic surgery among which 7 (7.29%) converted to open surgery. 36 (16.29%) patients had to get enterostomy. The average operative time was 220.00 min and the median blood loss was 100 ml with 55 (24.89%) patients needing intraoperative transfusion. As for risk factors for postoperative complication, patients with preoperative comorbid disease, longer operative time, more blood loss and intraoperative transfusion seemed more likely to have complication, although without significant difference. Preoperative low level of album (< 30 g/L) and emergency surgery were independent risk factors for postoperative complication ($p = 0.037$ and 0.021 , respectively). In conclusion, surgery for elder patients with colorectal cancer had its own characteristics, and was controllable in general. Preoperative low level of album (< 30 g/L) and emergency surgery were independent risk factors for postoperative complication.

Keywords: Elderly Patient, Colorectal Cancer, Surgery, Risk Factor, Complication

1. Introduction

Due to the significant advances in life quality and health care, life expectancy continues to increase in the global, leading to a higher old-aged population. Worldwide, life expectancy from birth increased from 61.7 years (95% uncertainty interval (61.4-61.9) in 1980 to 71.5 years (71.0-71.9) in 2013, and to 71.8 years (71.5-72.2) in 2015 [1, 2]. The population over 80 years old is expected to reach 11.4 million in the USA, estimated by the USA Bureau of Census [3]. And in our country, the life expectancy of Chinese is about 75 years old and the proportion of population over 65 years old is over 10% in 2017 [4, 5]. Meanwhile, the incidence of cancers including colorectal cancer increases with advancing

age. In fact, nearly one half of patients with colorectal cancer are aged over 70 years and colorectal cancer is the second leading cause of cancer-related mortality in this age group [6-8]. Aging per se, regardless of other factors, is not a prognostic factor of morbidity and mortality in gastrointestinal surgery [9-11]. However, elderly patients are often regarded as high-risk patients after surgery because advanced age is usually accompanied by underlying comorbidities, such as cardiovascular and pulmonary diseases, which may significantly affect the outcomes of surgical treatment [12-14]. Thus, surgery for the elderly with CRC is a major medical care issue.

There are some previous studies about surgery for elderly patients with colorectal cancer. Pinto RA, et al performed a retrospective analysis to compare the surgical and

postoperative outcomes of laparoscopic colorectal resections with those of open surgery in the octogenarian population and found laparoscopic colorectal resection was effective and safe for octogenarians, with less blood loss and faster postoperative recovery and the morbidity rate was lower than for traditional laparotomy [15]. A retrospective study from Ma L, *et al* enrolled 144 elderly patients (older than 65 years) diagnosed as colorectal cancer and found fast track surgery can effectively protect the perioperative organ function, increase postoperative immune function, decrease inflammation stress reaction, reduce perioperative morbidity of complication, improve efficacy for elderly colorectal cancer patients [16].

This retrospective study mainly focused on surgery for elderly patients with colorectal cancer from tow tertiary care centers in China. Date on the general demographic information, preoperative clinical characteristics, surgical information, postoperative clinical characteristics were collected and analyzed. This study described the characteristics of preoperative, surgical and postoperative variables and analyzed the risk factors for postoperative complication.

2. Patients and Methods

2.1. Patient Selection

Patients aged over 75 years undergoing surgery for colorectal cancer between 2007 and 2013 in the Sixth Affiliated Hospital of Sun Yat-sen University and the First Affiliated Hospital of Guangzhou Medical University (Guangzhou, China), were included in this retrospective study. This study was approved by the institutional review board of the two hospitals.

Data on the preoperative status, surgical variables and short-term postoperative outcomes were obtained by careful chart review. Preoperative status included the demographics data (including age and gender) and physical condition (such as preoperative body mass index (BMI), comorbid disease, previous abdominal surgery and American Society of Anesthesiology (ASA) score) and tumor status (including TNM stage and location). In this study, the related comorbid diseases mainly included cardio-cerebrovascular diseases, pulmonary diseases and diabetes mellitus. Surgical variables mainly included type of surgery (whether it was selective operation or emergency surgery), type of procedure performed (laparoscopic or open surgery), operative time (defined as the time from incision to closure of the skin), estimated blood loss, intraoperative transfusion. Short-term postoperative outcomes, such as intensive care unit (ICU) stay, duration of postoperative hospital stay, short-term complications (happened before discharging from hospital after surgery), reoperation due to complications, were included. Risks factor for postoperative complication were analyzed.

2.2. Statistical Analysis

Data were analyzed using the Statistical Package for Social Science software version 19.0 (SPSS Inc. Chicago, IL, USA). For all variables, descriptive statistics were conducted, including means and standard deviations or medians and quartiles for continuous factors, and frequencies for categorical factors, respectively. Chi-square or Fisher's exact probability tests (if expected cell counts were fewer than 5) were used to analyze risk factors of postoperative complication. Differences were considered with statistical significance when the two-sided p value was less than 0.05.

3. Results

3.1. General Information

In total, 221 patients were included in this study, with an average age of 78.84 years old. The preoperative nutritional status was roughly normal, with an average BMI of 21.98 kg/m², and average hemoglobin and album of 111.77 g/L and 36.13 g/L, respectively. As regards preoperative comorbidity factors, 125 (56.56%) patients had comorbid diseases and nearly one half (49.77%) were comorbid with cardio-cerebrovascular disease, among which most had hypertension. 29 (13.12%) patients had abdominal surgery for other reason previously. 146 (67.59%) patients had an ASA score of 3 or 4. Based on the American Joint Committee on Cancer (AJCC) TNM staging system, there were 28, 81, 79 and 30 patients with stages I, II, III and IV colorectal, respectively. The locations of the tumors were the rectum and colon in 91 and 130 patients, respectively. Table 1 showed the demographics and clinical characteristics of the enrolled patients.

Table 1. Demographics and clinical characteristics of the patients.

Variable	Number
No. of patients	221
Age (years)	78.84±3.44
Gender ratio, F/M	96/125
BMI (kg/m ²)	21.98±3.65
Comorbid disease	125 (56.56%)
Heart	110 (49.77)
Lung	22 (9.95%)
Diabetes Mellitus	22 (9.95%)
Hemoglobin (g/L)	111.77±23.29
Album (g/L)	36.13 ±5.83
Previous abdominal surgery	29 (13.12%)
ASA score, I/II/III/IV	1/69/138/8
TNM stage, 1/2/3/4	28/81/79/30
Tumor location, rectum/colon	91/130

F= female, M= male, BMI= body mass index, ASA= American Society of Anesthesiology.

Values are expressed as mean ± standard deviation or median (quartile), or as number (percentage).

3.2. Surgical Variables

Emergency surgery was performed in 12 (5.43%) patients mainly because of intestinal obstruction. 125 patients received

open surgery while 96 received laparoscopic surgery among which 7 (7.29%) converted to open surgery. 36 (16.29%) patients had to get enterostomy. The average operative time was 220.00 min and the median blood loss was 100 ml with 55 (24.89%) patients needing intraoperative transfusion. Surgical variables were showed in Table 2.

Table 2. Surgical variables.

Variable	Number
Emergency surgery	12 (5.43%)
Surgical procedures, laparoscopic/open	96/125
Conversion from laparoscopic to open	7 (7.29%)
Enterostomy	36 (16.29%)
Operative time (min)	220.00±77.93
Estimated blood loss (ml)	100 (80-200)
Intraoperative transfusion	55 (24.89%)

Values are expressed as mean ± standard deviation or median (quartile), or as number (percentage).

3.3. Postoperative Evaluation

Median hospital stay duration postoperatively was 14 days and 64 (28.96%) had to enter ICU. As to the postoperative complication, 71 (32.13%) patients had some kind of complications, among which most were wound complication, intestinal obstruction and respiratory complication (16, 17 and 22 cases, respectively). A total of 15 patients required reoperation due to postoperative complications. The causes for reoperation included anastomotic fistula (n=1), intestinal obstruction (n=2), hernia (n=3), stoma failure (n=2) and secondary sutures for wound infection or disruption (n=7). The evaluation of

short-term postoperative outcomes is presented in Table 3.

Table 3. Postoperative variables.

Variable	Number
Postoperative hospital stay duration (days)	14 (11-20)
Postoperative ICU stay	64 (28.96%)
Complication	71 (32.13%)
Wound	16 (7.24%)
Abdominal infection	8 (3.62%)
Intestinal obstruction	17 (7.69%)
Anastomotic fistula	6 (2.71%)
Hernia	4 (1.81)
Cardiovascular	5 (2.26%)
Respiratory	22 (9.95%)
Stoma	6 (2.71%)
Reoperation for complication	15 (6.79%)

ICU = intensive care unit.

Values are expressed as mean ± standard deviation or median (quartile), or as number (percentage).

3.4. Risk Factors for Postoperative Complication

Association between the risk of postoperative complication and preoperative or surgical variables was analyzed (showed in Table 4). Patients with preoperative comorbid disease, longer operative time, more blood loss and intraoperative transfusion seemed more likely to have complication, although without significant difference. Preoperative low level of album (<30 g/L) and emergency surgery were independent risk factors for postoperative complication (p = 0.037 and 0.021, respectively).

Table 4. Risk factor for postoperative complication.

Variable	Postoperative complication		p value
	yes	no	
Gender, F/M	42/29	81/67	0.537
Preoperative BMI (kg/m ²), >24/<24	13/44	33/77	0.324
ASA, 1-2/3-4	20/51	55/95	0.213
Preoperative Album (g/L), >30/<30	46/14	108/14	0.037*
Preoperative Hemoglobin (g/L), >90/<90	52/10	103/22	0.801
Preoperative Comorbid disease, yes/no	45/26	80/70	0.159
Previous abdominal surgery, yes/no	9/62	20/130	0.893
Location of tumor, rectum/colon	31/40	60/90	0.605
TNM stage, 1-2/3-4	40/31	72/78	0.247
Emergency surgery, yes/no	8/63	4/146	0.021*
Surgical procedures, laparoscopic/open	31/40	65/85	0.963
Conversion, yes/no	4/27	3/62	0.298
Operative time (min), >220/<220	34/31	56/82	0.117
Blood loss (ml), >100/<100	33/32	53/84	0.105
Intraoperative transfusion, yes/no	22/43	33/106	0.130
Postoperative ICU stay	24/47	40/109	0.580

F= female, M= male, BMI= body mass index, ASA= American Society of Anesthesiology.

*Results with statistical significance with two-sided p < 0.05.

4. Conclusion

Surgery for elder patients with colorectal cancer had its own characteristics and it was controllable in general. Preoperative low level of album (< 30 g/L) and emergency surgery were independent risk factors for postoperative complication.

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