

Original Article

# Colorectal Surgery in Patients over 90 Years Old: Shuang-Ho Hospital Experiences

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## Key Words

Colorectal surgery;

90 years old;

Laparoscopic surgery

**Background.** As society ages, the number of patients over 90 years old is increasing. Some of these patients need surgery. However, the treatment guidelines for elderly patients who need surgery remain unclear. This study aimed to assess short-term outcomes in patients  $\geq 90$  years old who underwent colorectal surgery.

**Materials and Methods.** From November 2013 to May 2019, patients over 90 years old receiving colorectal surgery in Shuang-Ho Hospital were included in this study. Patients' characteristics, operative findings, and medical records were reviewed retrospectively. Primary outcomes measured 30-day mortality, morbidity, and length of hospital stay. We also compared surgical outcomes between elective surgery and emergent surgery.

**Results.** Of the 46 patients, the mean age was 91.9 years, and the study included 25 male and 21 female patients. Of them, 18 patients (39%) underwent emergency surgery with three mortality. The most performed surgery is anterior resection (26%), and urinary tract infection (9%) and postoperative ileus (9%) were the most common postoperative complications. A total of 28 patients underwent elective surgery, and 14 had a laparoscopic operation. There was a statistical difference in operation time between laparoscopic and open surgery ( $p = 0.03$ ) but no difference in blood loss, intensive care unit stay, and lengths of hospital stay.

**Conclusions.** Although elderly patients are considered to have higher risks when having major abdominal surgery, our study showed a total mortality rate of 9%. For elective surgery, operative outcomes were similar between laparoscopic and open surgery. Further study is needed for detailed investigation.

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Colorectal cancer (CRC) is one of the most common cancers in the world, and its incidence is increasing.<sup>1</sup> CRC is the third most common cause of death from cancer in both men and women in Taiwan.<sup>2</sup> About 60% of CRC patients are older than 70 years at the time of diagnosis, and 43% are older than 75 years.<sup>1</sup> With people's life expectancy increasing gradually,

the number of elderly patients will increase.

In addition, diverticular disease of the colon is another important cause of hospital admission.<sup>3</sup> About 50% of individuals aged 60 years and older will have diverticulosis. By the age of 80 years, approximately 70% of patients will have diverticulosis.<sup>4</sup> Some of these people develop diverticulitis and may need sur-

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gical intervention. Sigmoid volvulus is another disease that mostly occurs in older adults.<sup>5</sup> Surgery is indicated in case of failure of endoscopic reduction and prevention of recurrence. However, elderly patients are more likely to have cardiovascular and pulmonary comorbidities. This situation is expected to increase the risk of operation and postoperative morbidity and mortality. Nevertheless, surgical resection has remained the first-choice treatment for patients with CRC and is necessary in case of an abdominal emergency such as Hinchey stage IV diverticulitis and un-reduced volvulus.

Aging is very individualized, and the patient's health is poorly reflected in chronological age. With the improvement of surgical techniques, medical devices, and postoperative care, performing surgery on old patients is not so challenging than before. But there are a few studies of very old patients, especially older than 90 years. Hence, this study aimed to investigate the outcomes of patients with CRC aged more than 90 years who underwent surgery in Shuang Ho-Hospital.

## Materials and Methods

We conducted a retrospective study of all patients undergoing colorectal surgery for primary colon lesions at Shuang Ho Hospital between November 2013 and May 2019.

We collected patient information of age, sex, body mass index, American Society of Anesthesiologists (ASA) score, preoperative comorbidities, surgical method, postoperative morbidity, postoperative hospital stay, and postoperative 30-day mortality by reviewing medical records. Emergent surgery was defined as surgery performed within 24 h after hospital admission. The definition of postoperative ileus was the patient could not tolerate a soft diet on postoperative day 7.<sup>6</sup>

The Statistical Package for the Social Science (SPSS) 25.0 for Windows (SPSS Inc. Chicago, IL, USA) was used for analysis. Categorical variables were compared with the chi-square test or student test when appropriate. A *p*-value lower than 0.05 was considered statistically significant.

## Results

A total of 46 patients were included: 25 male and 21 female patients. The mean age was 91.9 years. The patients' demographics and operation type are presented in Table 1. Of them, 18 patients (39%) underwent emergency surgery with three mortality and 28 (61%) patients underwent elective surgery with one mortality. Among the mortality patients, one was a 90 years old male patient with ischemic descending colon and underwent emergent left hemicolectomy. This patient had acute ST elevation myocardial infarction

**Table 1.** Patient demographics

Demographic and clinical characteristics	N = 46
Age	91.89 ± 1.76
Sex	
Male	25
Female	21
Body mass index (BMI)	21.58 ± 3.79
ASA	
1	0
2	33 (72%)
3	12 (26%)
4	1 (2%)
Comorbidity	
Diabetes mellitus	13 (28%)
Hypertension	34 (74%)
Coronary artery disease	10 (22%)
Chronic kidney disease	3 (7%)
Pulmonary disease	4 (9%)
Cerebrovascular accident	3 (7%)
Diagnosis	
Cancer	30 (65%)
Benign lesion	16 (35%)
Operation	
Emergent	18 (39%)
Elective	28 (61%)
Surgery	
Laparoscopic	14 (30%)
Open	32 (70%)
Procedure	
Right hemicolectomy	8 (17%)
Left hemicolectomy	3 (7%)
Anterior resection	12 (26%)
Hartmann's	4 (9%)
Reverse Hartmann	1 (2%)
Loop T-colostomy	10 (22%)
Stomy closure	4 (9%)
Others	4 (9%)

on postoperative day 3 and died because of multi-organ failure. The other patient was a 95 years old male patient underwent emergent right hemicolectomy because of intractable ascending colon tumor bleeding and died due to hemorrhagic shock in the operation. Another patient was a 95 years old man had bowel resection owing to ascending colon hemorrhage and obstruction and was died because of pulmonary embolism. The last one was a 92 years old woman with ascending colon cancer and underwent right hemicolectomy and died because of pneumonia with acute respiratory distress syndrome. The overall mortality rate was 9% and if we excluded stoma-related patient, the mortality rate was 13%.

The most performed surgery is anterior resection (26%), followed by T-colostomy (22%) and right hemicolectomy (17%). Totally, there were four mortality cases (8.7%), and 15 postoperative complications (Table 2).

Urinary tract infection (9%) and postoperative ileus (9%) were the most common postoperative complications. All were improving after medical treatment. Three patients had respiratory situations, two had pneumonia, and one had pulmonary embolism. Two patients had a cardiac situation, and both were refractory atrial fibrillation. One patient was noted to have an anastomosis leak.

A total of 28 patients underwent elective surgery. Twelve had a laparoscopic operation, and 16 had open surgery. There was no statistical difference in blood loss, intensive care unit (ICU) admission, and lengths of hospital stay but operation time (Table 3).

There were 18 patients who had emergent surgery. In comparison with elective surgery patients, there was no statistical difference in blood loss, ICU admission, and length of hospital stay but the proportion of postoperative ICU admission. The ASA score was higher in the emergent surgery group (Table 4).

## Discussion

The challenge of surgery in elderly patients comes from the physiological heterogeneity, the potential complications of coexisting comorbidities, and social

care issues.<sup>7</sup> A careful appraisal is necessary for a better selection of patients who benefit from surgery. A paucity of study made it difficult to do an evidence-based decision making. In this study, the overall in-hospital mortality rate was 8.7% ( $n = 4$ ), which was consistent with that of the currently available studies. Ford et al.<sup>8</sup> reported 33%, Rubinfeld et al.<sup>9</sup> reported 15%, and Lavanchy et al.<sup>10</sup> reported 16%. But those studies only included patients who had emergent surgery or had been in the ICU. In the current study, the mortality rate of emergent surgery was 17% and elective surgery 4%. The former was in accordance with other studies. The causes of mortality of emergent surgery were myocardial infarction, profound hemorrhage shock of enterovascular fistula, and respiratory failure. The other mortality case of elective surgery was due to pneumonia, and septic shock.

**Table 2.** Morbidity and mortality

Morbidity and mortality (N = 46)	
ICU	
Yes	20 (43%)
No	26 (57%)
ICU stay (days)	2.85 ± 8.22
Comorbidity of patients in ICU	
Diabetes mellitus	6 (30%)
Hypertension	16 (80%)
Coronary artery disease	5 (25%)
Chronic kidney disease	0 (0%)
Pulmonary disease	2 (10%)
Cerebrovascular accident	1 (5%)
Comorbidity of patients not in ICU	
Diabetes mellitus	7 (29%)
Hypertension	18 (69%)
Coronary artery disease	5 (19%)
Chronic kidney disease	3 (12%)
Pulmonary disease	2 (8%)
Cerebrovascular accident	2 (8%)
OP to discharge (days)	14.93 ± 8.3
Post OP complications	
Leak	1 (2%)
Respiratory	3 (7%)
Urinary tract infection	4 (9%)
Cardiac	2 (4%)
Wound infection	1 (2%)
Postoperative ileus	4 (9%)
Mortality (30 days)	4 (9%)
Mortality rate without stomy-related surgery	4 (13%)

**Table 3.** Laparoscopic vs. open surgery (in elective surgery)

Laparoscopic vs. open surgery (in elective surgery, N = 28)			
	Laparoscopic	Open	<i>p</i> value
N	12 (43%)	16 (57%)	
Surgery			
Right hemicolectomy	2 (17%)	4 (25%)	
Left hemicolectomy	1 (8%)	1 (6%)	
Anterior resection	7 (60%)	3 (19%)	
Hartmann's	0	0	
Others	2 (17%)	8 (50%)	
ASA			
0-2	12	12	0.11
3	0	4	
4	0	0	
ICU	3 (25%)	6 (38%)	0.69
Days in ICU	1.67 ± 1.16	2.33 ± 0.82	0.34
OP to discharge (days)	13.25 ± 5.64	13.25 ± 4.52	1
OP time	150.09 ± 57.56	97.25 ± 60.55	0.03
Blood loss	55.83 ± 72.8	66.88 ± 137.15	0.80
Diagnosis			
Cancer	11 (92%)	9 (56%)	
Benign	1 (8%)	7 (44%)	
Mortality (30 days)	0	1	

Laparoscopic colectomy is now widely used to treat CRC and decrease the rate of postoperative complications.<sup>11</sup> In our study, no difference between conventional open surgery in postoperative ICU care, days of ICU stay, perioperative outcome, or lengths of hospital stay were noted. Previous studies<sup>12,13</sup> showed that laparoscopic colectomy offered better results in terms of morbidity and length of hospital stays in patients younger than 85 years. With a good preoperative assessment of comorbidity conditions and perioperative care, laparoscopic surgery is still safe in elderly patients.<sup>14</sup> Data of the present study showed less operation time with open surgery. We assumed that owing to the proportion of surgery was different.

The treatment of colorectal cancer of those older than 90 years often presents clinical dilemmas. Some studies show that the decreased survival in the elderly is mainly because of the differences in early mortality in the first postoperative year.<sup>15-17</sup> However, once the patient survives the first postoperative year, the cancer-related mortality equals that of younger patients.<sup>17,18</sup> Apart from mortality, risk of functional decline should also be taken into account. Hamaker et al. reported more

**Table 4.** Emergent surgery vs. elective surgery

Emergent surgery vs. elective surgery			
	Elective surgery	Emergent surgery	<i>p</i> value
N	28 (61%)	18 (39%)	
ASA			0.02
0-2	24	9	
3	4	8	
4		1	
ICU	9 (32%)	11 (61%)	0.05
Days in ICU	2.11 ± 0.93	9.18 ± 14.63	0.14
OP to discharge (days)	13.25 ± 4.93	17.56 ± 11.48	0.15
OP time	120.25 ± 64.17	104.67 ± 83.63	0.48
Blood loss	62.14 ± 112.43	215.83 ± 479.78	0.2
Diagnosis			
Cancer	20 (71%)	10 (56%)	
Benign	8 (29%)	8 (44%)	
Mortality (30 days)	1 (5%)	3 (17%)	0.284

60% patients had functional decline after surgery in patients older than 80 years old.<sup>19</sup> Therefore, optimal appraisal and detail explanation to the patient and the family are essential for the decision making of treatment.

Postoperative morbidity increased in the elderly patients and is related to mortality.<sup>15</sup> Efforts should be made to decrease the occurrence of postoperative complications. Age is not a useful tool for selection. Measurements such as ASA score, Eastern Cooperative Oncology Group (ECOG) performance status, and cardiopulmonary comorbidity are needed. It is easy to miss geriatric impairments in a general oncologic work-up. Simple tests like gait speed or a timed-up-and-go test show correlation with overall survival in cancer patients, complications and postoperative functional decline.<sup>20-23</sup> Frasson, M et al. reported preoperative serum protein concentration is an independent risk factor for anastomotic leak and male gender, pulmonary disease, hepatic disease, and open surgical approach were identified as risk factors for postoperative morbidity.<sup>24</sup> Additionally, tools such as P-POSSUM score and Cr-POSSUM Scores help predict postoperative mortality. Hamaker et al. reported the presence of impairments of elderly often lead to a change in the treatment plan.<sup>19</sup>

There was one patient had pulmonary embolism. Incidence rates of deep vein thrombosis (DVT) and

pulmonary embolism increase markedly with age, and may lead to mortality. The risks of venous thromboembolism (VTE) included congestive heart failure, pulmonary circulation disorder, renal failure, metastatic cancer and obesity, etc. Early postoperative mobilization and pneumatic compression devices were recommended for prevention.<sup>25</sup>

There are several limitations. This study is retrospectively designed, and certainly, there was incompleteness of collected data. In addition, some patients or patients' families did not agree with surgery when indicated because of major comorbidity conditions or personal concerns, so selection bias is inevitable. Lastly, this study had a relatively small sample size. Therefore, further studies with larger sample sizes and prospective designs are needed to more detailed investigate this issue.

In conclusion, although elderly patients are considered to have higher risks, with a careful selection of patients, performing surgery on nonagenarian patients is safe, both in laparoscopic surgery and open surgery. The higher mortality rate was noted in emergent surgery.

## Disclosure

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原 著

## 大於九十歲病人接受大腸直腸手術之短期術後結果

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**背景** 本篇研究探討大於 90 歲之患者進行大腸直腸手術的短期相關結果。

**研究來源與方法** 從 2013 年 11 月至 2019 年 5 月，回顧所有 90 歲以上，進行大腸直腸手術患者，收集患者基本資料和手術相關結果，以及進入加護病房和住院天數等資料。同時也比較急診手術和常規手術的結果。

**結果** 共收集到 46 個病例，平均年齡 91.9 歲，18 位病人接受急診手術，其中 3 位於術後 30 日內死亡；28 位病人接受常規手術，其中 1 位於術後 30 內死亡。術後最多的併發症為泌尿道感染和腸阻塞。常規刀病人使用腹腔鏡手術或傳統開腹手術，於出血、術後進入加護病房、加護病房天術、住院天數無統計上之顯著差距。

**結論** 90 歲以上之患者，仔細評估後，施行手術是可行的。腹腔鏡手術也可以順利執行。急診手術患者的 30 天死亡率較高。之後的研究方向為使用前瞻性研究設計，並加入統計沒有接受手術之患者。

**關鍵詞** 大腸直腸手術、90 歲、腹腔鏡手術。