

Clinical and Oncological Outcomes of Laparoscopic Colorectal Surgery for Colorectal Cancer at Trang Hospital

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Abstract

Background & Objective: Colorectal cancer is the third most common cancer in both men and women in Thailand and around the world. Laparoscopic colectomy (LC) has gained wide acceptance as a curative procedure for colorectal cancer treatment. However, in Thailand, LC is practiced in high-volume hospitals. A predisposing factor for a higher morbidity rate of LC was male gender. The primary aim of this retrospective study was to review the clinical and short-term oncological outcomes of laparoscopic colectomy for colorectal cancer from the preliminary first-hand experience of a general surgeon performing LC at Trang Hospital. The secondary aim was to test the hypothesis that male gender has no impact on the clinical and short-term oncological outcomes.

Patients and Methods: A retrospective study was conducted at Trang hospital in all colorectal cancer patients who underwent laparoscopic colorectal surgery between August 2017 and December 2019. Patient characteristics, perioperative, pathologic and short-term oncological outcomes were reported and compared between the genders.

Results: In 19 colorectal cancer patients who underwent laparoscopic colorectal resection, there was a significant difference in tumor size between the men and women ($p = 0.049$) but no differences in perioperative outcomes between the two genders ($p > 0.05$). The overall conversion rate was 26%, the intraoperative complication rate was 5% and the postoperative complication rate was 16%. The mean follow-up period was 29 ± 11 months. There were no differences in the disease-free survival (DFS) (67% vs. 90%; $p = 0.224$) and overall survival (OS) (78% vs. 100%; $p = 0.125$) between men and women. The 2-year DFS and OS of all patients were 83% and 89%, respectively.

Conclusion: General surgeons can perform laparoscopic colorectal resection effectively and safely with acceptable outcomes. Male gender has no impact on the outcomes of laparoscopic colorectal resection in patients with colorectal cancer.

Keywords: Laparoscopic colorectal surgery, Colorectal cancer, Short-term outcomes

INTRODUCTION

Colorectal cancer (CRC) is the third most common cause of death from cancer among both men and women in Thailand and around the world.^{1,2} Laparoscopic colectomy (LC) has gained wide acceptance as a curative

surgical procedure for colorectal cancer since it was first introduced in 1991. Many randomized controlled trials have showed that LC has better short-term surgical outcomes while providing equally effective oncological outcomes compared to open colectomy (OC).³⁻⁸

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Between 2004 to 2014, the rate of LC has increased to more than 50% in high-income countries, including South Korea, the Netherlands and the United States.⁹

In Thailand, there appears to be a slow adoption rate of LC. The majority of LC for CRC is still being practiced only in high-volume hospitals by board-certified colorectal surgeons or well-trained laparoscopic surgeons. Some limitations could be due to surgeon-related factors (e.g. a steep learning curve for LC, and lack of adequate training or mentorship system) and specific regional health system factors (e.g. financial constraints, operating room time and resource limitations, unfavorable hospital reimbursement models and lack of access to relevant technology).² With the increasing need and desire to provide the benefits of LC to all colorectal patients, from the point of view of Thai general surgeons, it is important to increase the use of LC in low volume hospitals as well.

LC for CRC performed by general surgeons at Trang hospital was begun in August 2017. In the initial phase of LC, understanding the technical aspects of the procedure and being aware of risk factors related to operative complications are essential to minimizing operative morbidity and mortality. Previous studies have shown that male sex, lower location of rectal cancer, larger tumor size, preoperative chemoradiation (CCRT), and longer operative time were associated with a higher risk of postoperative morbidity.¹⁰ Anastomotic leakage was reported to be more common among men, which may be related to their narrow pelvises.¹⁰⁻¹³ A study by Kit et al¹⁴ found that the conversion rate among patients was 2.7 times higher in men than in women. Male gender was a significant risk factor for conversion to open surgery in other studies as well.¹⁵⁻¹⁸ In practice, however, some surgeons have observed a higher conversion and complication rates in female than in male patients.

The primary aim of this retrospective study was to review the clinical and short-term oncological outcomes of laparoscopic colectomy for colorectal cancer from the preliminary first-hand experience of a general surgeon at Trang Hospital. The secondary aim was to test the hypothesis that male gender has no impact on the clinical and short-term oncological outcomes.

PATIENTS AND METHODS

Medical records of 21 patients who underwent laparoscopic colectomy between August 2017 and December

2019 at Trang Hospital were reviewed. Two patients with pathologic reports of adenoma were excluded. The data of 19 patients who had adenocarcinoma and were followed up until December 2020 were collected for analysis; these included baseline characteristics, perioperative outcomes, pathologic outcomes and short-term oncological outcomes. The outcomes of all patients were compared between genders.

All statistical analyses were performed using the statistical package SPSS v.26.0 (IBM, New York, USA). The outcomes of both genders were compared using the chi-square and Fisher's exact test for categorical variables and t test for continuous variables. Disease free survival (DFS) and overall survival (OS) were estimated using the Kaplan-Meier method and compared using the log-rank test. A *p* value of 0.05 or less was considered statistically significant. Institutional Review Board approval was obtained for this study.

RESULTS

Data of all 19 patients who had the pathologic diagnosis of adenocarcinoma in between August 2017 and December 2019, and were followed up until December 2020 were collected retrospectively for analysis. There were 9 men (47%) and 10 women (53%). The mean age $\pm$ SD of all patients was 59.6 ± 16.6 years (range, 27 to 84 years). Most patients had rectal cancer (63%). Most did not receive preoperative chemoradiation (84.2%). The mean maximal tumor diameter $\pm$ SD was 50 ± 21.3 mm (range, 20 to 100 mm.). One female and two male rectal cancer patients received neoadjuvant chemoradiation therapy (CCRT) because of stage IV disease or large tumor size, although there was no obstruction. Most patients underwent laparoscopic colectomy within 4 weeks after completion of clinical or radiological staging. A comparison of preoperative data between male and female patients is shown in Table 1. There was a significant difference in tumor size between the two genders (*p* = 0.049).

The mean operative time $\pm$ SD of all patients was 301 ± 97 mins (range, 180 to 538 mins). The mean number of retrieved lymph nodes $\pm$ SD was 13 ± 7 . The conversion rate was 26% (5/19). Three cases (one male and two female patients) required conversion to open surgery due to large tumor size making laparoscopic manipulation difficult.

Table 1 Patient characteristics

Characteristic	Men (N=9)	Women (N=10)	p-value
Age (years): mean $\pm$ SD	55.3 $\pm$ 17.9	63.5 $\pm$ 15.3	0.299
Tumor location: number (%)			0.078
Right side	0	2 (20)	
Left side exclude rectum	1 (11)	4 (40)	
Rectum	8 (89)	4 (40)	
Diameter of tumor (mm): mean $\pm$ SD	60.0 $\pm$ 18.9	41.0 $\pm$ 19.9	0.049
Preoperative therapy: number (%)			0.201
Chemotherapy	2 (22)	0	
Chemoradiotherapy	0	1 (10)	

Table 2 Perioperative outcomes

Outcome	Men (N=9)	Women (N=10)	p-value
Operating time (minutes): mean $\pm$ SD	290.3 $\pm$ 77.6	310.1 $\pm$ 115.4	0.671
Lymph nodes harvested (number): mean $\pm$ SD	13 $\pm$ 6	12 $\pm$ 8	0.935
Conversion to open surgery: number (%)	2 (22)	3 (30)	0.999
Intraoperative complications: number (%)			0.999
Bladder injury	0	1 (10)	
Colostomy	1 (11)	2 (20)	0.999
Postoperative complications: number (%)			0.399
Urinary tract infection	0	1 (10)	
Anastomotic leakage	0	0	
Wound infection	0	1 (10)	
Bowel obstruction	1 (11.1)	0	
Deaths: number (%)	0	0	
Length of hospital stay (days): mean $\pm$ SD	9 $\pm$ 4	9 $\pm$ 2	0.725

One male patient with stage IV rectal cancer needed conversion to open surgery because of failure to insert the linear stapler passed his 10 cm size tumor in a narrow pelvic space for distal rectal transection. The last case that required conversion was a female patient who had received preoperative CCRT.

The overall complication rate was 21% (4/19). There was one intraoperative complication, which was a bladder injury occurring while dissecting a T4 rectal tumor from the bladder. This was detected intraoperatively and was successfully treated by conversion to open surgery to determine whether simple suture repair or partial cystectomy should be performed. There were 3 postoperative complications, including one urinary tract infection, one wound infection, and one with an episode of bowel obstruction.

The mean length of hospital stay was 9 $\pm$ 3 days. There was no difference in perioperative outcomes between genders (Table 2). Male and female patients were similar each other, in terms of operating time, number of harvested lymph nodes, conversion to open surgery, intraoperative complications, postoperative complications and length of hospital stay. There was no death within 30 days of surgery in either group. The most common tumor histology was well differentiated adenocarcinoma, seen in 84% of all patients (16/19). There was no significant difference in pathologic findings between genders (Table 3). Tumor margins were free from cancer in all resections.

The mean follow-up period $\pm$ SD was 29 $\pm$ 11 months, with a median follow-up of 32 months (range, 5 to 41 months).

Table 3 Pathologic outcome

Outcome	Men (N=9)	Women (N=10)	p-value
Tumor differentiation: number (%)			1.000
Well differentiated	8 (89)	8 (80)	
Moderately differentiated	1 (11)	2 (20)	
Poorly differentiated	0	0	
T category: number (%)			0.466
T1	1 (11)	1 (10)	
T2	0	2 (20)	
T3	6 (67)	4 (40)	
T4	2 (22)	3 (30)	
N category: number (%)			0.08
N0	6 (67)	5 (50)	
N1	3 (33)	1 (10)	
N2	0	4 (40)	
M category: number (%)			0.582
M0	7 (78)	9 (90)	
M1	2 (22)	1 (10)	
pTNM stage: number (%)			0.699
I	1 (11)	2 (20)	
II	4 (45)	3 (30)	
III	2 (22)	4 (40)	
IV	2 (22)	1 (10)	
Lymphovascular invasion: number (%)			0.252
Yes	4 (44)	2 (20)	
No	5 (56)	8 (80)	
Resection margin positive: number (%)	0	0	

Table 4 Oncological outcomes

Outcome	Men (N=9)	Women (N=10)	p-value
Postoperative chemotherapy: number (%)	6 (67)	6 (60)	0.999
Recurrence: number (%)			0.400
Liver	1 (11.1)	0	
Lung	0	0	
Distant lymph node	0	0	
Other local recurrence	0	0	
Follow-up time (months): mean $\pm$ SD	26.9 $\pm$ 12.5	31.5 $\pm$ 8.7	0.360

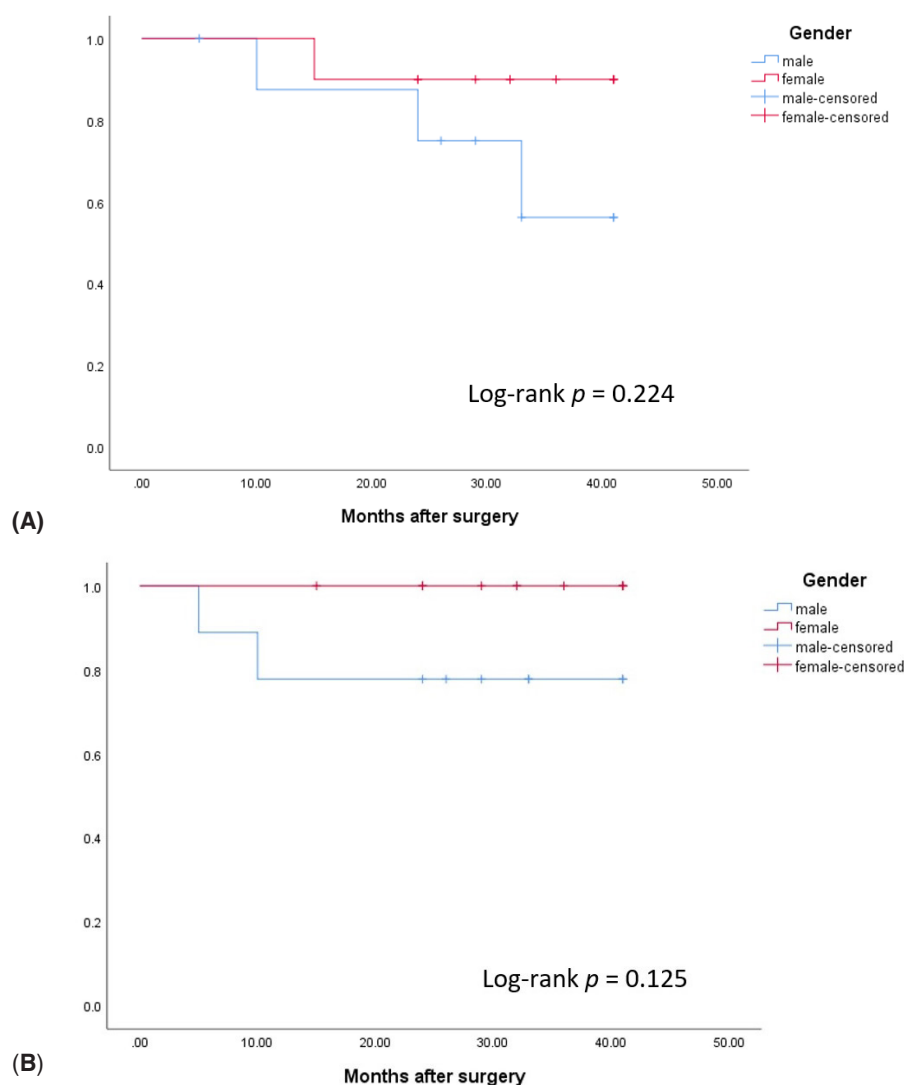


Figure 1 Kaplan-Meier curves of disease-free survival (A), and over-all survival (B) overall survival, after laparoscopic colectomy; log-rank test p-values are also provided.

Postoperative adjuvant chemotherapy was given to 63% of patients (12/19), with a similar proportion for each of the two genders. There was no local recurrence. Unfortunately, one male patient had liver metastasis. There was no difference in the recurrence rates between genders, as shown in Table 4. There was no difference in disease free survival (DFS) (67% vs. 90%; $p = 0.224$) and overall survival (OS) (78% vs. 100%; $p = 0.125$) between male and female patients (Figure 1). The 2-year DFS and OS rates of all patients were 83% and 89%, respectively.

DISCUSSION

Previous studies have shown that laparoscopic colectomy in men is associated with a higher postoperative

morbidity than in women. Multiple studies have found that male gender is one of the risk factors for anastomotic leakage.¹⁰⁻¹³ Kit et al¹⁴ found that the conversion rate was 2.7 times higher in men than women. Other studies also found that male gender is a risk factor for conversion to open surgery.¹⁵⁻¹⁸ In the present study, there was no anastomotic leakage. The conversion rate was similar between men and women. Complications were even slightly more frequent in women than in men, but without statistical significance.

The overall conversion rate in this study was 26%, higher than the 0 to 25% seen in others studies.^{3,6,10-11,14-15,17-22} This higher rate can be explained by the learning curve period.

A study found that the conversion rate was 38% during the first year of implementing LC, which gradually decreased to 16% in the 6th year.²⁴ The effect of conversion on patient morbidity and mortality is unclear. Recent studies describe similar outcomes after conversion to open surgery compared to the open surgery without LC.²⁵

The reported incidence of intraoperative adverse events ranges from 0 to 8%.^{23,26} The intraoperative complication rate in the present study was 5%, which was within the reported range. Previous studies reported postoperative complication rates to be between 4% to 17% for colorectal cancer surgery^{8,20,22-23} and 21% to 32% in rectal cancer surgery.^{6,10,22} The postoperative complication rate of 16% in the present study was also within the published range. The 30 day postoperative mortality was reportedly between 0.7% to 2.9%^{6,10,21-23,26} but there was no 30 day postoperative mortality in the present study.

The two-year recurrence rate in the present study was 7%, and was due to distant recurrence. There was no local recurrence, which suggested that oncological clearance was acceptable. This recurrence rate compared favorably to those of the published literature (9% to 25%).^{5-6,8,20} The one distant recurrence in the present study was liver metastasis in a male patient, and the liver was the most common recurrence site as described by Fleshman⁷ and Miyo.²⁰ Male gender was also found to be a predictive factor of colorectal cancer recurrence in a previous study.²²

In the present study the two-year disease-free survival (DFS) of all patients was 83% and the two-year overall survival (OS) of all patients was 89%. These survival probabilities were similar to those previous reported, which found the two-year DFS to be between 74% to 99%,^{8,19-20,23} and the two-year OS to be 75% to 92%.^{4,6,18,20,23-24} No significant differences in these survivals between the two genders were found in the present study. The study by Carter, et al.²⁷ found that women had significant longer survival than men. The present study found a similar, but non-significant, trend. The low recurrence rate and high OS in the present study maybe due to the short follow-up and favorable tumor histology.

There were several limitations in the present study. Firstly, the number of patients included in this study was much too small. Larger sample sizes will enable a more reliable and powerful comparison. Secondly, colorectal

cancers at different sites were pooled together in the analysis of the outcomes. This is debatable because the lymphatic drainage route, extent of dissection, operative techniques, and even biologic behavior are different for tumors at different locations. In future studies, with an increase in the number of patients, an analysis based on tumor location may be possible. Lastly, only short-term results were reported, and longer follow-up should also be done.

CONCLUSION

General surgeons can perform laparoscopic colorectal resection effectively and safely with acceptable outcomes. Male gender has no impact on the outcomes of laparoscopic colorectal resection in patients with colorectal cancer in the present study.

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บทคัดย่อ ผลการรักษาทางคลินิก และมะเร็งวิทยาของการผ่าตัด Laparoscopic colorectal surgery ในผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงโดยศัลยแพทย์ทั่วไปในโรงพยาบาลตราง

มุกดา นีวรสุวรรณกุล, พ.บ.

กลุ่มงานศัลยกรรม โรงพยาบาลตราง

ความเป็นมาและวัตถุประสงค์: มะเร็งลำไส้ใหญ่และไส้ตรง เป็นมะเร็งที่เป็นสาเหตุของการเสียชีวิต 3 อันดับแรกของทั้งเพศชายและเพศหญิงในโลกและในประเทศไทย การผ่าตัดส่องกล้องรักษามะเร็งลำไส้ใหญ่และไส้ตรงเป็นที่ยอมรับอย่างกว้างขวาง ในประเทศไทยการผ่าตัดแบบนี้นียังจำกัดในโรงพยาบาลมหาวิทยาลัยขนาดใหญ่ และการผ่าตัดนี้ในเพศชายเป็นปัจจัยที่ทำให้เกิดทุพพลภาพหลังการผ่าตัดมากขึ้น วัตถุประสงค์หลักของการศึกษานี้ คือ รายงานผลการรักษาทางคลินิกและมะเร็งวิทยาในระยะสั้นของผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็นมะเร็งลำไส้ใหญ่และไส้ตรง ที่ได้รับการรักษาโดยการผ่าตัดส่องกล้องตัดต่อลำไส้ใหญ่ในโรงพยาบาลตราง และวัตถุประสงค์รอง คือ การทดสอบสมมติฐานว่าเพศชายไม่ได้มีผลต่อผลการรักษาทางคลินิกและมะเร็งวิทยาในระยะสั้นของผู้ป่วย

วิธีการศึกษา: รวบรวมข้อมูลผู้ป่วยทั้งหมด 19 รายที่มีผลพยาธิวิทยาวินิจฉัยว่าเป็นมะเร็งลำไส้ใหญ่และไส้ตรงที่ได้รับการผ่าตัดโดยการผ่าตัดส่องกล้องตัดต่อลำไส้ใหญ่ ในโรงพยาบาลตรางตั้งแต่วันที่สิงหาคม 2560 ถึงเดือนธันวาคม 2562 โดยเก็บข้อมูลและรายงานผลการผ่าตัดในระยะสั้น ผลทางพยาธิวิทยา และผลการรักษา อัตราชีพรอดอย่างปราศจากโรค อัตราการรอดชีพโดยรวมจนถึงเดือนธันวาคม 2563 ในผู้ป่วยทั้งหมดและศึกษาเปรียบเทียบผลดังกล่าวระหว่างกลุ่มผู้ป่วยเพศชายและเพศหญิงรวมด้วย

ผลการศึกษา: ผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงที่ได้รับการผ่าตัดส่องกล้องตัดต่อลำไส้ใหญ่ทั้งหมด 19 ราย ผู้ป่วยเพศชายมีค่าเฉลี่ยขนาดเนื้องอกใหญ่กว่าเพศหญิงอย่างมีนัยสำคัญ ($p = 0.049$) แต่ไม่พบความแตกต่างของผลการผ่าตัดในระหว่างเพศ อัตราการเปลี่ยนผ่าตัดจากการส่องกล้องเป็นเปิดหน้าท้องทั้งหมดร้อยละ 26 มีภาวะแทรกซ้อนทั้งหมดร้อยละ 21 แบ่งเป็นภาวะแทรกซ้อนระหว่างผ่าตัดร้อยละ 5 และ ภาวะแทรกซ้อนหลังการผ่าตัดร้อยละ 16 ซึ่งไม่แตกต่างกันในทั้งสองเพศ ไม่มีผู้ป่วยเสียชีวิตจากการผ่าตัด ระยะเวลาการนอนโรงพยาบาลเฉลี่ยทั้งหมด คือ 9 ± 3 วัน ไม่มีความแตกต่างของอัตราการเปลี่ยนเป็นผ่าตัดเปิดหน้าท้อง ภาวะแทรกซ้อน และระยะเวลาการนอนโรงพยาบาลในเพศชายและหญิง การติดตามผู้ป่วยทั้งหมดเป็นระยะเวลาเฉลี่ย 29 ± 11 เดือน (พิสัย 5 ถึง 41 เดือน) อัตราชีพรอดอย่างปราศจากโรค (disease free survival) และอัตราการรอดชีพโดยรวม (overall survival) ระยะ 2 ปี คิดเป็นร้อยละ 83 และ 89 ตามลำดับและไม่พบว่าแตกต่างกันทางสถิติในระหว่างเพศ

สรุปผลการศึกษา: การผ่าตัดส่องกล้องตัดต่อลำไส้ใหญ่ในผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงโดยศัลยแพทย์ทั่วไปพบว่ามีความปลอดภัยและมีประสิทธิภาพที่อมรับได้ และเพศไม่ได้ส่งผลต่อผลลัพธ์ของการรักษา ควรส่งเสริมการผ่าตัดส่องกล้องให้มากขึ้นในกลุ่มศัลยแพทย์ทั่วไป