

## Postoperative Complications Following Colorectal Surgeries: A Retrospective Review

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### Abstract

**Background:** Colorectal surgery is commonly performed for colorectal cancer and other colorectal diseases; however, postoperative complications continue to remain a major challenge despite advances in surgical techniques and perioperative care. These complications may increase morbidity, prolong hospital stay, delay recovery, and adversely affect overall patient outcomes.

**Aim:** The present study aimed to evaluate postoperative outcomes and complications following colorectal surgery and to identify the associated risk factors contributing to postoperative morbidity.

**Methodology:** This retrospective study was conducted in the Department of General Surgery, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India, over a period of one year. A total of 124 patients who underwent colorectal surgery were included in the study. Data regarding demographic characteristics, comorbidities, operative details, postoperative outcomes, and complications were collected from hospital records and electronic medical records. Postoperative complications occurring within 30 days were graded using the Clavien–Dindo classification system. Statistical analysis was performed using IBM SPSS Statistics version 28.0.1.1.

**Results:** Surgical site infection was the most common postoperative complication followed by postoperative ileus and anastomotic leakage. Advanced age, diabetes mellitus, higher ASA grade, emergency surgery, and open surgical procedures were significantly associated with increased postoperative complications and prolonged hospital stay.

**Conclusion:** Postoperative complications following colorectal surgery remain a significant cause of morbidity. Early identification of high-risk patients, careful perioperative management, and minimally invasive surgical approaches may help improve postoperative outcomes and reduce complication rates.

**Keywords:** Colorectal surgery; postoperative complications; anastomotic leakage; surgical site infection; postoperative outcomes; retrospective study.

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### Introduction

One of the most common cancers in the world, colorectal cancer (CRC) continues to be the second most common cause of cancer-related death [1]. For colon cancer and several benign colorectal disorders, including ulcerative colitis, Crohn's disease, diverticulitis, bowel obstruction, ischemic bowel disease, and rectal prolapse, surgical resection remains the main and most successful therapeutic option [2]. Complications after colorectal surgery continue to be a serious worry for surgeons and healthcare systems worldwide, despite ongoing developments in surgical methods, anesthesia, perioperative care, and postoperative treatment.

It has been found that 18% to 38% of patients experience postoperative problems after colorectal surgery [3]. In addition to raising hospital stays, healthcare costs, surgical morbidity, and mortality,

these complications have a substantial impact on patient recovery and quality of life. Postoperative problems may also cause patients with colorectal cancer to put off starting adjuvant chemotherapy, which would negatively impact overall survival and long-term oncological outcomes [4].

Due to its benefits over open surgery, laparoscopic colorectal surgery has become more and more common in recent years. Research has shown that laparoscopic operations are linked to shorter hospital stays, quicker bowel function recovery, less discomfort following surgery, fewer surgical problems, and enhanced immune response [5]. Additionally, some research indicates that, in comparison to open procedures, laparoscopic surgery may result in better oncological results because of less postoperative immunological suppression. Howev-

er, in vulnerable individuals, postoperative immune dysfunction after colorectal surgery still plays a role in tumour recurrence and disease progression [6].

Intraoperative and postoperative problems can be used to broadly classify difficulties related to colorectal surgery. Excessive bleeding, bowel damage, ureteric damage, and bladder damage are examples of intraoperative problems that might arise from adhesions, changed anatomy, technical issues, or surgeon experience [7]. Surgical site infection, anastomotic leakage, postoperative ileus, intra-abdominal abscess, hemorrhage, and sepsis are typical major postoperative complications. Because it is linked to higher morbidity, longer hospital stays, reoperation, and low survival rates, anastomotic leaking is regarded as one of the most serious complications among these [8].

It was previously challenging to compare surgical outcomes across studies due to the lack of a standardized method for documenting postoperative problems. The Clavien-Dindo Classification was developed as a dependable and repeatable grading system based on the therapeutic intervention needed to address difficulties to get around this restriction [9]. This categorization is now often used to evaluate surgical results and patient care quality.

Postoperative problems have been shown to have a detrimental impact on long-term oncological outcomes in patients with colorectal cancer [10]. Postoperative morbidity has been found to be significantly predicted by a number of factors, including advanced age, poor nutritional condition, comorbidities, extended operating time, emergency surgery, and surgeon skill [11]. Through appropriate preoperative optimization, meticulous surgical planning, and enhanced perioperative treatment, many of these risk factors may be mitigated.

Thus, despite recent advances in surgery, postoperative complications after colorectal surgery remain a major clinical concern. Improving surgical outcomes, reducing morbidity and mortality, and raising the standard of patient care all depend on an understanding of the frequency, pattern, and risk factors of these complications. Therefore, using a retrospective analysis, the current study was conducted to assess postoperative complications and outcomes after colorectal surgery.

### Methodology

**Study Design:** The present study was a hospital-based retrospective observational study conducted to evaluate postoperative outcomes and complications following colorectal surgery. The study involved retrospective analysis of patient records maintained in the Department of General Surgery.

**Study Area:** The study was conducted in the Department of General Surgery, ICARE Institute of

Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India

**Study Duration:** The study was conducted over a period of one year.

**Sample Size:** A total of 124 patients who underwent colorectal surgery during the study period were included in the study.

**Study Population:** The study population consisted of patients who underwent colorectal surgery for both benign and malignant colorectal diseases at the Department of General Surgery during the study period. Data related to demographic profile, clinical presentation, operative details, postoperative outcomes, and complications were obtained from hospital medical records and electronic databases.

### Inclusion Criteria

- Patients who underwent colorectal surgery during the study period.
- Patients aged 18 years and above.
- Patients with complete medical records and postoperative follow-up details.
- Patients undergo surgery for both benign and malignant colorectal conditions.

### Exclusion Criteria

- Patients with incomplete or missing medical records.
- Patients with concurrent or previous malignancies other than colorectal malignancy.
- Patients are diagnosed with hereditary colorectal syndromes such as familial adenomatous polyposis or hereditary non-polyposis colorectal cancer.
- Patients with malignancies other than adenocarcinoma.
- Patients who were lost to follow-up.

**Data Collection:** Data were retrospectively collected from prospectively maintained hospital records and electronic medical records of patients who underwent colorectal surgery. Information regarding demographic profile, comorbidities, operative details, tumor characteristics, duration of surgery, hospital stay, and postoperative outcomes was recorded. Postoperative complications occurring within 30 days of surgery, including surgical site infection, anastomotic leakage, ileus, bleeding, respiratory and cardiac complications, were assessed and graded according to the Clavien–Dindo classification system.

**Procedure:** All patients underwent preoperative evaluations including clinical examination, laboratory investigations, colonoscopy, and radiological imaging wherever indicated. Surgical procedures were performed according to standard colorectal surgical principles. Details regarding operative

findings, type of surgery, postoperative recovery, duration of hospitalization, morbidity, mortality, and reoperation were obtained from hospital records and analyzed.

**Statistical Analysis:** Statistical analysis was performed using IBM SPSS Statistics software version 28.0.1.1 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean  $\pm$  standard deviation, while categorical variables were presented as frequency and percentage. Chi-square test, Fisher's exact test, Student's t-test, and Mann-Whitney U test were used wherever appropriate. Survival analysis was performed using the Kaplan-Meier method and log-rank test, while multivariable analysis was carried out using the Cox propor-

tional hazards model. A p-value  $<0.05$  was considered statistically significant."

## Result

Table 1 displays the clinicodemographic characteristics of patients who are undergoing colorectal surgery. The majority of patients (51.6%) were between the ages of 50 and 70. Patients under 50 (25.8%) and over 70 (22.6%) came next. Of the patients in the research, 62.9% were men and 37.1% were women. 24.2% of patients had diabetes mellitus, whereas 33.9% of patients had hypertension. Colon tumors were more prevalent (58.1%) than rectal tumors (41.9%), with 66.1% of patients falling into ASA class I-II and 33.9% into ASA class III-IV, according to the ASA physical status categorization.

Variables	Frequency (n)	Percentage (%)
<b>Age (Years)</b>		
<50	32	25.8
50-70	64	51.6
>70	28	22.6
<b>Gender</b>		
Male	78	62.9
Female	46	37.1
<b>Comorbidities</b>		
Hypertension	42	33.9
Diabetes Mellitus	30	24.2
Both Hypertension & Diabetes	18	14.5
<b>ASA Physical Status</b>		
ASA I-II	82	66.1
ASA III-IV	42	33.9
<b>Tumor Location</b>		
Colon	72	58.1
Rectum	52	41.9

Table 2 illustrates the distribution of surgical procedures conducted by study participants. With 25.8% of patients, anterior resection was the most frequently performed operation, followed by right hemicolectomy (22.6%). 16.1% of patients under-

went sigmoid colectomy, 14.5% underwent left hemicolectomy, and 12.9% underwent abdominoperineal resection. With 8.1% of patients, Hartmann's procedure was the least prevalent surgical technique.

Surgical Procedure	Frequency (n)	Percentage (%)
Right Hemicolectomy	28	22.6
Left Hemicolectomy	18	14.5
Anterior Resection	32	25.8
Abdominoperineal Resection	16	12.9
Sigmoid Colectomy	20	16.1
Hartmann's Procedure	10	8.1

Table 3 illustrates the frequency of postoperative complications that occur subsequent to colorectal surgery. The most frequent postoperative complication seen in 17.7% of patients was surgical site infection, which was followed by anastomotic leakage in 8.9% of cases and postoperative ileus in

12.9% of cases. Smaller percentages of respiratory problems, postoperative haemorrhage, dysuria, and heart problems were noted. Overall, during the research period, 38.7% of patients experienced no postoperative problems.

Postoperative Complications	Frequency (n)	Percentage (%)
Surgical Site Infection	22	17.7
Anastomotic Leakage	11	8.9
Postoperative Ileus	16	12.9
Respiratory Complications	9	7.3
Cardiac Complications	5	4
Postoperative Bleeding	7	5.6
Dysuria	6	4.8
No Complications	48	38.7

Table 4 shows how postoperative complications are distributed using the Clavien-Dindo classification system. The most common type of complications were Grade II (22.6%) and Grade I (19.4%). In

9.7%, 6.5%, and 3.2% of patients, respectively, severe problems such as Grade III, Grade IV, and Grade V were noted. 38.7% of patients had no problems following surgery.

Clavien–Dindo Grade	Frequency (n)	Percentage (%)
Grade I	24	19.4
Grade II	28	22.6
Grade III	12	9.7
Grade IV	8	6.5
Grade V	4	3.2
No Complications	48	38.7

Table 5 shows the characteristics of the operating and postoperative outcomes for people who had colorectal surgery. The average intraoperative blood loss was  $274.5 \pm 82.6$  mL, and the average

surgical time was  $172.6 \pm 38.4$  minutes. The average hospital stay was  $10.8 \pm 3.6$  days. The average ICU stay was  $2.1 \pm 0.9$  days, and patients returned to oral feeding after an average of  $3.5 \pm 1.4$  days.

Variables	Mean $\pm$ SD
Duration of Surgery (minutes)	$172.6 \pm 38.4$
Intraoperative Blood Loss (mL)	$274.5 \pm 82.6$
Length of Hospital Stay (days)	$10.8 \pm 3.6$
Time to Oral Feeding (days)	$3.5 \pm 1.4$
ICU Stay (days)	$2.1 \pm 0.9$

Table 6 illustrates the relationship between several risk factors and problems following surgery. Patients over 70 years of age, those with diabetes, those with higher ASA grades (III–IV), those receiving open surgical procedures, and those undergoing emergency surgery all had considerably

greater rates of postoperative problems. All of these factors showed statistically significant correlations with p-values less than 0.05, suggesting that they have a major role in predicting postoperative morbidity after colorectal surgery.

Variables	Complications Present n (%)	No Complications n (%)	p-value
Age >70 years	20 (26.3)	8 (16.7)	0.042
Diabetes Mellitus	24 (31.6)	6 (12.5)	0.018
ASA III–IV	30 (39.5)	12 (25.0)	0.031
Open Surgical Procedure	48 (63.2)	18 (37.5)	0.009
Emergency Surgery	26 (34.2)	8 (16.7)	0.014

Table 7 shows the multivariate study of the factors linked to problems after colorectal surgery. With an odds ratio (OR) of 3.18, emergency surgery was found to be a significant independent predictor of postoperative problems. Additionally, there was a strong correlation between anastomotic leaking and

poor postoperative outcomes (OR = 4.62). Furthermore, it was discovered that the risk of postoperative complications was independently increased by advanced age (>70 years), diabetes mellitus, and higher ASA grades. The p-values for each variable were statistically significant (<0.05).

**Table 7: Multivariate Analysis of Factors Associated with Postoperative Complications**

Risk Factors	Odds Ratio (OR)	95% Confidence Interval	p-value
Age >70 years	2.08	1.04–4.14	0.036
Diabetes Mellitus	2.54	1.21–5.31	0.011
ASA III–IV	2.27	1.13–4.56	0.024
Emergency Surgery	3.18	1.47–6.89	0.002
Anastomotic Leakage	4.62	1.92–11.08	0.001

## Discussion

To analyze postoperative outcomes and complications, 124 patients who had colorectal surgery were included in the current retrospective analysis. Patients between the ages of 50 and 70 made up the largest age group (51.6%), followed by those under 50 (25.8%) and over 70 (22.6%). Males made up 62.9% of the studied population, while females made up 37.1%, indicating a male preponderance. The most common comorbidities were diabetes mellitus and hypertension, which were found in 24.2% and 33.9% of patients, respectively. Elderly male patients with related comorbidities were shown to have higher postoperative morbidity in earlier colorectal surgery trials, according to similar demographic and clinical results [12]. Additionally, patients with higher ASA grades showed increased postoperative sequelae and operational risk”.

Anterior resection accounted for 25.8% of all surgical operations, with right hemicolectomy coming in second at 22.6%. Less common procedures included abdominoperineal resection, left hemicolectomy, sigmoid colectomy, and Hartmann's operation. Previous studies assessing the surgical therapy of colorectal cancers and benign colorectal diseases found similar operational patterns [13]. The location of the tumor, the severity of the illness, and the patient's clinical state at presentation are the primary determinants of surgical technique variance.

Despite improvements in surgical methods and perioperative care, postoperative complications continue to be one of the biggest problems after colorectal surgery. The most frequent postoperative complication in the current research was surgical site infection, which affected 17.7% of patients. It was followed by postoperative ileus (12.9%) and anastomotic leakage (8.9%). Heart problems, dysuria, postoperative hemorrhage, and respiratory problems were less common. Similar results have been reported in a number of studies where anastomotic leakage and surgical site infection were among the most common causes of postoperative morbidity after colorectal operations [14]. Because anastomotic leakage is linked to longer hospital stays, reoperations, higher healthcare costs, and death, it remains one of the most serious consequences.

Grade II problems were the most common (22.6%), followed by Grade I complications (19.4%), ac-

ording to an evaluation of postoperative complications using the Clavien-Dindo classification. Smaller percentages of individuals experienced severe problems, such as Grade III, Grade IV, and Grade V. Similar findings were shown in earlier research, where the Clavien-Dindo classification system was regarded as a dependable and standardized technique for evaluating surgical results and objectively classifying postoperative complications [15]. The homogeneity of reporting postoperative morbidity in colorectal surgery has been greatly enhanced by the categorization system.

The current study's operational and postoperative outcome analysis showed that the average intraoperative blood loss was  $274.5 \pm 82.6$  mL, and the average surgical time was  $172.6 \pm 38.4$  minutes. The average length of hospital stay was  $10.8 \pm 3.6$  days. In earlier colorectal surgical trials, longer operating times and higher blood loss have been linked to slower postoperative recovery and higher postoperative morbidity [16]. The entire cost of healthcare is increased because patients who experience surgical difficulties frequently need extended hospital stays and intense postoperative care.

Increased postoperative complications were shown to be substantially correlated with advanced age, diabetes mellitus, higher ASA grade, emergency surgery, and open surgical procedures, according to risk factor analysis. Compared to younger patients, those over 70 years of age had noticeably higher postoperative morbidity. Previous reports have found that older age and related physiological deterioration are significant predictors of worse surgical outcomes [17]. Additionally, it was shown that diabetes mellitus markedly increased postoperative complications, most likely as a result of compromised wound healing, weakened immunity, and heightened vulnerability to infections.

In the current investigation, one of the best indicators of postoperative morbidity was emergency surgery. Compared to elective operations, patients receiving emergency colorectal procedures showed much greater rates of complications. Previous research has shown that emergency colorectal procedures are linked to greater postoperative morbidity, poor patient optimization, increased operating stress, and contamination [18]. Additionally, compared to less invasive techniques, open surgical

procedures were linked to increased postoperative problems. Compared to open surgery, laparoscopic colorectal surgery has been demonstrated to offer benefits such as less postoperative discomfort, a shorter hospital stay, a quicker recovery, and fewer complications. The results of this study provide more evidence in favor of minimally invasive colorectal surgery techniques wherever possible.

Emergency surgery, anastomotic leakage, advanced age, diabetes mellitus, and a higher ASA grade were found to be independent predictors of postoperative problems by multivariate analysis. Anastomotic leaking showed a particularly high correlation with poor surgery results and a longer recovery period. Anastomotic leaking considerably raises postoperative morbidity and mortality and adversely impacts long-term survival results after colorectal surgery, according to earlier research [19]. In individuals with colorectal cancer, postoperative problems may also negatively impact overall oncological outcomes and postpone adjuvant therapy.

Overall, the current study shows that despite improvements in surgical management and perioperative care, postoperative complications after colorectal surgery continue to considerably increase patient morbidity and healthcare burden.

### Conclusion

The current retrospective investigation showed that postoperative complications after colorectal surgery continue to be a significant cause of patient morbidity. The most frequent complications were surgical site infection, postoperative ileus, and anastomotic leakage. Significant risk factors linked to unfavorable postoperative outcomes included advanced age, diabetes mellitus, higher ASA grade, emergency surgery, and open surgical procedures. The study also showed that individuals with postoperative problems had longer hospital stays and took longer to recover from surgery. An efficient way to grade postoperative problems and evaluate surgical results was to apply the Clavien-Dindo classification system. All things considered, thorough preoperative optimization, early detection of high-risk patients, better perioperative care, and increased use of minimally invasive surgical techniques may help lower postoperative problems and enhance overall results after colorectal surgery.

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