

Original Article

# Short-term Outcomes of Laparoscopic Colonic Surgery in Elderly Patients

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## Key Words

Colonic cancer;  
Short-term outcomes;  
Postoperative complications;  
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Surgery

**Purpose.** Colonic cancer is a lethal disease, and laparoscopic colectomy was widely used as a standard procedure in Taiwan recently. Due to the current increase in aging of the population, colectomy is more frequently performed among the elderly. However, elderly patients are considered to be at high risk for radical surgery because of their decreasing functional reserves and increasing medical comorbidities. We aimed to compare the short-term outcomes of colonic surgery between patients aged > 75 years and those aged 50-75 years in our hospital.

**Materials and Methods.** A total of 111 patients with colonic cancer who underwent an elective laparoscopic colectomy between January and December 2020 were assigned to two groups: aged 50-75 years (n = 69) and > 75 years (n = 42). Operative time, length of postoperative stay, days to resume a soft diet and postoperative complications were evaluated.

**Results.** The elderly group showed a longer mean operative time, albeit it was not significantly different ( $172.2 \pm 50.3$  vs.  $193.7 \pm 66.0$  minutes,  $p = 0.055$ ). Moreover, no significant difference was noted in the length of postoperative stay (8 vs. 9 days,  $p = 0.061$ ) and the days to resume a soft diet ( $7.1 \pm 1.7$  vs.  $7.6 \pm 3.1$ ,  $p = 0.354$ ). Furthermore, elderly patients presented with significantly more frequent occurrence of comorbidity according to the Charlson classification ( $0.93 \pm 0.86$  vs.  $1.21 \pm 0.91$ ,  $p < 0.05$ ) when compared with the younger patients, especially in terms of hypertension (48% vs. 69%,  $p = 0.029$ ). No difference was noted in the major complications (14% vs. 26%,  $p = 0.127$ ) such as anastomotic problems, pneumonia, wound infection, and ileus.

**Conclusion.** Laparoscopic colectomy is a safe and feasible method for colonic cancer in elderly patients. The short-term complications of carefully selected elderly patients are similar to those of younger patients.

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Colonic cancer is a common and lethal disease, especially in developed countries. This disease rarely occurs before the age of 50 years, and its risk is the highest around the age of 65-69 years in Taiwan.<sup>1</sup>

In the past decades, there has been an increase in the number of elderly patients reporting colon cancer

across the world. The life expectancy of people is increasing, currently at 78.1 years for men and 84.7 years for women in Taiwan. In Taiwan, laparoscopic surgery is the standard treatment for patients with colonic cancer as its oncological safety has been proven in randomized trials on these groups of patients.<sup>2</sup> Un-

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fortunately, elderly patients tend to suffer from more severe and significant comorbidities, which increases the operative risk and the risk of postoperative morbidity and mortality.<sup>3</sup>

Hence, it needs to be determined whether elderly patients with colonic cancer can tolerate a surgical experience to the same extent as that by younger patients. This study was designed to evaluate the short-term outcomes of colonic surgery between patients > 75 years and those aged 50-75 years in our hospital.

## Materials and Methods

### Patients

This retrospective study was conducted at the Department of Surgery of Chia-Yi Christian Hospital. All surgeries were conducted by coloproctological subspecialists at the Division of Colon and Rectal Surgery. All patients were followed up at the outpatient department after surgery until the wounds were well healed. In total, 111 patients with colonic cancer who underwent an elective laparoscopic colectomy between January and December 2020 were enrolled in this study.

The patients were assigned to two groups: aged 50-75 years ( $n = 69$ ) and > 75 years ( $n = 42$ ). The exclusion criteria were individuals with distant metastases and surgical emergency with colorectal cancer. This separation was based on several other publications concerning this subject.<sup>4-6</sup>

The following data were collected for each patient: their age, sex, characteristics of the tumor, the American Society of Anaesthesiologist (ASA) grade, type of operation, comorbidities, the length of postoperative stay, operative time, days to resume a soft diet, and complications.

Preoperative risk evaluation by an experienced anesthesiologist was performed on any patient with the coexisting medical disease. All possible efforts were undertaken to correct and treat comorbid conditions before surgery. Preoperative cardiopulmonary examination would be performed under the advice of the anesthesiologist. Surgical treatment was offered to

all patients, irrespective of the age considered to be suitable for undertaking major surgery.

Comorbidity was classified according to an adapted version of Charlson et al. and divided as COPD, cardiovascular disease, chronic kidney disease, cerebrovascular disease, hypertension, and diabetes.<sup>7</sup>

Postoperative complications were defined as those occurring on the day of surgery until the day of discharge from the hospital.

### Surgical technique

Laparoscopic surgical procedures were performed by four skilled surgeons at our hospital. Olympus 10.0 mm LTF-190 ENDOEYE™ FLEX 3D Deflectable Videoscope was used for all 3D imaging-assisted laparoscopic surgeries. Mesocolic dissection was performed through the medial-to-lateral approach. Liga-Sure™ Sealer was used for vessel-sealing and tissue dissection. The specimen was then retracted through a 3- to 5-cm extended umbilical wound using a 4-cm wound protector. The anastomosis was closed intra- or extracorporeally using staplers and one Jackson-Pratt drain was placed routinely.

### Statistical analysis

All data are described as the mean  $\pm$  standard deviation or median (minimum and maximum) for continuous variables and as the numbers and percentages for categorical variables. Comparisons of continuous data between the groups were evaluated by Student's *t*-test, and the comparisons of the categorical data were made with the  $\chi^2$ -test or Fisher's exact test, as deemed appropriate. Statistical analysis was performed using the SPSS for Windows version 21.0 (IBM Corp., Armonk, NY, USA).  $p < 0.05$  was considered to indicate statistical significance.

## Results

### Clinical characteristics

During the 1-year study period, 111 patients with

clinical diagnoses of colonic cancer underwent laparoscopic surgery. The characteristics of these patients are summarized in Table 1. Among these patients, 60 (54%) were men and 51 (46%) were women. The mean age of the patients aged > 75 years was 82.1 years (range: 75-99 years), while it was 61.9 years in the 50-75-year-age group. No significant difference was detected in the two groups in terms of sex, location of the tumor, and the AJCC stage.

Table 2 shows the comorbidity of the two groups. The elderly patients more frequently occurrence of

more than one type of comorbidity according to the Charlson classification ( $p < 0.05$ ) when compared with the younger patients ( $p < 0.001$ ), especially in terms of hypertension ( $p = 0.029$ ).

**Short-term outcomes**

Table 3 depicts the short-term outcomes of the studied patients. When compared to the elderly group, the younger group showed a shorter mean operative time ( $193.7 \pm 66.0$  min vs.  $172.2 \pm 50.3$  min), albeit with no significant difference ( $p = 0.055$ ). The mean length of the postoperative stay of the patients aged > 75 years was 9 days (range: 7-28 days), while it was 8 days (range: 6-23 days) in the 50-75-year-age group. Patients started their oral water intake on postoperative day 1 and started clear liquid intake after flatus passage; after which they advanced to a low-residue diet if they had no discomfort. In the group aged > 75 years, the mean number of days to resume a soft diet was 7.6 days. In the group aged 50-75 years, the mean number of days to resume a soft diet was 7.1 days. No significant difference was noted in the length of postoperative stay ( $p = 0.061$ ) and the days to resume a soft diet ( $p = 0.354$ ).

Table 4 lists the types of surgeries performed; these did not differ significantly between the elderly and the younger patients.

Complications are listed in Table 5. Complications

**Table 1.** Patient and tumor characteristics

	50-75 years group (n = 69)	> 75 years group (n = 42)	p-value
Age (years), mean ± SD	61.9 ± 6.5	82.1 ± 5.2	< 0.001
Sex			0.367
Male	35	25	
Female	34	17	
Location of tumor			0.354
Cecum	10	10	
Ascending colon	8	6	
Transverse	7	3	
Descending colon	8	1	
Sigmoid	36	22	
pT stage			0.008
pT1	15	2	
pT2	9	7	
pT3	41	23	
pT4	4	10	
pN stage			0.042
pN0	47	19	
pN1	15	13	
pN2	7	10	
AJCC stage			0.059
I	20	8	
II	27	11	
III	22	23	
Anaesthesiologist (ASA) grade			< 0.001
1-2	69	31	
≥ 3	0	11	

SD, standard deviation.

**Table 2.** Comorbidity

Comorbidity	50-75 years	%	> 75 years	%	p-value
COPD	2	3	0	0	0.525
Cardiovascular	4	6	8	19	0.054
CKD	0	0	1	2	0.378
Cerebrovascular disease	1	1	3	7	0.151
Hypertension	33	48	29	69	0.029
DM	24	35	10	24	0.224
Average no. of disease	0.93 ± 0.86		1.21 ± 0.91		< 0.05

**Table 3.** Short-term outcomes

Short-term outcomes	50-75 years	> 75 years	p-value
Operative time (min, mean ± SD)	172.2 ± 50.3	193.7 ± 66.0	0.055
Length of postoperative stay (range)	8 (6-23)	9 (7-28)	0.061
Days to resume a soft diet	7.1 ± 1.7	7.6 ± 3.1	0.354

**Table 4.** Types of operation

Type of operation	50-75 years	%	> 75 years	%	<i>p</i> -value
Right hemicolectomy	21	31	16	38	0.340
Left hemicolectomy	9	13	2	5	
Anterior resection	38	54	23	55	
Others*	1	1	1	2	

\* One case of transverse colectomy in the younger group and one case of subtotal colectomy in the elderly group were performed.

were noted in 10 younger patients (14%) and in 11 elderly patients (26%) ( $p = 0.127$ ). However, no difference was detected for major complications such as anastomotic problems, pneumonia, wound infection, and ileus. Delirium was noted in 3 patients belong to the elderly group, although no significant difference was recorded ( $p = 0.052$ ). Mortality within 30 days of surgery was not observed in either of the two groups.

## Discussion

Between 2020 and 2070, it is estimated that the percentage of the population aged  $\geq 65$  years will more than double, possibly accounting for 20% of the total population by 2025 according to the National Development Council of Taiwan.<sup>8</sup> Due to the current increase in longevity and the overall aging of the population, major abdominal surgery is more frequently performed among the elderly. Elderly patients represent a unique surgical challenge because of the associated complex comorbidities. Therefore, utilizing surgical techniques to improve the outcomes in the elderly is critical.

Surgical resection remains the core of curative treatment for colonic cancer. In addition, laparoscopic surgery is a potential alternative to open surgery in terms of better short-term outcomes,<sup>9</sup> featuring smaller wound sizes and faster recoveries. Some observational studies have shown that laparoscopic surgery has an equivalent oncological result and better short-term outcomes than laparotomy surgery for elderly patients with colorectal cancer.<sup>10-13</sup> And previous studies have shown that age alone is not a significant prognostic factor affecting survival after colonic surgery.<sup>6,14-16</sup>

**Table 5.** Complications

	50-75 years	%	> 75 years	%	<i>p</i> -value
Total no. of complications	10	14	11	26	0.127
Anastomotic leakage	0	0	1	2.4	0.378
Anastomotic bleeding	1	1.4	0	0	1.000
Anastomotic stenosis	1	1.4	0	0	1.000
Pneumonia	0	0	1	2.4	0.378
Delirium	0	0	3	7.1	0.052
Wound infection	1	1.4	2	4.8	0.556
Ileus	9	13	7	16.7	0.591
30-day mortality	0	0	0	0	-

However, elderly patients are considered to be at high risk for radical surgery because of their decreasing functional reserves and increasing medical comorbidities.<sup>4,17</sup> Therefore, the careful selection of elderly patients to surgery and making efforts to correct comorbidity are essential.

Though no significant difference in the AJCC stage was noted in the two groups, the elderly group showed more advanced pT and pN stages. We believe this to be related to Taiwan's policy because publicly funded screening for colorectal cancer was only available to people aged 50-74 years.

Furthermore, more patients in the elderly group were classified as ASA III and showed a significantly higher number of comorbidities. In detail, although there were no significant differences in most of the comorbidities, the elderly group showed significantly more frequency of hypertension than the younger group.

In our study, ileus accounted for the largest proportion of total complications; also, it was the main cause of postponement of discharge. The incidence of ileus in our study was 14%, accounting for 76% of the total number of complications. The impact of postoperative ileus who underwent colectomy surgery remains an unmet clinical challenge, and it has been associated with a 29% increase in the hospital length of stay and a 15% increase in the cost of hospitalization.<sup>18</sup> Delirium only occurred in 3 patients of the elderly group; we believe that delirium itself is closely related to advanced age.

The operative time, the length of postoperative stay, the number of days taken to resume a soft diet,

and the type of surgery did not differ between these two groups, indicating a similar short-term outcome between the two groups.

Careful consideration should be given to selection of patients for major surgery taking into account previous functioning and comorbid conditions to avoid postoperative complications. If possible, it might be arranged electively, and a multidisciplinary patient-oriented plan is needed before surgery for optimizing the preoperative comorbidities. We believe that individual preoperative evaluation is essential to reduce postoperative complications, especially for the elderly. And the availability of a wide variety of operative instruments for colonic cancer at present has made it possible to undertake individual treatment plans.

For surgical technique, laparoscopic surgery is becoming a major option since several randomized controlled trials<sup>19,20</sup> have demonstrated its safety, effectiveness, and benefits in less intraoperative blood loss, faster recovery, less postoperative pain, shorter hospital stays, etc. Laparoscopic instruments allow us to perform operations more accurately and delicately, thereby achieving minimal damage to intra-abdominal tissues. This is mainly related to avoidance of manual traction and manipulation of abdominal tissue, and it is thought to diminish cell-mediated immunosuppression.<sup>21</sup> Besides, the use of advanced energy devices allows faster and more secure hemostasis than do conventional laparoscopic techniques such as clips and monopolar diathermy. According to the above, we had practiced the surgical principle to achieve decreasing tissue damage during the laparoscopic colectomy.

During these decades, laparoscopic surgical techniques have improved substantially as a result of growing experience and progressing technology that allows better video imaging, and safer and more efficient tissue ablation. Procedure times have dropped and undue tissue manipulation has decreased.

Detailed preoperative risk assessment, careful selection of patients for laparoscopic surgery, refined and standardized surgical technique, and improved perioperative care are therefore considered essential in maintaining acceptable complication rates. If these are done, short-term outcomes of elderly patients can be similar to those of younger patients.

This study has several limitations. First, this study was a nonrandomized retrospective study conducted in a single institute with small sample size; hence, it was associated with the risk of selection bias. Second, our follow-up period was extremely short; therefore, data about the long-term outcomes were limited. Further large-scale multicentre randomized trials are warranted to verify our results.

## Conclusion

Laparoscopic colectomy for colonic cancer in elderly patients could be a safe and feasible method, and age alone does not indicate less aggressive therapy, although they show a greater number of comorbidities. Thus, the short-term outcomes and postoperative complications in carefully selected elderly patients are similar to those in younger patients.

## References

1. Cancer Registry Annual Report, 2018 Taiwan. [https://www.hpa.gov.tw/Pages/ashx/File.ashx?FilePath=~/File/Attach/13498/File\\_15611.pdf](https://www.hpa.gov.tw/Pages/ashx/File.ashx?FilePath=~/File/Attach/13498/File_15611.pdf) (Page 560).
2. Deijen CL, Vasmel JE, de Lange-de Klerk ESM, et al. Ten-year outcomes of a randomized trial of laparoscopic versus open surgery for colon cancer. *Surg Endosc* 2017;31:2607-15.
3. Janssen-Heijnen MLG, Maas HA, Houterman S, et al. Comorbidity in older surgical cancer patients: influence on patient care and outcome. *Eur J Cancer* 2007;43:2179-93.
4. Devon KM, Vergara-Fernandez O, Victor JC, McLeod RS. Colorectal cancer surgery in elderly patients: presentation, treatment, and outcomes. *Dis Colon Rectum* 2009;52:1272-7.
5. Vironen JH, Sainio P, Husa AI, Kellokumpu IH. Complications and survival after surgery for rectal cancer in patients younger than and aged 75 years or older. *Dis Colon Rectum* 2004;47:1225-31.
6. Hermans E, Van Schaik PM, Prins HA, et al. Outcome of colonic surgery in elderly patients with colon cancer. *J Oncol* 2010;865908.
7. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987; 40(5):373-83.
8. Population Projections for the R.O.C (Taiwan) 2020~2070. <https://pop-proj.ndc.gov.tw/upload/download/Population%20Projections%20for%20the%20Republic%20of%20China>



- %20(Taiwan)-2020~2070.pdf.
9. Feroci F, Baraghini M, Lenzi E, Garzi A, Vannucchi A, Cantafio S, Scatizzi M. Laparoscopic surgery improves post-operative outcomes in high-risk patients with colorectal cancer. *Surg Endosc* 2013;27(4):1130-7.
  10. Colon Cancer Laparoscopic or Open Resection Study Group, Buunen M, Veldkamp R, Hop WC, Kuhry E, Jeekel J, Haglind E, Pählman L, Cuesta MA, Msika S, Morino M, Lacy A, Bonjer HJ. Survival after laparoscopic surgery versus open surgery for colon cancer: long-term outcome of a randomised clinical trial. *Lancet Oncol* 2009;10(1):44-52.
  11. Hemandas AK, Abdelrahman T, Flashman KG, Skull AJ, Senapati A, O'Leary DP, Parvaiz A. Laparoscopic colorectal surgery produces better outcomes for high risk cancer patients compared to open surgery. *Ann Surg* 2010;252(1):84-9.
  12. Vallribera Valls F, Landi F, Espín Basany E, Sánchez García JL, Jiménez Gómez LM, Martí Gallostra M, Salgado Cruz L, Armengol Carrasco M. Laparoscopy-assisted versus open colectomy for treatment of colon cancer in the elderly: morbidity and mortality outcomes in 545 patients. *Surg Endosc* 2014;28(12):3373-8.
  13. Hinoi T, Kawaguchi Y, Hattori M, Okajima M, Ohdan H, Yamamoto S, Hasegawa H, Horie H, Murata K, Yamaguchi S, Sugihara K, Watanabe M; Japan Society of Laparoscopic Colorectal Surgery. Laparoscopic versus open surgery for colorectal cancer in elderly patients: a multicenter matched case-control study. *Ann Surg Oncol* 2015;22(6):2040-50.
  14. Anonymous. Surgery for colorectal cancer in elderly patients: a systematic review. Colorectal Cancer Collaborative Group. *Lancet* 2000;356:968-74.
  15. Barrier A, Ferro L, Houry S, et al. Rectal cancer surgery in patients more than 80 years of age. *Am J Surg* 2003;185:54-7.
  16. Smith JJ, Lee J, Burke C, et al. Major colorectal cancer resection should not be denied to the elderly. *Eur J Surg Oncol* 2002;28:661-6.
  17. Yen C, Simillis C, Choudhry M, et al. A comparative study of short-term outcomes of colorectal cancer surgery in the elderly population. *Acta Chir Belg* 2017;117:303-7.
  18. Iyer S, Saunders WB, Stenkowski S. Economic burden of postoperative ileus associated with colectomy in the United States. *J Manag Care Pharm* 2009;15:485-94.
  19. Veldkamp R, Kuhry E, Hop WC, Jeekel J, Kazemier G, Bonjer HJ, Haglind E, Pählman L, Cuesta MA, Msika S, Morino M, Lacy AM; COlon cancer Laparoscopic or Open Resection Study Group (COLOR). Laparoscopic surgery versus open surgery for colon cancer: short-term outcomes of a randomised trial. *Lancet Oncol* 2005;6(7):477-84.
  20. Clinical Outcomes of Surgical Therapy Study Group, Nelson H, Sargent DJ, Wieand HS, Fleshman J, Anvari M, Stryker SJ, Beart RW Jr, Hellinger M, Flanagan R Jr, Peters W, Ota D. A comparison of laparoscopically assisted and open colectomy for colon cancer. *N Engl J Med* 2004;350(20):2050-9.
  21. Whelan RL, Franklin M, Holubar SD, Donahue J, Fowler R, Munger C, Doorman J, Balli JE, Glass J, Gonzalez JJ, Bessler M, Xie H, Treat M. Postoperative cell mediated immune response is better preserved after laparoscopic vs open colorectal resection in humans. *Surg Endosc* 2003;17(6):972-8.

原 著

## 老年病人接受腹腔鏡大腸癌手術之 短期術後結果

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**引言** 大腸癌是威脅生命的疾病。腹腔鏡大腸癌手術近年來在台灣已被廣泛使用。隨著人口老齡化，需要接受大腸癌手術的老年患者數量逐漸增加。然而老年患者本身身體機能較差且共病較多，在接受手術時被認為風險較高。本篇研究比較大於 75 歲之患者與 50 至 75 歲之患者進行大腸癌手術的短期相關結果。

**方法** 我們收集自 2020 年 1 月至 2020 年 12 月，共 111 位大於 75 歲之患者 (69 位) 與 50 至 75 歲之患者 (42 位)，進行腹腔鏡大腸癌手術之患者，進行評估並比較手術時間、住院天數、軟食進食時間以及術後並發症之差異。

**結果** 我們的研究結果顯示老年組別平均手術時間較長 (172.2 分鐘 vs. 193.7 分鐘)，但無統計上顯著意義。術後平均住院天數與平均第一次軟食進食時間在兩組間無統計學上顯著差異 (8 日 vs. 9 日)。老年組別本身較年輕組別有較多的共病 (0.93 種 vs. 1.26 種)，特別是高血壓的比例較高 (48% vs. 69%)。術後併發症中 (14% vs. 26%)，在吻合處相關併發症、肺炎、傷口感染與腸阻塞的比例無統計學上顯著意義。

**結論** 腹腔鏡大腸癌手術對於老年病患為一種安全且可行的手術方式。經過仔細評估後，大於 75 歲之大腸癌患者接受腹腔鏡手術可以得到與較年輕患者相似的短期結果。

**關鍵詞** 大腸癌、短期術後結果、術後病發症、老年人、手術。