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RESEARCH

Characteristics and outcomes of patients with colorectal cancer who underwent laparoscopic colorectal surgery: descriptive study

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ABSTRACT

Background. Laparoscopic surgery is a widely accepted treatment modality, but with few disadvantages.

Objective. To describe the demographic, clinical, tumor, and operative characteristics of patients with colorectal cancer who underwent laparoscopic surgery.

Design. Descriptive study.

Participants. 47 males and 40 females, aged 19 years and older with colorectal cancer who underwent laparoscopic colorectal surgery.

Setting. Surgery Department - Colorectal Surgery section, Southern Philippines Medical Center, Davao City, August 2014 to August 2018.

Main outcome measures. Demographic and clinical characteristics, tumor profile, and operative outcomes.

Main results. This study analyzed 87 patients with colorectal cancer who underwent laparoscopic colorectal surgery. The participants had a mean age of 56.55 ± 11.99 years, with a slight male predominance (54.02%). Most patients resided within Davao Province (72.41%) and commonly presented with comorbidities, particularly hypertension (22.99%). Tumors were mostly located in the rectum (62.07%), and the majority of patients had advanced disease, with 59.77% classified as stage IIIB. Advanced tumor invasion was common, with 60.92% of patients presenting with T3 and 32.18% with T4 disease, while lymph node involvement was observed in 75.86% of cases. Distant metastasis was present in 11.49% of patients, most frequently involving the liver. Low anterior resection was the most commonly performed procedure (39.08%). The mean operative time was 278.89 ± 72.76 minutes, with a mean blood loss of 476.73 ± 341.86 mL and a conversion-to-open rate of 23.26%. Postoperative outcomes showed a morbidity rate of 26.44% and a mortality rate of 3.45%, with patients resuming oral intake after a mean of 4.02 ± 2.17 days and a mean hospital stay of 8.35 ± 6.38 days.

Conclusion. Laparoscopic colorectal surgery at our institution was performed among middle-aged patients, mostly males. Rectal cancer was the most common diagnosis, with most patients presenting with advanced stage IIIB disease, and low anterior resection was the most frequently performed procedure. The mean operative time was 279 minutes, with a conversion-to-open rate of nearly 25%. The mean intraoperative blood loss was 476 mL. Oral intake was resumed after a mean of 4 days. The mean hospital stay was 8 days, with low mortality despite a moderate morbidity rate.

Keywords. minimally invasive surgery, tumor, malignant, mortality

INTRODUCTION

For conditions requiring bowel resection, such as colorectal cancer, laparoscopic surgery is a widely accepted treatment approach.[1] With ongoing advancements in techniques and continuous surgeon training, it is considered as safe and effective as open colorectal surgery. Advantages include lower postoperative complications, shorter hospital stay, reduced intraoperative blood loss, decreased systemic inflammatory response, and improved cosmetic outcomes.[2,3]

Despite its advantages, laparoscopic colorectal surgery has several challenges. Even for experienced surgeons, safe identification and transection of vascular structures, determination of target segments,

IN ESSENCE

Although laparoscopic surgery is widely used and well established, it presents some inherent disadvantages.

Laparoscopic colorectal surgery was predominantly performed in middle-aged patients, the majority of whom were male. Rectal cancer was the most common indication, with most patients presenting with advanced stage IIIB disease. The mean operative time was comparable to those reported in the literature, and outcomes were characterized by low mortality and moderate rate of postoperative morbidity.

This study highlights the operative outcomes of patients who underwent laparoscopic colorectal surgery.

bowel mobilization and resection, specimen retrieval, and creation of anastomoses can be difficult.[3-7] Moreover, the procedure is still evolving and not universally adopted due to the lack of standardized techniques, technical complexity, concerns about adequacy of oncologic resection, and longer operative times.[6 8 9]

Since 2011, minimally invasive procedures have been performed at Southern Philippines Medical Center (SPMC) across multiple specialties, including gynecology, hepatobiliary surgery, colorectal surgery, pediatric surgery, orthopedics, neurosurgery, and surgical endoscopy. However, data on surgical outcomes remain unavailable. We did this study to describe the demographic, clinical, tumor, and operative characteristics of patients with colorectal cancer who underwent laparoscopic surgery at SPMC.

METHODOLOGY

Setting

We did a retrospective descriptive study among patients who underwent laparoscopic colorectal surgery under the Surgery Department - Colorectal Surgery section of SPMC between August 2014 to August 2018. The department handles an average of approximately 125 colorectal cancer surgical cases annually.

Table 1 Demographic and clinical profile of patients who underwent colorectal surgery.

Characteristics	Values (n=87)
Median age ± SD, *years*	56.55 ± 11.99
Sex, *frequency (%)*	
Male	47 (54.02)
Female	40 (45.98)
Place of residence, *frequency (%)*	
Within Davao Region	63 (72.41)
Outside Davao Region	24 (27.59)
Comorbidities, *frequency (%)*	
Hypertension	20 (22.99)
Diabetes mellitus	8 (9.20)
Hyperthyroidism	1 (1.15)
Pneumonia	1 (1.15)
Tuberculosis	5 (5.75)
Asthma	1 (1.15)
Others	3 (3.45)
With history of abdominal surgeries, *frequency (%)*	6 (6.90)
Baseline serum albumin ± SD, *g/L*	32.56 ± 6.91

Participants

We included patients aged 19 years and up with colorectal cancer who underwent elective laparoscopic colorectal surgery at SPMC. All patients had preoperative localization of tumor using either colonoscopy or computed tomography. We excluded patients initially operated on at another institution and subsequently transferred to SPMC for management, as well as those who underwent emergency laparoscopic colorectal surgery.

To determine the minimum sample size for this study, we assumed that the mortality rate of patients who underwent colorectal surgery is 6.52%.[10] Using a sample size calculation for descriptive research carried out with a 5% margin of error, a design effect of 1.0, and a 90% confidence level, a minimum sample size of 66 would be needed.

Data collection

We reviewed the medical records of each patient with colorectal cancer who underwent elective laparoscopic colorectal surgery and were included in the study. From the records of these patients, we collected data on age, sex, place of residence (within or outside Davao Region), comorbidities (hypertension, diabetes mellitus, hyperthyroidism, pneumonia, bronchial asthma, pulmonary tuberculosis, and others), history of previous abdominal surgery, and serum albumin levels. We also collected data on tumor profiles such as tumor location (rectum, left or right colon, sigmoid colon, or transverse colon), postoperative cancer staging, and Tumor/Node/Metastasis (TNM) classification. The operative profiles were also collected including the type of procedure performed (anterior resection, abdominoperineal resection, hemicolectomies, Hartmann's procedure, intersphincter resection, sigmoidectomy or total colectomy), intraoperative blood loss, conversion to open surgery, if blood transfusion was done, time to resumption of oral diet, postoperative morbidity, mortality, and length of postoperative hospital stay.

Statistical analysis

We summarized continuous variables using means and standard deviations, and expressed categorical variables as frequencies and percentages. For all our statistical tests, we utilized Epi Info™ 7.2.2.6.

Table 2 Postoperative tumor profile.

Characteristics	Values (n=87)
Tumor location, *frequency (%)*	
Rectum	54 (62.07)
Left colon	4 (4.60)
Right colon	9 (10.34)
Bilateral colon	1 (1.15)
Sigmoid colon	18 (20.69)
Transverse colon	1 (1.15)
Postoperative cancer staging, *frequency (%)*	
I	2 (2.30)
IIA	12 (13.79)
IIB	3 (3.45)
IIIA	6 (6.90)
IIIB	52 (59.77)
IIIC	2 (2.30)
IVA	9 (10.34)
IVB	1 (1.15)
T stage, *frequency (%)*	
T0	0 (0.00)
T1	0 (0.00)
T2	6 (6.90)
T3	53 (60.92)
T4	28 (32.18)
N stage, *frequency (%)*	
N0	20 (22.99)
N1	66 (75.86)
N2	1 (1.15)
M stage, *frequency (%)*	
M0	77 (88.51)
M1	10 (11.49)
Metastasis location, *frequency (%) (n=10)*	
Liver	7 (70.00)
Lungs	3 (30.00)

RESULTS

This study included 87 records of patients with colorectal cancer who underwent laparoscopic colorectal surgery. Table 1 shows the preoperative demographic and clinical profiles of the participants. Participants had a mean age of 56.55 ± 11.99 years, and a sex distribution of 47/87 (54.02%) males and 40/87 (45.98%) females. Most of the participants (63/87; 72.41%) lived within Davao Region, while the remaining participants (24/87; 27.59%) lived outside of Davao Region. Of the 87 participants, 22.99% had hypertension, 9.20% had diabetes mellitus, 1.15% had hyperthyroidism, 1.15% had pneumonia, 5.75% had tuberculosis, 1.15% had asthma, and 3.45% had other comorbidities. Out of the 87 participants, 9 (6.90%) had history of previous abdominal surgery. The mean baseline serum albumin of all participants was 32.56 ± 6.91 g/L.

Table 2 shows the tumor profile based on the biopsy of tumors from the 87 participants in the study. Of the 87 participants, 62.07% of the tumors were located in the rectum, 4.60% in the left colon, 10.34% in the right colon, 1.15% in both left and right colon, 20.69% in the sigmoid colon, and 1.15% in the transverse colon. For the postoperative cancer staging distribution, 2.30% had Stage I colorectal cancer, 13.79% had Stage IIA, 3.45% had Stage IIB, 6.90% had Stage IIIA, 59.77% had Stage IIIB, 2.30% had Stage IIIC, 10.34% had Stage IVA, and 1.15% had Stage IVB. For the TNM classification, most patients presented with advanced T stage disease, 60.92% classified as T3 and 32.18% as T4. Lymph node involvement was common among the participants, such that 75.86% of patients were staged as N1, while 22.99% had no nodal involvement. Distant metastasis was identified in 11.49% of patients, with the liver being the most frequent metastatic site (70%), followed by the lungs (30%).

The operative profile of patients who underwent laparoscopic colorectal surgery is shown in Table 3. Among the 87 patients included, the most frequently performed procedure was low anterior resection (39.08%), followed by anterior resection (17.24%) and abdominoperineal resection (12.64%). Other surgical procedures include hemicolectomies, Hartmann's procedure, intersphincter resection, sigmoidectomy and total colectomy. The mean intraoperative blood loss was 476.73 ± 341.86 mL, and conversion to open surgery occurred in 23.26% of cases. The mean duration of surgery was 278.89 ± 72.76 minutes. Blood transfusion was required in 18.39% of patients, with a mean of 1.33 ± 1.29 units transfused among those who received transfusions. Postoperatively, the mean time it took for patients to resume oral intake was 4.02 ± 2.17 days. Overall morbidity and mortality rates were 26.44% and 3.45%, respectively. The mean length of postoperative hospital stay was 8.35 ± 6.38 days.

Table 3 Operative profile of patients who underwent laparoscopic colorectal surgery.

Characteristics	Values (n=87)
Type of procedure performed, *frequency (%)*	az
Abdominoperineal resection	11 (12.64)
Anterior resection	15 (17.24)
Extended left hemicolectomy	1 (1.15)
Extended right hemicolectomy	1 (1.15)
Hartmann's procedure	9 (10.34)
Intersphincter resection	1 (1.15)
Left hemicolectomy	4 (4.6)
Right hemicolectomy	8 (9.20)
Low anterior resection	34 (39.08)
Sigmoidectomy	1 (1.15)
Total colectomy	1 (1.15)
Total proctocolectomy with radical cystoprostatectomy	1 (1.15)
Mean volume of blood loss ± SD, *mL (n=75)*	476.73 ± 341.86
Converted to open surgery, *frequency (%)*	20 (23.26)
Mean operating time ± SD, *mins*	278.89 ± 72.76
With blood transfusion, *frequency (%)*	16 (18.39)
Mean number of blood units transfused ± SD, *(n=15)*	1.33 ± 1.29
Mean time to resumption of oral intake ± SD, *days (n=75)*	4.02 ± 2.17
Postoperative morbidity, *frequency (%)*	23 (26.44)
Mortality, *frequency (%)*	3 (3.45)
Mean length of postoperative hospital stay ± SD, *days (n=83)*	8.35 ± 6.38

DISCUSSION

Key results

This study showed that laparoscopic colorectal surgery at our institution was most commonly performed in middle-aged patients, with a slight male predominance, and a high proportion of rectal cancer cases. The majority of patients presented with stage IIIB disease, characterized by T3 or T4 tumors and frequent lymph node involvement. Distant metastasis was observed in a small proportion of patients, most commonly involving the liver and lungs. Low anterior resection was the most frequently performed procedure. The mean operative time was 279 minutes, and conversion to open surgery occurred in nearly one-fourth of cases. The mean intraoperative blood loss was 476 mL, with 16 patients requiring blood transfusion. Among these, the mean transfusion transfusion requirement was one unit of blood. Patients resumed oral intake after an average of 4 days postoperatively, and the mean length of postoperative hospital stay was 8 days. Postoperative morbidity occurred in 23 patients, and 3 in-hospital deaths were recorded.

Strengths and limitations

This study provided a detailed description of the demographic and clinical characteristics, as well as postoperative outcomes, of patients with colorectal cancer who underwent laparoscopic colorectal surgery at SPMC. However, since this is a descriptive research, we cannot establish associations between preoperative or intraoperative characteristics and postoperative outcomes. To explore these associations, conducting an analytic research is recommended. We also recommend looking at long-term outcomes, including disease recurrence and disease-free survival.

Interpretation

Colorectal cancer predominantly affects older adults, particularly those aged over 50 years, making age a well-established risk factor for disease development.[11-14] However, advances in colorectal cancer screening—especially in developed countries—have coincided with a rising incidence among younger adults (<50 years).[15 16] Early-stage colorectal cancer is often asymptomatic, contributing to delayed diagnosis and a higher likelihood of advanced-stage disease at presentation.[17] Although distant metastases occur in approximately 20% of patients at the time of diagnosis—lower than in many other malignancies—they most commonly affect the liver and lungs.[18-22] The operative time in our study was comparable to those reported in previous literature.[23 24] While laparoscopic colorectal surgery typically requires longer operative times than open surgery,[24 25] it offers several advantages, including reduced blood loss, shorter hospital stay, earlier resumption of oral intake, and lower postoperative morbidity and mortality.[23 24 26]

Generalizability

In this study, we focused on patients with colorectal cancer who underwent laparoscopic colorectal surgery. As one of the institutions providing minimally invasive surgery for colorectal cancers, findings of this study are applicable to majority of patients seeking medical treatment for this disease.

CONCLUSION

In this study, laparoscopic colorectal surgery

was primarily performed in middle-aged patients, with a slight male predominance, and rectal cancer as the most common diagnosis. Most patients presented with advanced disease (stage IIIB), characterized by T3–T4 tumors and frequent lymph node involvement, while distant metastases were uncommon, primarily affecting the liver and lungs. Low anterior resection was the most frequently performed procedure. The mean operative time was 279 minutes, with nearly one-fourth of cases converted to open surgery. Mean intraoperative blood loss was 476 mL, and 16 patients required blood transfusion, receiving an average of one unit. Patients resumed oral intake after a mean of 4 days, had a mean hospital stay of 8 days, and postoperative morbidity and mortality were observed in 23 and 3 patients, respectively.

Contributors
KRSDLR and ORBJr had substantial contributions to the study design, and to the acquisition, analysis and interpretation of data. KRSDLR wrote the original draft and subsequent revisions. All authors reviewed, edited, and approved the final version of the manuscript. All authors agreed to be accountable for all aspects of the work.

AI use declaration
We used an AI language model to assist with phrasing, structural refinement, and summarization of publicly available information. We independently verified all evidence, and the final analysis and opinions in this editorial are entirely our own.

Ethics approval
This study was reviewed and approved by the Department of Health XI Cluster Ethics Review Committee (DOH XI CERC reference P19030801).

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