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Early Experience with Laparoscopic Colectomy for Colon Adenocarcinoma: A Single-Center Case Series from Addis Ababa, Ethiopia

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Abstract

Background

Laparoscopic colectomy has become standard for colon cancer in high-resource settings, offering faster recovery and comparable oncologic outcomes to open surgery. However, data on its feasibility and outcomes in low- and middle-income countries, particularly in sub-Saharan Africa, remain limited.

Methods

This retrospective case series included all patients who underwent elective laparoscopic or laparoscopic-assisted colectomy for colon adenocarcinoma at MCM Specialized Comprehensive Hospital in Addis Ababa, Ethiopia, between January 2022 and December 2025. Patients with stage IV disease, emergency presentations, or incomplete records were excluded. Outcomes assessed included operative time, conversion rate, lymph node yield, margin status, postoperative complications, length of stay, and 30-day mortality.

Results

Nine patients (six female, 67%; with a mean age 57.3 ± 10.9 years) underwent left (n = 6), right (n = 1), or extended right (n = 2) hemicolectomy. Mean operative time was 3.9 hours, and one patient (11%) required conversion to open surgery. The mean lymph node yield was 15, with at least 12 nodes retrieved in eight patients (89%). All patients achieved R0 resection. There were no postoperative complications, 30-day deaths, or readmissions. The mean hospital stay was 5.6 days.

Conclusion

In this small single-center series, laparoscopic colectomy for colon adenocarcinoma was technically feasible, with R0 resection in all patients, adequate lymph node retrieval in 8 of 9, and no recorded 30-day complications or mortality. Because of the small sample, absence of a comparator, and lack of long-term follow-up, these findings do not establish safety or oncologic equivalence. Larger prospective multicenter studies are needed.

Introduction

Colorectal cancer accounts for about 1.85 million new cases each year, accounting about 10% of all malignancies (1){Bray, 2024 #752}. Although treatment of colon cancer has evolved into a multimodality approach for most patients, a cure cannot be attained without surgical intervention. In addition to cure, surgery also offers the information upon which all other adjuvant therapy is planned, and definitive prognosis is determined {Benson, 2024 #165}.

Surgical resection can be performed through either open surgery or laparoscopic techniques. There has been an increasing adoption of laparoscopic techniques. Laparoscopic surgery, compared to conventional open surgery, provides benefits such as smaller incisions, decreased blood loss, and reduced postoperative pain (2). Nevertheless, studies have noted some drawbacks, including longer surgery duration and a more demanding learning curve for surgeons. Additionally, for larger tumors, laparoscopic surgery may be less effective due to limited tactile sensation and inadequate visualization of the surgical field (3, 4).

Globally, colorectal surgery is increasingly adopting minimally invasive approaches, including laparoscopic and robotic-assisted techniques, driven by advances in surgical technology and the growing burden of colorectal cancer. These approaches are associated with improved postoperative recovery, shorter hospital stays, and fewer postoperative complications compared with open surgery {Bonjer, 2007 #171}.

The application of laparoscopic colectomy for colon cancer was first reported in the early 1990s. Unlike other laparoscopic procedures, however, its adoption was slow because of concern that minimally invasive surgery might not achieve an adequate oncologic resection or might compromise oncologic outcomes (5). Multiple studies have demonstrated that laparoscopic colectomy is a safe and effective alternative to open surgery for colon cancer. Patients undergoing laparoscopy experienced smaller incisions, less postoperative pain, reduced blood loss, and faster recovery. Importantly, long-term oncologic outcomes, including survival and recurrence, were comparable to open surgery. These studies established laparoscopic colectomy as a standard option for elective colon cancer {Nelson, 2004 #33} {Veldkamp, 2005 #17}{Guillou, 2005 #31}{McCombie, 2018 #27}{Baigrie, 2010 #34}{Leake, 2013 #136}.

Colorectal cancer is an increasing health burden in Ethiopia, where surgical capacity remains limited, with approximately 0.5 specialist surgical, obstetric, and anesthesia physicians per 100,000 population (6, 7). In this context, expanding access to specialized colorectal surgery and minimally invasive techniques is particularly relevant. We therefore report our early experience with laparoscopic colectomy for colon adenocarcinoma at a single center in Addis Ababa, Ethiopia, focusing on perioperative and pathologic outcomes.

Methods

Study Area

This study was conducted at MCM Specialized Comprehensive Hospital (MCM CSH) in Addis Ababa, Ethiopia. MCM CSH is a private tertiary care hospital with a dedicated gastrointestinal surgery unit that performs a high volume of elective oncologic resections. The hospital maintains detailed medical records and a standardized pathology reporting system, enabling reliable retrospective data abstraction.

Study Design

This study was designed as a retrospective case series evaluating the perioperative and pathologic outcomes of laparoscopic colectomy for colon cancer. The study period included patients who underwent surgery between January 1, 2022, and December 31, 2025.

Medical records and pathology reports of all eligible patients were reviewed to collect demographic, clinical, operative, and pathological data. Pathologic outcomes, including tumor size, tumor grade, lymph node yield, lymph node involvement, resection margin status, and tumor stage, were assessed based on postoperative histopathological examination.

Inclusion Criteria

Patients were included if they met the following criteria:

- Age 18 years or older
- Histologically confirmed primary adenocarcinoma of the colon (cecum to sigmoid colon)
- Underwent elective laparoscopic colectomy with curative intent at MCM CSH during the study period
- Availability of a complete operative record and final histopathology report

Exclusion Criteria

Patients were excluded if they met any of the following criteria:

- Emergency surgery for bowel obstruction, perforation, or massive bleeding
- Procedures planned as primary open laparotomy
- Stage IV at the time of surgery
- Surgery performed for recurrent malignancy, benign disease, or non-adenocarcinoma histology
- Incomplete medical records

Eligible patients were included consecutively, and all data were de-identified before analysis.

Surgical Procedure

Laparoscopic colectomy (right, extended right,left, left extended according to tumor location) was performed using a standardized operative technique and positioning. Pneumoperitoneum was established by open insertion of an umbilical port, allowing inspection of the peritoneal cavity. Additional ports were placed under direct vision. For right and extended right colectomy, these were a 12-mm port approximately 2 cm medial to the left anterior superior iliac spine, a 5-mm port 2 cm medial to the right anterior superior iliac spine, and a 5-mm port on the left lateral abdominal wall just above the umbilicus. For left colectomy, the layout was mirrored: the 12-mm port approximately 2 cm medial to the right

anterior superior iliac spine, a 5-mm port 2 cm medial to the left anterior superior iliac spine, and a 5-mm port on the right lateral abdominal wall just above the umbilicus. For left hemicolectomy, the standard mirrored layout was used: a 12-mm port approximately 2 cm medial to the right anterior superior iliac spine, a 5-mm port 2 cm medial to the left anterior superior iliac spine, and a 5-mm port on the right lateral abdominal wall just above the umbilicus, with an additional 5-mm port added when needed to facilitate splenic flexure mobilization.

For right colectomy, the ileocolic pedicle was elevated to allow dissection beneath the vessels and identification of the origin of the ileocolic vessels (and the right colic vessels, when present) and the duodenum. The vessels were ligated and divided at their origin. The right colon and proximal transverse colon were mobilized from the retroperitoneum, the lesser sac was entered, the greater omentum was divided and included with the specimen, and the hepatic flexure was mobilized to the mid-transverse colon. For extended right colectomy, the middle colic vessels were additionally divided at their origin and the transverse colon was mobilized to the splenic flexure. For left colectomy, the inferior mesenteric pedicle was elevated, the inferior mesenteric artery was divided at an oncologically appropriate level with preservation of the left ureter and gonadal vessels, the inferior mesenteric vein was divided as needed, and the descending colon and splenic flexure were mobilized to allow a tension-free anastomosis. In all cases, lateral peritoneal attachments were divided to complete mobilization.

The specimen was exteriorized through a 4–6 cm umbilical incision using a wound protector. The bowel was divided extracorporeally, and an ileocolic anastomosis (right and extended right) or a Colo-colic or colorectal anastomosis (left and extended left) was constructed. After extracorporeal anastomosis pneumoperitoneum was established using multiple towel clips. Standard laparoscopic instruments were used throughout, including reusable ports, graspers, laparoscopic scissors, and monopolar or bipolar electrocautery. At the end of the procedure, port-site fascial defects were closed with absorbable sutures, and the extraction incision was closed in layers. All extracted tissue were sent for histopathologic analysis.

Perioperative and Postoperative Care

The perioperative care protocol included prophylactic antibiotic administration on the day before surgery. Patients underwent bowel preparation with enemas twice daily until 12 hours before surgery. Nasogastric tubes and intra-abdominal drains were not routinely used.

Following surgery, patients were offered a full liquid diet within 24 hours as the first postoperative meal. Thereafter, dietary intake was advanced as tolerated, with no specific restrictions.

Early mobilization was strongly encouraged, with patients advised to ambulate outside their room at least five times on the first postoperative day. Deep vein thrombosis prophylaxis was administered until patients were able to ambulate independently.

Urinary catheters were typically removed on the first postoperative morning, provided the patient was ambulatory.

Postoperative analgesia included intravenous tramadol every six hours and diclofenac 50 mg three times daily as required. Intravenous catheters were generally removed on postoperative day two, unless clinically indicated otherwise.

Patients were discharged once they met the following criteria:

- Tolerance of three regular meals without nausea or vomiting
- Absence of abdominal distention
- Adequate pain control with oral analgesics
- Passage of flatus

Study Variables

The primary outcomes assessed included:

- Operative time
- Conversion to open surgery
- Lymph node yield
- Resection margin status (R0 resection)

Secondary outcomes included:

- Postoperative complications
- Length of hospital stay
- 30-day mortality
- 30-day readmission

Data Analysis

Data were analyzed using descriptive statistics. Continuous variables were summarized using means, while categorical variables were reported as frequencies and percentages. Due to the small sample size and descriptive nature of the case series, no inferential statistical analysis was performed. Microsoft Excel was used for the data analysis.

Results

A total of nine patients underwent laparoscopic colectomy for colon cancer during the study period, all patients were included. The mean age was 57.3 ± 10.9 years, with a predominance of female patients (n

= 6, 67%), while three patients (33%) were male. The mean body mass index (BMI) was 24.5 ± 2.5 kg/m². The majority of patients were classified as ASA II (n = 5, 56%), followed by ASA I (n = 3, 33%) and ASA III (n = 1, 11%). Surgical procedures performed included left hemicolectomy (n = 6), right hemicolectomy (n = 2), and extended right hemicolectomy (n = 1). The mean operative time was 3.9 hours, and conversion to open surgery occurred in one patient (11%). The operative time showed a decrease in trend as shown in Fig. 1. No intraoperative complications were recorded. On histopathological evaluation, the majority of tumors were classified as T3 lesions, with both node-negative and node-positive disease represented. The mean lymph node yield was 15, with adequate lymphadenectomy (≥ 12 nodes) achieved in 8 patients (89%). R0 resection was achieved in all patients. Postoperative outcomes were favorable, with no complications, no 30-day mortality, and no readmissions observed. The mean length of hospital stay was 5.6 days.

Table 1
Patient characteristics

Variable	Value
Number of patients	9
Age (years), mean ± SD	57.3 ± 10.9
Sex, n (%)	
Male	3 (33%)
Female	6 (67%)
Body Mass Index (kg/m²), mean ± SD	24.5 ± 2.5

Solid line

Observed operative time

Dotted line

Linear trend

Discussion

Pathologic outcomes are critical determinants of oncologic adequacy in colon cancer surgery. Accurate staging relies heavily on proper lymph node evaluation making lymph node status the most important prognostic factors in colorectal cancer. The identification of metastatic involvement in regional lymph nodes determines tumor staging within the TNM classification and plays a pivotal role in guiding subsequent management decision. Inadequate lymph node assessment may result in under staging of the disease and potentially lead to suboptimal treatment strategies.

Current guidelines from the National Comprehensive Cancer Network recommend examination of at least 12 regional lymph nodes following colon cancer resection to ensure accurate staging and appropriate risk stratification (8). Studies have demonstrated that evaluating an adequate number of lymph nodes improves staging accuracy and is associated with better survival outcomes. In addition to lymph node assessment, achieving negative surgical margins (R0 resection) remains a fundamental oncologic principle in colon cancer surgery. Complete tumor removal with negative margins minimizes the risk of residual disease and local recurrence, thereby improving long-term oncologic outcomes and overall survival (9).

Several landmark randomized trials and large observational studies have reported detailed numerical outcomes for laparoscopic colectomy compared with open surgery for colon cancer. These studies provide quantitative data on operative parameters such as mean operative time, lymph node harvest, rates of R0 resection, length of hospital stay, 30-day mortality, and readmission, demonstrating that laparoscopic colectomy achieves oncologic outcomes comparable to open surgery while often offering shorter recovery times (1, 4, 10, 11).

When comparing our group to landmark trials of laparoscopic colectomy, several similarities and differences are noteworthy. The mean age of our patients was 57.3 years, younger than the populations in majority of the large-scale studies (1, 4, 10). This difference may reflect variations in the epidemiology and population age structure between our setting and the predominantly high-income countries in which these trials were conducted. A recent large scale study among African countries reported a median age of 53.5 years, while studies from high income countries report median age above 65 years {Dagnaw, 2025 #28}. These findings suggest that the younger age observed in our cohort is consistent with the reported epidemiology of colon cancer in our set-up.

The mean operative time in our series was 3.9 hours (234 minutes). This was longer than operative times reported in several established laparoscopic colorectal surgery series and randomized trials (1, 4, 10). Despite the relatively long overall operative duration, operative time showed a progressive reduction over the study period, suggesting an improvement in operative efficiency with increasing surgical experience. This temporal trend is consistent with the learning curve described during the introduction of laparoscopic colorectal surgery, in which operative duration generally decreases as the surgical team gains experience (12).

v: the mean lymph node yield was 15, exceeding the recommended threshold of 12 nodes and comparable to the lymph node harvest reported in large randomized trials. All patients in our series achieved R0 resection with negative margins, aligning with the high rates of complete tumor removal observed in the major trials (1, 4, 10). Postoperative recovery was favorable, with a mean hospital stay of 5.6 days, similar to or slightly shorter than the durations reported in these multicenter studies. Importantly, there were no cases of 30-day mortality or readmission in our cohort, which mirrors the low short-term mortality and readmission rates documented in the major trials and large registry data. Overall, our findings demonstrate that laparoscopic colectomy in a resource-limited setting can achieve

clinical and pathologic outcomes comparable to those reported in high-resource international trials (13–15). A summary table comparing our study with landmark trials is present in Table 2.

Table 2
Comparison of Patient, Operative, and Pathologic Outcomes Between Our Cohort and Major Laparoscopic Colectomy Trials

Variable	Our Result	COST / COLOR / CLASICC / Big Cohorts
Age	Mean 57.3 yrs	~ 67–70 yrs
Sex	67% female	Balanced ~ 50% female
Operative Time	Mean ~ 3.2h	Longer than open in all trials; laparoscopic usually longer than open
Lymph Node Yield	Mean ~ 15	~ 12 nodes
R0 Margin	100%	Similar R0 rates in major trials
Length of Hospital Stay	5.6 days	Generally shorter in laparoscopic vs open (~ 5–7 days)
30-day Mortality	0%	Low; ~1–2%
Readmission	0%	Low; similar between laparoscopic and open

In the present study, the mean lymph node yield was 15 nodes, exceeding the recommended minimum of 12 nodes for adequate oncologic staging according to current guidelines. Adequate lymphadenectomy was achieved in 89% of patients, reflecting a high standard of oncologic resection even within a resource-limited setting. Importantly, all patients achieved R0 resection with negative margins, indicating complete tumor excision and minimizing the risk of local recurrence. These findings are consistent with results from major randomized trials, such as the COST and CLASICC studies, which have demonstrated that laparoscopic colectomy can achieve comparable lymph node harvest, margin status, and overall oncologic outcomes relative to open surgery. Our results reinforce the growing evidence that, when performed by experienced surgeons, laparoscopic colectomy does not compromise pathologic quality and can provide both oncologic adequacy and the additional benefits of minimally invasive surgery, including reduced postoperative pain, shorter hospital stays, and faster recovery (16, 17) .

The adoption of laparoscopic colorectal surgery in low- and middle-income countries remains limited due to several barriers, including restricted access to laparoscopic equipment, limited training opportunities, and financial constraints (18). Additionally, patients in resource-limited settings often present at more advanced stages of disease, which may further complicate surgical management. Despite these challenges, our findings demonstrate that laparoscopic colectomy can be performed safely with acceptable oncologic outcomes when adequate expertise and infrastructure are available (19).

Postoperative outcomes in our cohort were favorable, with no recorded complications or 30-day mortality. The mean length of hospital stay was 5.6 days, which is consistent with previously reported benefits of laparoscopic surgery, including faster recovery and reduced postoperative morbidity. The minimally invasive nature of laparoscopic colectomy is associated with reduced surgical trauma, improved postoperative pain control, and earlier mobilization, all of which contribute to enhanced recovery (20).

Conclusion

In this case series of nine patients undergoing laparoscopic colectomy for colon cancer, we observed favorable surgical and pathologic outcomes. Adequate lymph node retrieval was achieved in the majority of patients, with a mean yield of 15 nodes, and all patients underwent R0 resection with negative margins, indicating complete tumor removal. There was also decreased operative time showing the difficulty of the procedure. Operative outcomes were also satisfactory, with a low conversion rate, no intraoperative complications, and a short mean hospital stay of 5.6 days. These results suggest that, even in a resource-limited setting, laparoscopic colectomy can provide oncologically adequate resection comparable to outcomes reported in large international trials. While our study is limited by its small sample size, single-center design, and lack of long-term follow-up, the findings support the feasibility and safety of minimally invasive colectomy when performed by experienced surgeons. Future multicenter prospective studies with larger cohorts and long-term follow-up are needed to confirm these findings and assess recurrence and survival outcomes, and initiatives to expand laparoscopic training and improve access to minimally invasive technologies may facilitate broader adoption of this approach in developing countries.

Strength and Limitation

The This study presents an early experience with laparoscopic colorectal surgery in an African setting, contributing evidence from a resource-limited environment. Its strengths include consecutive case inclusion, detailed perioperative outcome reporting, and assessment of oncologic surrogate measures, including R0 resection and lymph node yield. The findings may inform local surgical training, capacity building, and future multicenter research. However, the small sample size (n = 9) limits precision, and zero observed complications, mortality, or readmissions cannot establish safety. The retrospective, single-center design and absence of an open-surgery comparison group limit generalizability and permit selection bias. Patients were younger than those in major trials, and all procedures were performed by one lead surgeon. Operative time was longer than in major trials, while the small sample and mixed procedures preclude reliable assessment of a learning curve. Retrospective data collection and lack of long-term follow-up may limit complication ascertainment and conclusions about long-term oncologic outcomes.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and relevant institutional guidelines and regulations. The Institutional Review Board (IRB) of Myungsung Medical College waived the requirement for ethical review for data collection, as the study was a retrospective review of routinely collected clinical records. Written informed consent for treatment and for the use of anonymized clinical data was obtained from all patients.

Consent for publication

Written informed consent for publication was obtained from all patients.

Availability of data and materials

The data supporting the findings of this case series are included within the article. Further details are available from the corresponding author upon reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

M.N. conceptualized the study, supervised the study, drafted the manuscript, and contributed to data analysis. D.Y. designed the study, analyzed the data, and wrote the manuscript. K.Z. and A.T. collected the data and reviewed the manuscript. E.M. was the lead surgeon and performed the surgical procedures, assisted by P.B. and F.M., who also assisted in the operations. All three critically revised and helped write the manuscript. All authors read and approved the final manuscript.

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Clinical trial number

Not applicable.

PROCESS guidelines

This study was reported in accordance with the Process guideline for observational studies. The completed STROBE checklist is provided as a supplementary file.

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Figures

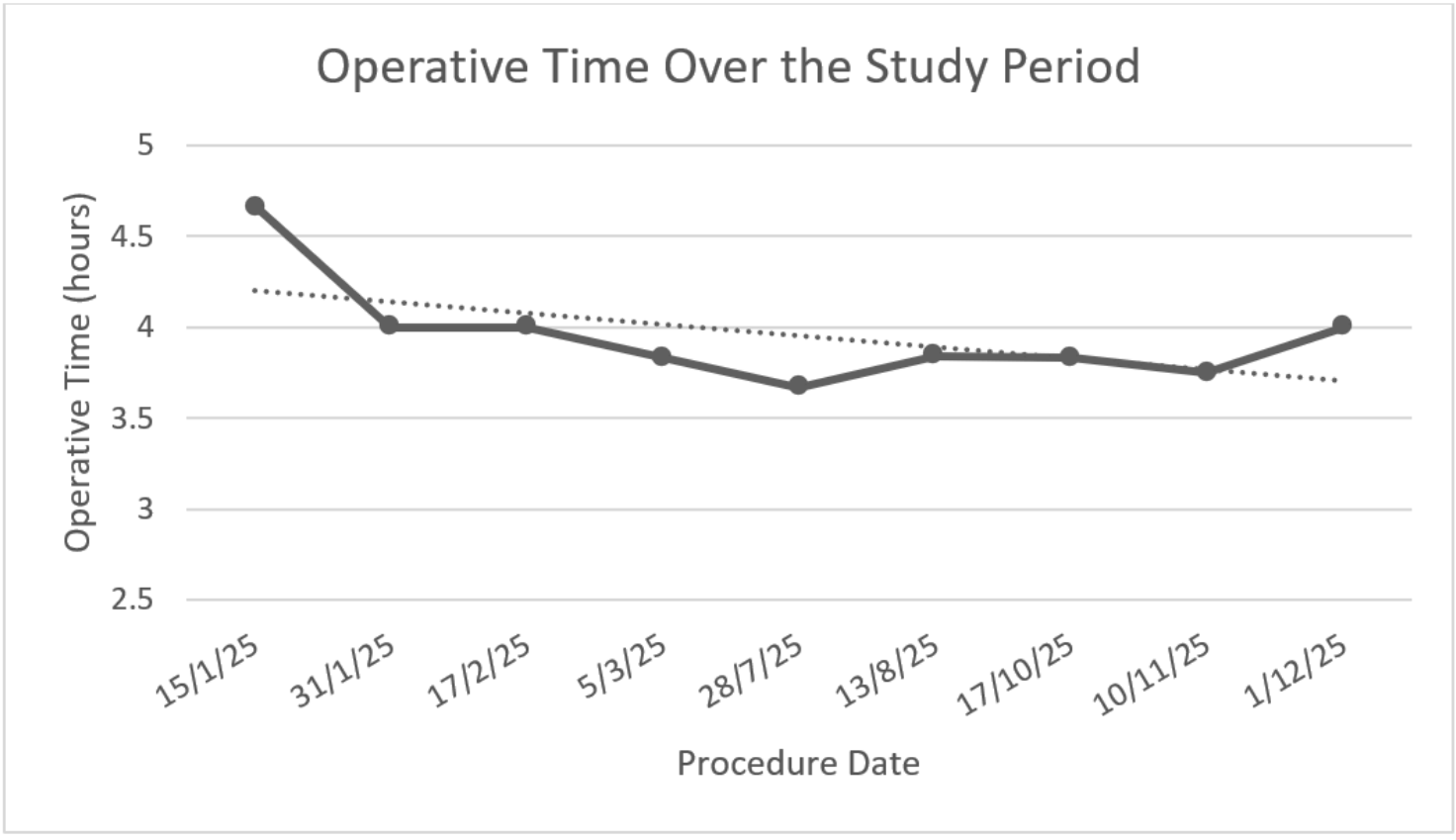


Figure 1

Operative Time Over the Study Period

Solid line: Observed operative time

Dotted line: Linear trend

Supplementary Files

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- PROCESSChecklistCRCdraft3.docx