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Original Research Article

Surgical Outcomes of Colorectal Cancer Surgery for ≥ 85-year-old Patients in Our Hospital: Retrospective Comparison of Short- and Long-term Outcomes with Younger Patients

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Abstract

Objectives: To evaluate future problems in colorectal cancer surgery for elderly patients.

Methods: We conducted a retrospective review of patients receiving colorectal cancer surgery in our hospital from January 2010 to December 2018. Patients were divided into the ≥ 85-year-old patient group and the younger patient group. We compared patient backgrounds, surgical outcomes (surgical procedure, reduction of lymph node dissection range, operative duration, and blood loss), postoperative short-term outcomes (mortality, morbidity, and postoperative length of stay) and prognosis.

Results: We performed colorectal cancer surgery on 1,240 patients during the study period. Of them, 109 (8.7%) were ≥ 85 years old, and 1,131 (91.2%) were < 85 years old. The American Society of Anesthesiologists physical status (ASA-PS) was significantly poorer in the elderly group than in the younger group and patients with a history of cardiac disease and anticoagulant use were significantly more in the elderly group. The rate of reduction of lymph node dissection range was significantly higher in the elderly group (16.8% vs. 3.8%, $p < 0.05$). Overall morbidity was significantly higher in the elderly group (42.2% vs. 21.9%, $p < 0.05$), as were the respective frequencies of pneumonia and thromboembolism (8.2% vs. 0.7%, $p < 0.05$ and 3.6% vs. 0.8%, $p < 0.05$, respectively). Postoperative hospital stay was significantly longer in the elderly group (17 vs. 12 days, $p < 0.05$). Overall survival was significantly lower in the elderly group ($p < 0.05$), but relapse-free survival and colorectal cancer-specific survival were not statistically different between the groups ($p = 0.05$ and $p = 0.15$, respectively).

Conclusions: Prevention of postoperative pneumonia and thromboembolism remains a problem. After proper assessment and careful management of peri-operative surgical risks, surgery can be indicated in elderly patients.

Keywords

colorectal cancer surgery, elderly patients, ≥ 85-year-old

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Introduction

Elderly people aged ≥ 85 years comprised 0.3% of the population in Kanagawa in 1980 and 2.9% in 2015[1]. Aging of the population involves an increased opportunity for elderly patients to receive colorectal cancer surgery. Elderly patients have a poor general condition and shorter life span compared with younger patients. It is important for clinicians to judge whether receiving surgery is the better choice for these elderly patients. Many articles have reported on colorectal cancer surgery for elderly patients. Although some researchers have reported that the morbidity and mortality of

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colorectal surgery for elderly patients are high[2-4], other authors have reported that postoperative colorectal cancer-specific survival is not lower than that in younger patients[2,4,5]. In our hospital, we recommend surgery to elderly patients when we feel that they can tolerate the surgery. However, we have experienced not a few morbidities following colorectal cancer surgery in these patients. In this study, we retrospectively examined patient backgrounds and short-term surgical outcome and prognosis of elderly patients who received colorectal cancer surgery in our hospital, and we evaluated future problems in colorectal cancer surgery for these patients.

Methods

We conducted a retrospective review of patients who received colorectal cancer surgery in our hospital from January 2010 to December 2018. The patients were divided into the ≥ 85-year-old patient group and the younger patient group. We compared patient backgrounds (age, sex, tumor location, American Society of Anesthesiologists physical status (ASA-PS), comorbidities, and pathological stage), surgical outcomes (surgical procedure, reduction of lymph node dissection range, operative duration, and blood loss), postoperative short-term outcomes (mortality, morbidity, and postoperative length of stay) and prognosis. We excluded patients who received emergency surgery and local resection. Comorbidities included cardiac disease and cerebrovascular disease, and we examined the preoperative use of anticoagulants. Stage was classified according to the 9th Japanese Classification of Colorectal, Appendiceal, and Anal Carcinoma[6]. When patients with Stage I-III colorectal cancer did not receive lymph node dissection according to the JSCCR Guidelines 2014 for the Treatment of Colorectal Cancer[7], we considered the lymph node dissection range to be reduced. Morbidities were classified according to the Clavien-Dindo classification into surgical site infection, ileus, intra-abdominal abscess, anastomotic leakage, pneumonia, thromboembolism, lymphorrhea, postoperative bleeding, and others. We examined complications higher than grade I and assessed the complication with the highest grade when patients suffered multiple complications.

Overall survival, relapse-free survival, and colorectal cancer-specific survival were compared between the two groups. The survival outcomes were compared in patients who received surgery from January 2010 to December 2015. Patients with a distant metastasis that was not resected with the primary tumor were excluded.

We conducted preoperative examination of physiological function, such as spirometry, exercise electrocardiography, and cardiac ultrasonography, on the patients and judged their tolerance to surgery based on these results, their performance status (PS) and comorbidities, but we weighed the results of exercise electrocardiography the most in our decision. We consulted anesthesiologists and cardiologists as necessary. We mainly utilized the laparoscopic approach for performing colorectal cancer surgery. However, we performed open surgery when the primary tumor was considerably invasive; furthermore, we performed open surgery in patients with poor respiratory function using epidural and spinal anesthesia. We performed lymph node dissection as per the guidelines, but when the preoperative general condition of the patient was poor, we occasionally reduced the range of lymph node dissection.

Comparisons were conducted using the Mann-Whitney U test for quantitative variables and Fisher's exact test for categorical variables. The survival outcomes were compared using the log rank test and summarized using Kaplan-Meier curves. P values < 0.05 were considered to be statistically significant.

This study was conducted with approval from the St. Marianna University School of Medicine's ethics committee (approval number: 4479). Consent was obtained from all patients using the opt-out method.

Results

We performed colorectal cancer surgery on 1,240 patients from January 2010 to December 2018. Of these patients, 109 (8.7%) were ≥ 85 years old, and 1,131 (91.2%) were < 85 years old. The mean age was 87 (85-98) years in the elderly group and 69 (20-84) years in the younger group. The ASA-PS was significantly poorer in the elderly group than in the younger group and the number of patients with a history of cardiac disease and anticoagulant use was significantly greater in the elderly group. There was no significant difference in final stage between the two groups (p = 1) (Table 1).

There was no significant difference in surgical procedures between the two groups. Open surgery was selected more frequently in the elderly group (22.0% vs. 14.0%, p < 0.05), but when open conversion was included in the open surgery group, there was no significant difference in the use of the abdominal approach (22.9% vs. 15.5%, p = 0.056). There was also no significant difference in the rate of open conversions between the two groups (0.9% vs. 1.5%, p = 0.71). The differences in operative duration and blood loss between the two groups were also not significant (p = 0.92 and p = 0.05, respectively) (Table 2). The range of lymph node dissection was significantly reduced in the elderly group.

There was no significant difference in mortality between the two groups (1.8% vs. 0.3%, p = 0.09), but overall morbidity was significantly higher in the elderly group (42.2% vs. 21.9%, p < 0.05). The respective frequencies of pneumonia and thromboembolism were higher in the elderly group

Table 1. Patient Background.

	≥85 years (N = 109)	<85 years (N = 1131)	P
Age (years)	87 (85–98)	69 (20–84)	
Sex (Male/Female)	64/45	652/480	0.84
ASA-PS (1/2/3)	0/86/23 (0/78.8/21.1)	80/930/121 (7/82.2/10.6)	<0.05
Comorbidities			
Cardiac disease	38 (34.8)	167 (14.7)	<0.05
Cerebrovascular disease	14 (12.8)	90 (7.9)	0.1
Use of anti-coagulants	42 (38.5)	219 (19.3)	<0.05
Tumor location			0.48
Appendix	0	7 (0.65)	
Cecum	12 (11)	93 (8.2)	
Ascending colon	25 (22.9)	199 (17.5)	
Transverse colon	12 (11)	109 (9.6)	
Descending colon	3 (2.7)	79 (6.9)	
Sigmoid colon	28 (25.6)	302 (26.6)	
Rectosigmoid colon	11 (10)	129 (11.4)	
Ra	12 (11)	102 (9.0)	
Rb	8 (8.2)	138 (12.1)	
Rbp	1 (0.9)	8 (0.7)	
Other	0	1 (0.08) *	
fStage			
0	2 (1.8)	28 (2.4)	
I	18 (16.5)	232 (20.4)	
IIa	40 (36.6)	302 (26.7)	
IIb	2 (1.8)	25 (2.2)	
IIc	2 (1.8)	14 (1.2)	
IIIa	3 (2.7)	44 (3.8)	
IIIb	28 (25.6)	232 (20.4)	
IIIc	7 (6.4)	64 (5.6)	
IV	5 (4.5)	159 (14.0)	
Recurrence	1 (0.9)	29 (2.6)	
Unknown**	1 (0.9)	2 (0.1)	

There was no difference in stage between the two groups.

Values are reported as number (percentage) or median (range).

In the elderly group, three patients had primary tumors in two sites. In the younger group, 31 patients had primary tumors in two sites, and 3 patients had primary tumors in three sites.

* Mesentery

** Difficulties in histological assessment due to specimen degeneration

(8.2% vs. 0.7%, $p < 0.05$ and 3.6% vs. 0.8%, $p < 0.05$). The postoperative hospital stay was significantly longer in the elderly group (17 vs. 12 days, $p < 0.05$). However, there was no significant difference in the severity of morbidity between the two groups (Table 3).

Overall survival was significantly lower in the elderly group ($p < 0.05$), but there was no statistical difference in relapse-free survival between the two groups ($p = 0.05$). There was also no significant difference in colorectal cancer-specific survival between the two groups ($p = 0.15$) (Figure 1). The mean follow-up periods were 30 (1-106) months and 56 (1-114) months, respectively.

Among the patients who were ≥ 85 years, 31 patients selected palliative treatment. Of these 31 patients, 1 patient underwent colostomy, 3 patients underwent colonic stent placement, and 15 were cStage I-III.

Discussion

In this study, there were no significant differences in the incidence of local complications such as surgical site infection, anastomotic leakage, and abdominal abscess, but the incidence of general complications such as pneumonia and thromboembolism was significantly higher in the ≥ 85-year-old patients than in the younger patients. Articles comparing surgical outcomes in colorectal cancer surgery between elderly patients and younger patients reported similar results. Hata et al.[2] reported that the frequency of total postopera-

Table 2. Surgical Outcomes in the ≥85-year-old Patients and the Younger Patients.

	≥85 years (N = 109)	<85 years (N = 1,131)	P
Surgical procedure			1
Ileocecal resection	26 (23.8)	219 (19.3)	
Right hemicolectomy	14 (12.8)	108 (9.5)	
Left hemicolectomy	1 (0.9)	17 (1.5)	
Sigmoidectomy	24 (22.0)	266 (23.5)	
Partial resection	11 (10.0)	136 (12.0)	
High anterior resection	8 (7.3)	80 (7.0)	
Low anterior resection	15 (13.7)	213 (18.8)	
Inter-sphincter resection	1 (0.9)	19 (1.6)	
Hartmann operation	7 (6.4)	25 (2.2)	
Abdominoperineal resection	2 (1.8)	49 (4.3)	
Total pelvic exenteration	0	3 (0.2)	
Other	1 (0.9) *	1 (0.08) **	
Double region	1 (0.9)	5 (0.4)	0.42
Open surgery	25 (22.9)	176 (15.5)	0.06
Conversion to open	1 (0.9)	17 (1.5)	0.71
Operative duration (min)	266 (90–642)	288 (72–1,035)	0.05
Blood loss (mL)	83 (5–3,819)	100 (5–23,017)	0.92

* Total colorectal resection, ** Total colon resection

Values are reported as number (percentage) or median (range).

Table 3. Short-term Postoperative Outcomes of the ≥85-year-old Patients and the Younger Patients.

	≥85 years (N = 109)	<85 years (N = 1,131)	p
Mortality	2 (1.8)	4 (0.3)	0.09
Overall morbidity	46 (42.2)	249 (21.9)	<0.05
Surgical site infection	12 (11.0)	80 (7.0)	0.13
Ileus	11 (10.0)	61 (5.3)	0.05
Anastomotic leakage	6 (5.5)	60 (5.3)	0.83
Intra-abdominal abscess	2 (1.8)	24 (2.1)	1
Lymphorrhea	2 (1.8)	15 (1.3)	0.66
Thromboembolism	4 (3.6)	10 (0.8)	<0.05
Pneumonia	9 (8.2)	8 (0.7)	<0.05
Postoperative bleeding	2 (1.8)	3 (0.2)	0.06
Other	9 (8.2)	33 (2.9)	
Length of stay after surgery (days)	17 (7–158)	12 (1–226)	<0.05
Clavien-Dindo classification			
Grade I	6 (5.5)	48 (4.2)	
Grade II	23 (21.1)	84 (7.4)	
Grade IIIa	8 (7.3)	75 (6.6)	
Grade IIIb	4 (3.6)	25 (2.2)	
Grade IVa	3 (2.7)	6 (0.5)	
Grade IVb	0	1 (0.08)	
Grade V	2 (1.8)	4 (0.3)	

Values are reported as number (percentage) or median (range).

tive complications in patients ≥ 80 years old was higher than that in younger patients; in particular, the frequencies of delirium and respiratory complications were higher. Nitsche et al.[5] reported that patients aged ≥ 75 years did not have significantly higher rates of intraoperative complications or surgical morbidity but developed more general complications such as pneumonia and urinary tract infections. These researchers reported no significant difference in mortality between elderly patients and younger patients[2,5,8], but some researchers reported that mortality was higher in the elderly

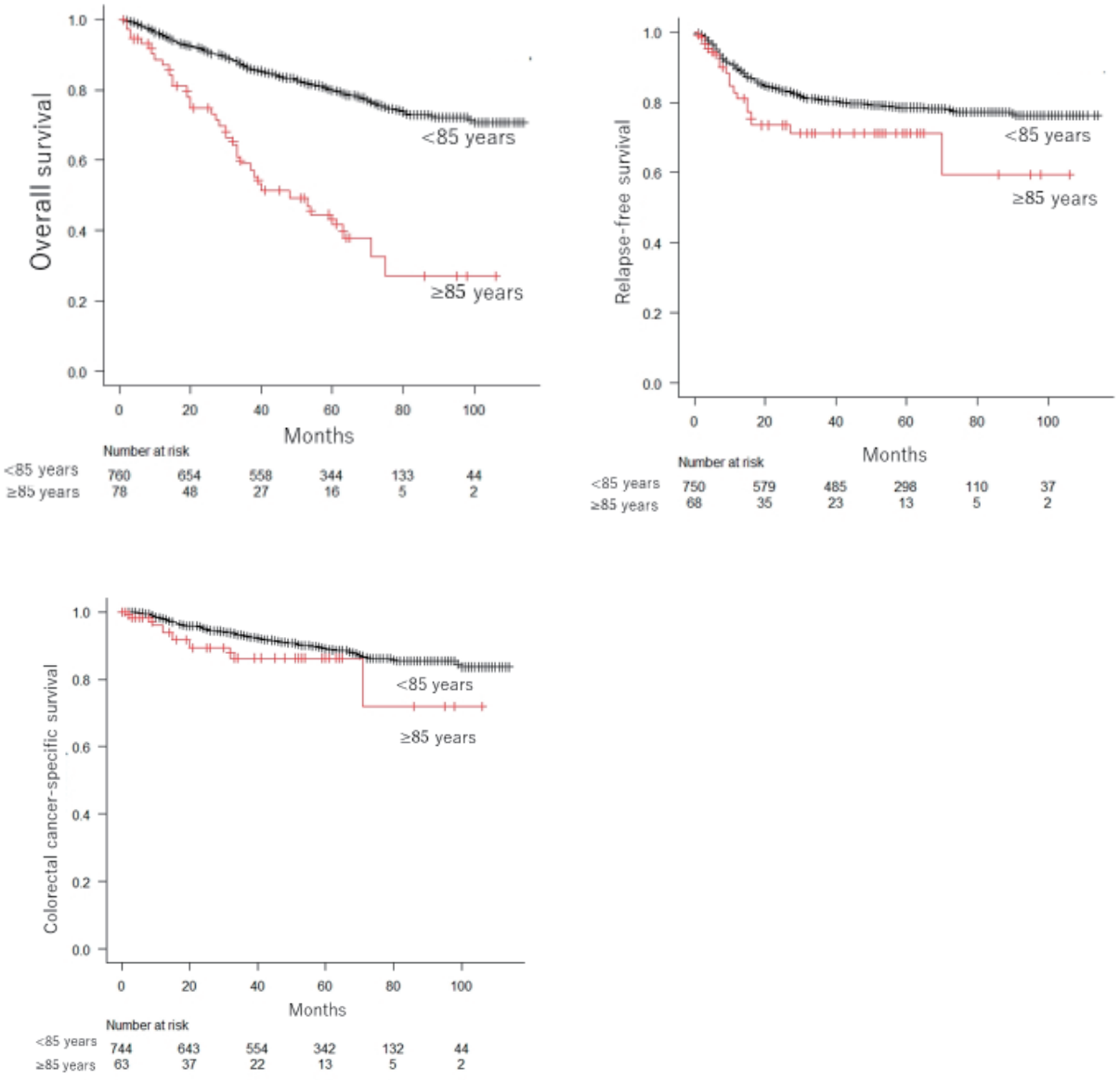

Figure 1. Overall survival was significantly lower in the ≥85-year-old patients ($P < 0.05$). No statistical differences were found in the rates of relapse-free survival and colorectal cancer-specific survival were found between the two groups ($p = 0.06$ and 0.15, respectively).

patients[3,9].

Many researchers who compared long-term outcomes in colorectal cancer surgery between elderly and younger patients reported results similar to those of the present study[2,5]. Dekker et al.[4] reported that elderly colorectal cancer patients had higher mortality, but those who survived the first year had the same cancer-related survival as younger patients. Therefore, treatment of elderly colorectal cancer patients should focus on peri-operative care and the first postoperative year.

In the present study, the range of lymph node dissection was significantly reduced in the elderly group, but there was no statistical difference in colorectal cancer prognosis between the two groups. However, Takahashi et al.[10] reported that limited lymph node dissection was not recommended in elderly patients. They reported that in stage II or III colon surgery for patients aged ≥ 80 years overall, relapse-free and cancer-specific survival rates were higher in the patients who had ≥ 12 harvested lymph nodes. Further study of the range of lymph node dissection necessary in elderly colorectal cancer patients is needed.

Kochi et al.[9] reported that restrictive respiratory impairment, obstructive respiratory impairment, history of cerebrovascular events and open surgery were determined to be risk factors of postoperative pneumonia in colorectal surgery for patients aged ≥ 80 years. Recently, many researchers have reported that short-term outcomes of laparoscopic colorectal surgery for their elderly patients were better than

those of open surgery[11-14]. Niitsu et al.[13] reported that laparoscopic surgery in elderly colorectal cancer patients with poor performance status was safe and not inferior to open surgery in terms of overall survival. The present study demonstrated no significant differences in overall morbidity between laparoscopic surgery and open surgery in the ≥ 85-year-old patients.

Postoperative thromboembolism occurred in four of the study patients; pulmonary thromboembolism occurred in two patients; and cerebral infarction and superior mesenteric artery embolism occurred in one patient. According to the Guidelines for Diagnosis, Treatment, and Prevention of Pulmonary Thromboembolism and Deep Vein Thrombosis[15], aging, surgery, and a malignant tumor are risk factors for pulmonary thromboembolism. Abdominal cancer surgery for patients age ≥ 40 years is classified as high-risk surgery. In addition to early ambulation, intermittent pneumatic compression, and use of prophylaxis are recommended.

In the present study, the elderly patients who suffered pneumonia and thromboembolism were those who experienced complications of Clavien-Dindo grades IVa and V. However, these complications would seem to be preventable by further promotion of rehabilitation. Early ambulation may be difficult for elderly patients with poor performance status. Both preoperative and postoperative rehabilitation appear to be important. Recent evidence has indicated that the preoperative period is the better time to intervene. Barberan-Garcia et al.[16] reported that personalized prehabilitation in high-risk patients (age > 70 years, ASA III/IV) undergoing major abdominal surgery reduced postoperative complications. In the Guidelines for Cancer Rehabilitation edited by The Japanese Association of Rehabilitation of Medicine[17], prehabilitation is recommended to patients expecting to undergo open surgery to prevent postoperative complications and shorten their postoperative hospital stay. In our hospital, when patients have poor respiratory function, we preoperatively instruct them at home on the use of respiratory training devices. Physical therapists promote elderly patients to ambulate from the next morning following surgery. However, manpower of the physical therapists is limited and is used mainly for postoperative rehabilitation. Therefore, preoperative training at home cannot always be performed, and it remains a continuing problem. In addition, proper judgment of whether patients could tolerate surgery would seem to be important.

Our study has some limitations. This is a retrospective study conducted at a single institution. Thus, the significance of this study is limited compared to that of a multicenter trial. There were also some differences in patient background, such as in ASA-PS, comorbidities, and anticoagulant use, between the two groups. These differences could possibly influence the postoperative hospital stay and the rate of complications, but as these background factors are typically associated with aging, we did not perform a case-matching study.

Prevention of postoperative pneumonia and thromboembolism remains a problem. After proper assessment and careful management of peri-operative surgical risks, surgery can be indicated in elderly patients.

Conflicts of Interest

There are no conflicts of interest.

Author Contributions

Asako Fukuoka: Substantial contributions to the conception or design of the work and the acquisition, analysis, or interpretation of data for the work

Ryoji Makizumi: Drafting the work or revising it critically for important intellectual content

Takayuki Asano: Drafting the work or revising it critically for important intellectual content

Taro Hamabe: Drafting the work or revising it critically for important intellectual content

Takehito Otsubo: Final approval of the version to be published

Approval by Institutional Review Board (IRB)

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Approval from the St. Marianna University School of Medicine's ethics committee

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