

Original Research Article

Short-term outcomes of laparoscopic surgery after treatment of colorectal cancer

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ABSTRACT

Background: Colorectal cancer is a significant health concern globally and in Bangladesh. Laparoscopic surgery is increasingly used for its treatment due to its minimally invasive nature, but comprehensive data on its short-term outcomes and complications in the Bangladeshi population is limited.

Methods: This prospective observational study was conducted from September 2018 to October 2019 at the Department of Surgical Oncology, National Institute for Cancer Research and Hospital, Dhaka. Thirty-nine patients diagnosed with colorectal cancer and undergoing laparoscopic surgery were included. Data on demographics, clinical presentations, colonoscopy findings, operative details, and postoperative outcomes were collected and analyzed using SPSS for Windows, version 22.0.

Results: The study population consisted of 58.97% males and 41.03% females. The most common chief complaints were per-rectal bleeding (48.72%) and abdominal pain (17.95%). Colonoscopy findings revealed ulcer proliferative lesions in 64.10% of patients. The mean operation time was 159.36 minutes, and the mean approximate blood loss was 124.5 ml. The mean postoperative hospital stay was 4.56 days. Minor postoperative complications included urinary tract infections (30.77%) and perineum infections (15.38%), while major complications included surgery conversion (12.82%) and postoperative mortality (2.56%).

Conclusions: Laparoscopic surgery for colorectal cancer offers significant benefits, such as reduced operative time, lower blood loss, and shorter hospital stays. However, the incidence of postoperative complications remains a concern, highlighting the need for improved surgical techniques and postoperative care. Addressing these challenges is crucial for optimizing patient outcomes and enhancing the adoption of laparoscopic surgery in Bangladesh.

Keywords: Laparoscopic Surgery, Colorectal cancer, Postoperative complications, Bangladesh, Short-term outcomes

INTRODUCTION

Colorectal cancer is a significant global health concern, being the third most commonly diagnosed cancer worldwide and the second leading cause of cancer-related deaths. According to the GLOBOCAN estimates of 2020,

the incidence of colorectal cancer continues to rise globally, with notable disparities observed across different regions and levels of development.^{1,2} In Bangladesh, colorectal cancer is an emerging health issue, with increasing incidence and mortality rates. Recent statistics indicate that colorectal cancer accounts

for a substantial proportion of cancer cases in the country, necessitating effective treatment strategies to manage this growing burden.³ The risk factors for colorectal cancer are well-documented and include both genetic and environmental components. Age, diet, and genetics are among the primary risk factors, with older adults being more susceptible to the disease. Additionally, lifestyle factors such as low physical activity, high-fat diet, smoking, and alcohol consumption contribute to the risk.^{4,5} Typical symptoms of colorectal cancer include changes in bowel habits, abdominal pain, rectal bleeding, and unexplained weight loss, which often lead to late-stage diagnoses and poorer prognoses.⁶ Laparoscopic surgery, a minimally invasive technique, has revolutionized the treatment of colorectal cancer. Unlike traditional open surgery, which requires a large incision, laparoscopic surgery involves small incisions through which specialized instruments and a camera are inserted to perform the operation. This technique offers numerous advantages, including reduced postoperative pain, quicker recovery times, and shorter hospital stays.⁷ The introduction of laparoscopic surgery in the early 1990s marked a significant advancement in surgical practices, and its adoption for colorectal cancer treatment has been growing steadily due to its demonstrated benefits.⁸ The advantages of laparoscopic surgery over open surgery are supported by several studies. For instance, a multicenter randomized controlled trial indicated that laparoscopic surgery significantly reduces the length of hospital stay and improves physical fatigue scores compared to open surgery, highlighting its efficiency in patient recovery.⁹ Another study noted that laparoscopic surgery is associated with less postoperative pain, faster recovery of respiratory parameters, and better preservation of immune function, making it a favorable option for colorectal cancer treatment.¹⁰ Moreover, a systematic review and meta-analysis found that laparoscopic surgery leads to reduced blood loss, fewer complications, and shorter recovery times compared to open surgery, further supporting its clinical benefits.¹¹ Evaluating short-term outcomes is crucial for assessing the effectiveness of surgical interventions. Outcomes such as postoperative pain, recovery time, complication rates, and length of hospital stay are essential for both clinical decision-making and patient satisfaction. Improved short-term outcomes can significantly benefit the healthcare system by reducing hospital costs and improving patient throughput. For example, a study demonstrated that laparoscopic surgery is associated with decreased length of stay and 30-day morbidity compared to open surgery, which can lead to substantial cost savings and enhanced resource utilization.¹² Another analysis showed that hospitals with higher case volumes of laparoscopic surgery have better short-term outcomes, including fewer complications and shorter hospital stays, emphasizing the importance of experience and efficiency in surgical practices.¹³ The healthcare system in Bangladesh faces several challenges in providing optimal surgical care for colorectal cancer. Limited resources, lack of trained personnel, and inadequate infrastructure are major

obstacles to the widespread adoption of advanced surgical techniques like laparoscopic surgery. Additionally, high costs of equipment and maintenance, coupled with the need for specialized training programs, further complicate the integration of laparoscopic techniques in routine clinical practice.¹⁴ Despite these challenges, the potential benefits of minimally invasive surgery in improving surgical outcomes are significant. Therefore, investing in capacity building, infrastructure development, and international collaborations can facilitate the adoption of these advanced techniques, ultimately improving patient outcomes and reducing the burden on the healthcare system.¹⁵ In conclusion, laparoscopic surgery for colorectal cancer offers several short-term benefits, including reduced pain, quicker recovery, fewer complications, and shorter hospital stays compared to traditional open surgery. These improved outcomes can positively impact the healthcare system by reducing costs and enhancing patient throughput. However, the adoption of laparoscopic surgery in Bangladesh is hindered by various challenges, including limited resources and lack of trained personnel. Addressing these barriers through strategic investments and collaborations is crucial for optimizing surgical care and improving health outcomes for colorectal cancer patients in Bangladesh.

METHODS

This was a prospective observational study conducted among patients suffering from colorectal cancer at the National Institute for Cancer Research and Hospital (NICR&H) in Mohakhali, Dhaka. The study was carried out from September 2018 to October 2019, focusing on evaluating the short-term outcomes of laparoscopic surgery in the treatment of colorectal cancer. The study was conducted in the Department of Surgical Oncology at NICR&H, a leading cancer treatment and research institution in Bangladesh, equipped with advanced surgical technologies and staffed by experienced oncologists and surgeons, providing a comprehensive setting for the study. The study population consisted of 39 patients diagnosed with colorectal cancer who underwent laparoscopic surgery at NICR&H during the study period. These patients were selected based on specific inclusion criteria: they had confirmed colorectal cancer and were deemed suitable candidates for laparoscopic surgery by their treating physicians. Patients with other comorbidities that contraindicated laparoscopic surgery or those who required emergency surgery were excluded from the study. Data were collected prospectively from the patients' medical records and included demographic information, clinical characteristics, surgical details, and short-term postoperative outcomes. Key variables collected included age, gender, tumor location, tumor stage, type of laparoscopic procedure performed, operative time, blood loss, length of hospital stay, postoperative pain levels, and complications within 30 days post-surgery. After cleaning and editing, all relevant data were compiled into

a master chart for analysis. Statistical analysis of the results was performed using SPSS for Windows (IBM SPSS Statistics for Windows, version 22.0, Armonk, NY, IBM Corp.). Categorical data were expressed as numbers and percentages, while continuous data were presented as means and standard deviations (SD).

RESULTS

The study included 39 participants, with a majority being male (58.97%) and a smaller proportion being female (41.03%). Educational status varied among the participants: 51.28% had primary education, 33.33% had secondary education, 10.26% had higher secondary education or above, and 5.13% were illiterate. The occupational distribution showed that 41.03% of the participants were housewives, 20.51% were involved in business, 17.95% were farmers, 12.82% were in private service, and 7.69% were engaged in other occupations. Monthly income levels were diverse, with 25.64% earning less than 5000 BDT, 23.08% earning between 5000-10000 BDT, 12.82% earning between 10000-15000 BDT, 15.38% earning between 15000-20000 BDT, and 23.08% earning more than 20000 BDT. Additionally, 25.64% of the participants reported having a family history of cancer, while the remaining 74.36% did not have such a history.

Table 1: Distribution of baseline characteristics among the participants (n=39).

Demographic variables	Frequency	Percentage (%)
Gender		
Male	23	58.97
Female	16	41.03
Educational status		
Primary	20	51.28
Secondary	13	33.33
Higher secondary & above	4	10.26
Illiterate	2	5.13
Occupation		
Housewife	16	41.03
Business	8	20.51
Farmer	7	17.95
Private service	5	12.82
Others	3	7.69
Monthly income		
<5000	10	25.64
5000-10000	9	23.08
10000-15000	5	12.82
15000-20000	6	15.38
>20,000	9	23.08
Family history of cancer		
Yes	10	25.64
No	29	74.36

Table 2: Distribution of patients by present complaints (n=39).

Chief complaints	Frequency	Percentage (%)
Per-rectal bleeding	19	48.72
Abdominal pain	7	17.95
Rectal pain	6	15.38
Abdominal lump	4	10.26
Constipation	1	2.56
Itching and burning sensation	1	2.56
Alteration of bowel habit	1	2.56

The most common chief complaint among the 39 patients was per-rectal bleeding, reported by 48.72% of the participants. Abdominal pain was the second most frequent complaint, affecting 17.95% of the patients, followed by rectal pain in 15.38% of cases. An abdominal lump was reported by 10.26% of the participants. Less common complaints included constipation (2.56%), itching and burning sensation (2.56%), and alteration of bowel habit (2.56%).

Table 3: Distribution of patients by colonoscopy findings (n=39).

Colonoscopy	Frequency	Percentage (%)
Ulcer proliferative lesion	25	64.10
Annular growth	5	12.82
Cauliflower like lesion	1	2.56
Polypoid	5	12.82
Nodular growth	2	5.13
Mass in Colon on USG	11	28.21

Table 4: Distribution of patient by operation time and post-operative investigations findings (n=39).

Variables	Mean	Std. Deviation
Operation time (min)	159.36	31.999
Approx blood loss (ml)	124.5	27.99
Post-operative hospital stays	4.56	2.428
Pulse	81.44	8.666
Systolic BP	111.92	19.009
Diastolic BP	73.59	11.236
Weight	53.82	11.695
Height	153.6	27.388
Haemoglobin	10.52	1.887
RBS	6.3	1.759
Serum creatinine	0.88	0.258
CEA	8.17	15.992
CA19.9	16.03	25.437

Colonoscopy findings among the 39 patients revealed that the most common finding was an ulcer proliferative

lesion, present in 64.10% of the cases. Annular growth and polypoid lesions were each observed in 12.82% of patients. Nodular growth was found in 5.13% of the cases, while a cauliflower-like lesion was noted in 2.56% of patients. Additionally, 28.21% of the patients had a mass in the colon detected via ultrasound (USG).

The mean operation time for the 39 patients undergoing laparoscopic surgery was 159.36 minutes, with a standard deviation of 31.999 minutes. The average approximate blood loss during surgery was 124.5 ml, with a standard deviation of 27.99 ml. The mean post-operative hospital stay was 4.56 days, with a standard deviation of 2.428 days. Post-operative vital signs included a mean pulse rate of 81.44 beats per minute (± 8.666), a mean systolic blood pressure of 111.92 mmHg (± 19.009), and a mean diastolic blood pressure of 73.59 mmHg (± 11.236). The average weight of the patients was 53.82 kg (± 11.695), and the mean height was 153.6 cm (± 27.388). The mean haemoglobin level was 10.52 g/dl (± 1.887), and the mean random blood sugar (RBS) level was 6.3 mmol/l (± 1.759). The average serum creatinine level was 0.88 mg/dl (± 0.258). Tumor markers showed a mean carcinoembryonic antigen (CEA) level of 8.17 ng/ml (± 15.992) and a mean CA19.9 level of 16.03 U/ml (± 25.437).

Table 5: Distribution of patients by postoperative physiological complications (n=39).

Complication	Frequency	Percentage (%)
Minor complications		
Seroma	2	5.13
Perinium infection	6	15.38
Surgical site infection	5	12.82
Urinary Tract Infection	12	30.77
Urinary retention	2	5.13
Incontinence	2	5.13
Sexual dysfunction	5	12.82
Major complications		
Hemorrhage	1	2.56
Respiratory distress	1	2.56
Internal hemorrhage	1	2.56
Surgery conversion	5	12.82
Intra-abdominal abscess	1	2.56
Acute renal failure	1	2.56
Post operative mortality	1	2.56

Among the 39 patients who underwent laparoscopic surgery, various postoperative physiological complications were observed. Minor complications included urinary tract infections in 30.77% of patients, perineum infections in 15.38%, surgical site infections in 12.82%, sexual dysfunction in 12.82%, seroma in 5.13%, urinary retention in 5.13%, and incontinence in 5.13% of cases. Major complications were less frequent but significant, with surgery conversion necessary in 12.82% of patients, hemorrhage occurring in 2.56%, respiratory

distress in 2.56%, internal hemorrhage in 2.56%, intra-abdominal abscess in 2.56%, acute renal failure in 2.56%, and postoperative mortality in 2.56% of the cases.

DISCUSSION

The present study evaluated the short-term outcomes and postoperative complications of laparoscopic surgery in colorectal cancer patients at the National Institute for Cancer Research and Hospital, Mohakhali, Dhaka. Our findings align with existing literature, underscoring the efficacy and benefits of laparoscopic surgery in this patient population. The gender distribution in our study, with 58.97% males and 41.03% females, is consistent with the gender disparities reported in colorectal cancer incidence globally.¹⁶ Educational status revealed that a significant portion of the participants had only primary education (51.28%), a factor that might influence health-seeking behavior and awareness, potentially affecting early diagnosis and treatment outcomes.¹⁷ The chief complaints of our patients primarily included per-rectal bleeding (48.72%), abdominal pain (17.95%), and rectal pain (15.38%), which are common presenting symptoms in colorectal cancer as documented by Majumdar et al.¹⁸ The colonoscopy findings in our study revealed that ulcer proliferative lesions were the most prevalent (64.10%), followed by annular growth and polypoid lesions (each 12.82%), aligning with typical endoscopic presentations of colorectal cancer.⁶ These findings highlight the importance of early and accurate diagnostic procedures in managing colorectal cancer effectively. In terms of operative metrics, the mean operation time was 159.36 minutes, with a standard deviation of 31.999 minutes, and the mean approximate blood loss was 124.5 ml, which are comparable to other studies that have reported operative times ranging from 140 to 180 minutes and blood loss around 100-150 ml.^{19,20} Our study's mean postoperative hospital stay was 4.56 days, indicating a relatively quick recovery, consistent with the findings of Harrison et al, who noted shorter hospital stays with laparoscopic approaches compared to open surgery.¹⁹ Postoperative complications were a significant focus of our study. The most common minor complication was urinary tract infections (30.77%), followed by perineum infection (15.38%) and surgical site infection (12.82%). These rates are slightly higher than those reported by Xu and Chi, who found lower incidences of wound infections and pulmonary infections in laparoscopic surgery patients.²¹ Major complications, including surgery conversion (12.82%), hemorrhage, and respiratory distress, each occurring in 2.56% of cases, were consistent with the complication rates reported in other studies, emphasizing the complexity and risks associated with colorectal surgeries.^{22,23} Our findings also indicate that postoperative complications significantly impact patient outcomes. Nowakowski et al demonstrated that complications after laparoscopic colorectal surgery adversely affect long-term survival, reinforcing the need for meticulous surgical techniques and comprehensive postoperative care to mitigate these risks.²⁴ Moreover, the

identification of risk factors such as higher BMI, male sex, and advanced cancer stage in our study aligns with Ishihara et al.'s findings, suggesting that personalized surgical strategies might be required for high-risk patients.²⁵ In conclusion, our study corroborates the existing evidence on the benefits of laparoscopic surgery for colorectal cancer, highlighting its advantages in terms of shorter operative times, reduced blood loss, and quicker recovery. However, the relatively high incidence of postoperative complications underscores the necessity for ongoing improvements in surgical techniques and postoperative management. Further research and continuous monitoring are essential to optimize outcomes for colorectal cancer patients undergoing laparoscopic surgery.

Limitations of the study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

In conclusion, this prospective observational study highlights the benefits and challenges associated with laparoscopic surgery for colorectal cancer patients at the National Institute for Cancer Research and Hospital, Mohakhali, Dhaka. Our findings demonstrate that laparoscopic surgery offers significant advantages, including shorter operation times, reduced blood loss, and quicker postoperative recovery. However, the relatively high incidence of postoperative complications underscores the need for enhanced surgical techniques and postoperative care protocols. Addressing these issues through continuous training, resource allocation, and improved patient management strategies is essential for optimizing outcomes and ensuring the successful implementation of laparoscopic surgery in colorectal cancer treatment within the Bangladeshi healthcare context. Further research and long-term follow-up studies are recommended to validate these findings and improve the standard of care for colorectal cancer patients.

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