

## Early Surgical and Oncologic Outcomes After Elective versus Emergency Colorectal Cancer Resection

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### ABSTRACT

**Introduction:** Emergency presentations of colorectal cancer (CRC) carry distinct perioperative risks compared with elective resections. Comparing early surgical and oncologic quality metrics between elective and emergency pathways yields actionable benchmarks to optimize care in regional referral settings

**Aim:** To compare early surgical and oncologic outcomes after elective versus emergency CRC resections at a tertiary hospital in Northeast India.

**Objectives:** 1. To study baseline demographics of colorectal cancer patients undergoing resections. 2. To analyse operative patterns including surgical approach and stoma creation.

**Methodology:** Record based retrospective study of patients undergoing definitive CRC resection at Christian Institute of Health Sciences and Research (CIHSR), Chumoukedima, Nagaland, India, from 1 December 2022 to 31 December 2024 was done. Cases were categorized as elective (planned) or emergency (acute obstruction, perforation, or bleeding). Variables included demographics, operative approach, stoma formation, pathologic stage, lymph-node (LN) metrics (examined;  $\geq 12$  nodes), margins (R0), complications, anastomotic leak, ICU/HDU use and duration, length of stay (LOS), and in-hospital mortality. Descriptive statistics are reported.

**Results:** Forty patients were analyzed (elective 32; emergency 8); mean age  $55.0 \pm 14.5$  years; 60.0% male; comorbidities 37.5%. Open surgery predominated (67.5%); stoma in 55.0%. Pathologic stages: II 25.0%, III 60.0%, IV 15.0%. Mean LN yield  $18.6 \pm 6.1$ ; adequate harvest ( $\geq 12$ ) 92.5%; node-positive 57.5%; R0 100%. Any complication occurred in 20.0%; anastomotic leak 5.0%. ICU/HDU use 97.5% (typical stay  $\sim 1$  day). Median LOS 7 days overall (elective 7; emergency 6). No in-hospital mortality.

**Conclusion:** In this study, emergency resections comprised one-fifth of CRC operations and were more frequently open with higher stoma use, yet oncologic quality was largely maintained (R0 100%;  $\geq 12$  nodes 92.5%) and early outcomes were acceptable, with low leak rates and zero in-hospital mortality.

**Keywords:** Anastomotic leak; Colorectal cancer; Emergency surgery; Lymph node yield; Oncologic outcomes; R0 resection; Stoma

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### 1. INTRODUCTION

Colorectal cancer (CRC) remains a major global health burden, with  $>1.9$  million new cases and  $\sim 0.9$  million deaths reported worldwide in 2020 [1]. Around one in five patients present with acute obstruction, perforation, or bleeding, necessitating emergency surgery and creating a distinct perioperative risk profile compared with elective resections [2]. Across settings, emergency surgery for CRC is linked to higher short-term morbidity and mortality and inferior long-term survival relative to elective surgery [3].

Oncologic quality indicators for curative resection include R status and adequacy of lymphadenectomy; current guidance and staging conventions emphasize achieving an R0 margin and assessing  $\geq 12$  lymph nodes to ensure accurate pathologic staging [4]. In emergency scenarios, the operative approach is often open rather than minimally invasive, especially in the context of peritonitis or frank perforation, and stoma formation rates are typically higher; selected patients with left-sided malignant obstruction may benefit from self-expanding metal stents (SEMS) as a bridge to surgery, which can increase

laparoscopic resection and reduce stomas and length of stay [5,6].

Against this backdrop, we evaluated early surgical and oncologic outcomes after elective versus emergency colorectal cancer resection at a high-volume referral center in Northeast India.

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## 2. MATERIALS & METHODS

### Study design and setting

This was a retrospective, record-based observational study at the Christian Institute of Health Sciences and Research (CIHSR), Chümoukedima (earlier Dimapur), Nagaland, India—a regional referral hospital. Consecutive patients who underwent colorectal cancer resection between 1 December 2022 and 31 December 2024 were identified from operative logs, pathology registers, and electronic medical records

### Participants

From hospital records, we included all consecutive patients who underwent definitive colorectal resection during the study window with histopathologic confirmation of carcinoma. Cases identified in the records as diversion/bypass without tumor resection or non-oncologic colorectal procedures were excluded from the analytic cohort

Cases were categorized as:

**Elective** resection: planned operations after standard preoperative assessment.

**Emergency** resection: unplanned operations performed for acute complications (e.g., obstruction, perforation, hemorrhage) at initial presentation or during acute admission.

### Inclusion Criteria

Age  $\geq 18$  years.

Histologically confirmed colorectal adenocarcinoma.

Underwent resectional surgery (elective or emergency) at your centre during study period.

Records available for surgery + pathology + in-hospital outcome.

### Exclusion Criteria

Benign lesions or non-adenocarcinoma histology.

Only diversion/bypass without resection.

Incomplete records (missing final pathology or discharge outcome)

### Variables and operational definitions

**Baseline:** age, sex, comorbidities.

**Operative:** procedure, surgical approach (open, laparoscopic, converted), any stoma.

**Pathology:** histology grade (as recorded), final stage (grouped I–IV for reporting), resection margin (R0), lymph nodes examined (continuous), node-positive disease ( $\geq 1$  positive node). Adequate lymph node harvest was defined a priori as  $\geq 12$  nodes in keeping with accepted standards.

**Early outcomes:** any postoperative complications (as captured in the master chart), anastomotic leak, ICU/HDU stay (yes/no and days), length of stay, and in-hospital mortality.

### Statistical approach

This study was planned as a descriptive comparison of elective versus emergency cohorts. Data was entered in MS Excel and analyzed with the help of SPSS v25. Categorical variables are presented as n (%). Continuous variables are summarized as mean  $\pm$  SD and median [IQR].

### Ethical considerations

This retrospective, record-based analysis used de-identified data and involved no patient contact. Accordingly, formal ethics committee approval was not required, and informed consent was not applicable.

### 3. RESULTS

A total of 40 consecutive patients who underwent colorectal cancer resection in the study duration were analyzed. 32 (80.0%) were elective and 8 (20.0%) emergency cases. The overall mean age was  $55.0 \pm 14.5$  years (median 56.5). Males comprised 24/40 (60.0%), and comorbidities were present in 15/40 (37.5%). There were no in-hospital deaths.

**Table 1** details patient demographics and comorbidity status by presentation. Age distribution was broadly comparable (elective  $55.8 \pm 15.5$ ; median 58.5 [44.0–66.2] vs emergency  $52.0 \pm 9.1$ ; median 53.5 [47.5–56.5]). The sex distribution was 20/32 (62.5%) male in elective and 4/8 (50.0%) male in emergency groups. Comorbidities were present in 12/32 (37.5%) elective and 3/8 (37.5%) emergency patients.

**Table 2** summarizes intraoperative strategy and pathologic stage distribution. Surgery was most commonly performed via an open approach (27/40, 67.5%; elective 20/32, 62.5%; emergency 7/8, 87.5%), followed by laparoscopic resections (12/40, 30.0%) with a single conversion (2.5%). A stoma was fashioned in 22/40 (55.0%)—elective 16/32 (50.0%), emergency 6/8 (75.0%). Grouped pathologic stage across the cohort was Stage II in 10/40 (25.0%), Stage III in 24/40 (60.0%), and Stage IV in 6/40 (15.0%).

**Table 3** shows nodal yields and status. The lymph-node (LN) yield was high overall (mean  $18.6 \pm 6.1$ ; median 18.5 [18.0–21.0]); by group, elective resections yielded  $19.5 \pm 4.8$  (median 19 [18.0–21.0]) and emergency resections  $15.2 \pm 9.5$  (median 18 [13.8–20.2]). Adequate LN harvest ( $\geq 12$ ) was achieved in 37/40 (92.5%), including 31/32 (96.9%) elective and 6/8 (75.0%) emergency cases. Node-positive disease ( $\geq 1$  LN) was present in 23/40 (57.5%)—elective 17/32 (53.1%) and emergency 6/8 (75.0%). R0 margins were achieved in all resections (40/40, 100.0%).

**Table 4** presents early postoperative outcomes. Any complication occurred in 8/40 (20.0%)—6/32 (18.8%) elective and 2/8 (25.0%) emergency. Anastomotic leak occurred in 2/40 (5.0%), one in each group. Nearly all patients required ICU/HDU care (39/40, 97.5%), with typical ICU stay of 1 day (elective mean  $1.9 \pm 3.4$ ; median 1 [1.0–2.0] vs emergency mean  $1.5 \pm 0.8$ ; median 1 [1.0–2.0]). The length of stay (LOS) for the entire cohort was  $7.4 \pm 2.5$  days (median 7 [6.0–9.2]); group medians were 7 days in elective ( $7.7 \pm 2.4$ ; 7 [7.0–10.0]) and 6 days in emergency cases ( $6.0 \pm 2.6$ ; 6 [5.8–6.5]).

**Figure 1** visually depicts the grouped pathologic stage across elective and emergency cohorts. Stage III predominated in both arms (elective 18/32, 56.2%; emergency 6/8, 75.0%), with Stage IV confined to the elective group (6/32, 18.8%), and Stage II evenly represented.

**Figure 2** illustrates LOS using box plots, highlighting the overall median of 7 days, with the elective group centered around 7 days and the emergency group around 6 days.

**Figure 3** illustrates the proportion of patients receiving a stoma across surgical approaches (open—including conversions—vs laparoscopic) stratified by presentation (elective vs emergency), with the highest rate in open–emergency and the lowest in laparoscopic–emergency.

**Figure 4** shows that Complications occurred in 20% of the cases

**Table 1. Baseline characteristics by presentation**

Characteristic	Category	Elective	Emergency	Total
Age (years)	mean $\pm$ SD	55.8 $\pm$ 15.5	52.0 $\pm$ 9.1	55.0 $\pm$ 14.5
	median [IQR]	58.5 [44.0–66.2]	53.5 [47.5–56.5]	56.5 [44.0–63.2]
Sex	Male	20 (62.5%)	4 (50.0%)	24 (60.0%)
	Female	12 (37.5%)	4 (50.0%)	16 (40.0%)
Any comorbidity	Yes	12 (37.5%)	3 (37.5%)	15 (37.5%)
	No	20 (62.5%)	5 (62.5%)	25 (62.5%)

**Table 2. Operative details & stage by presentation**

Characteristic	Category	Elective	Emergency	Total
Approach	Open	20 (62.5%)	7 (87.5%)	27 (67.5%)
	Laparoscopic	11 (34.4%)	1 (12.5%)	12 (30.0%)

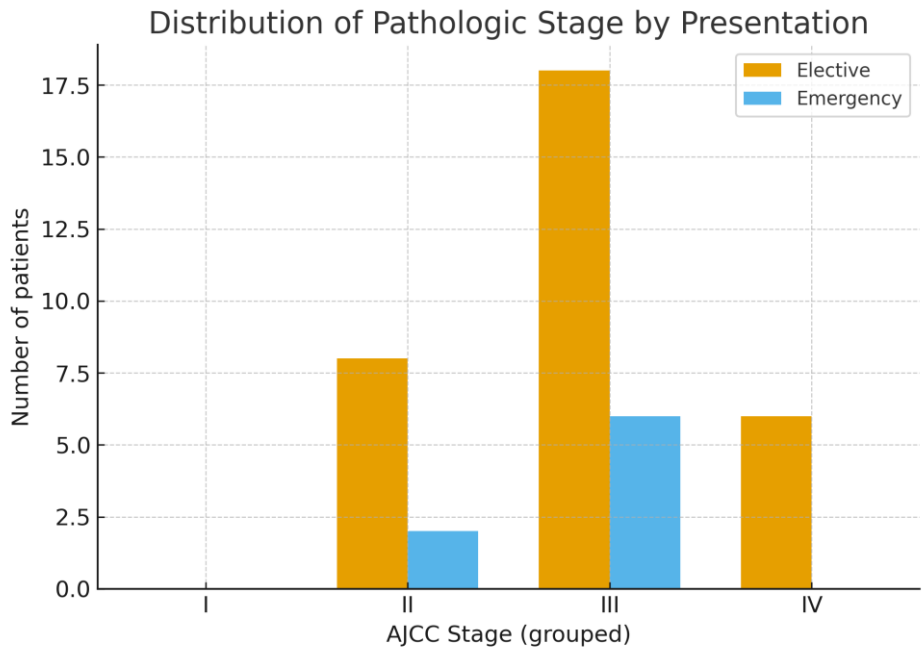
	Converted	1 (3.1%)	0 (0.0%)	1 (2.5%)
Any stoma	Yes	16 (50.0%)	6 (75.0%)	22 (55.0%)
	No	16 (50.0%)	2 (25.0%)	18 (45.0%)
Stage	II	8 (25.0%)	2 (25.0%)	10 (25.0%)
	III	18 (56.2%)	6 (75.0%)	24 (60.0%)
	IV	6 (18.8%)	0 (0.0%)	6 (15.0%)

**Table 3. Nodal assessment & margins by presentation**

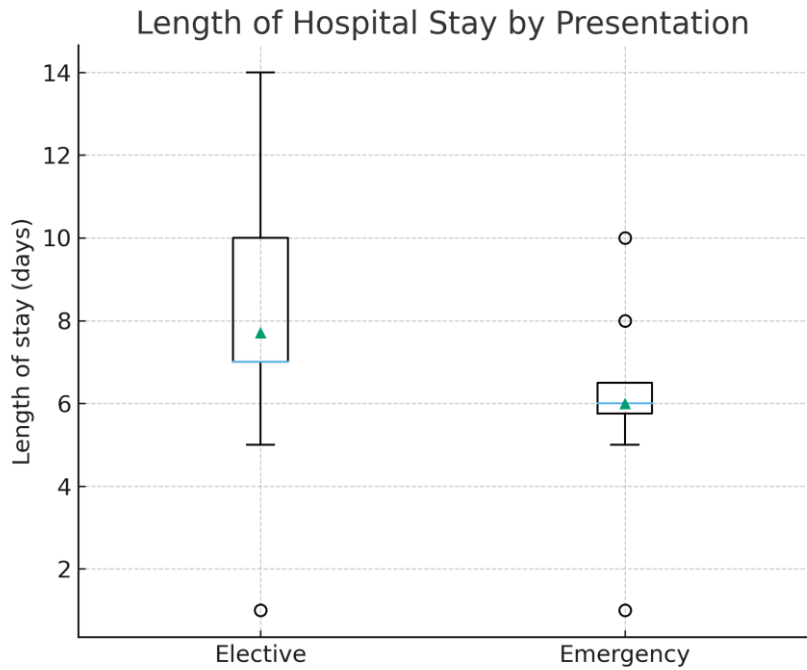
Characteristic	Category	Elective	Emergency	Total
LN examined	mean±SD	19.5±4.8	15.2±9.5	18.6±6.1
	median [IQR]	19.0 [18.0–21.0]	18.0 [13.8–20.2]	18.5 [18.0–21.0]
Adequate LN	≥12	31 (96.9%)	6 (75.0%)	37 (92.5%)
	≤12	1 (3.1%)	2 (25.0%)	3 (7.5%)
Node-positive	≥1	17 (53.1%)	6 (75.0%)	23 (57.5%)
	≤1	15 (46.9%)	2 (25.0%)	17 (42.5%)
Margins	R0	32 (100.0%)	8 (100.0%)	40 (100.0%)

**Table 4. Short-term outcomes by presentation**

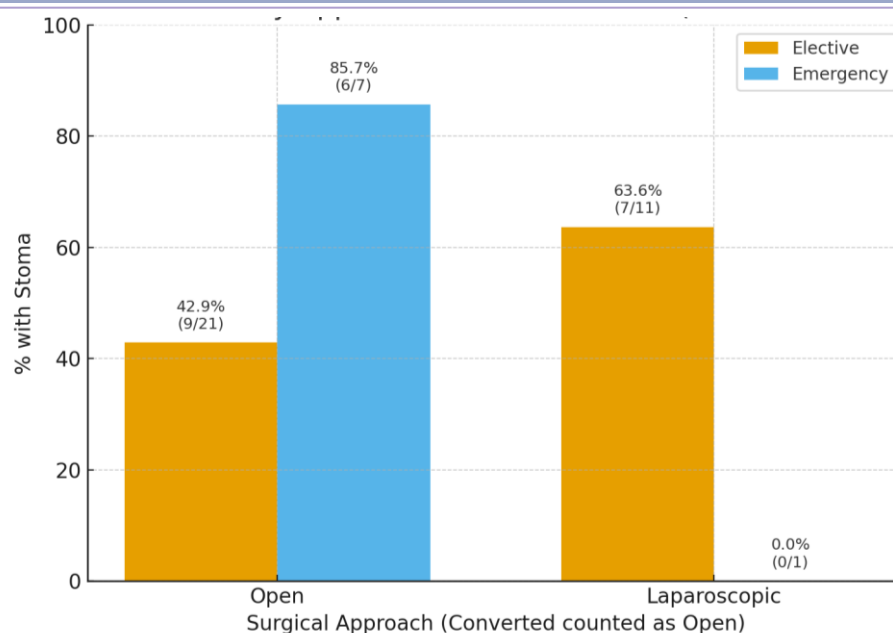
Outcome	Category	Elective	Emergency	Total
Complication	Yes	6 (18.8%)	2 (25.0%)	8 (20.0%)
	No	26 (81.2%)	6 (75.0%)	32 (80.0%)
Anastomotic leak	Yes	1 (3.1%)	1 (12.5%)	2 (5.0%)
	No	31 (96.9%)	7 (87.5%)	38 (95.0%)
ICU/HDU stay	Yes	31 (96.9%)	8 (100.0%)	39 (97.5%)
	No	1 (3.1%)	0 (0.0%)	1 (2.5%)
ICU stay (days)	Mean±SD	1.9±3.4	1.5±0.8	1.8±3.0
	median [IQR]	1.0 [1.0–2.0]	1.0 [1.0–2.0]	1.0 [1.0–2.0]
Length of stay (days)	Mean±SD	7.7±2.4	6.0±2.6	7.4±2.5
	median [IQR]	7.0 [7.0–10.0]	6.0 [5.8–6.5]	7.0 [6.0–9.2]
In-hospital mortality	Yes	0 (0.0%)	0 (0.0%)	0 (0.0%)
	No	32 (100.0%)	8 (100.0%)	40 (100.0%)



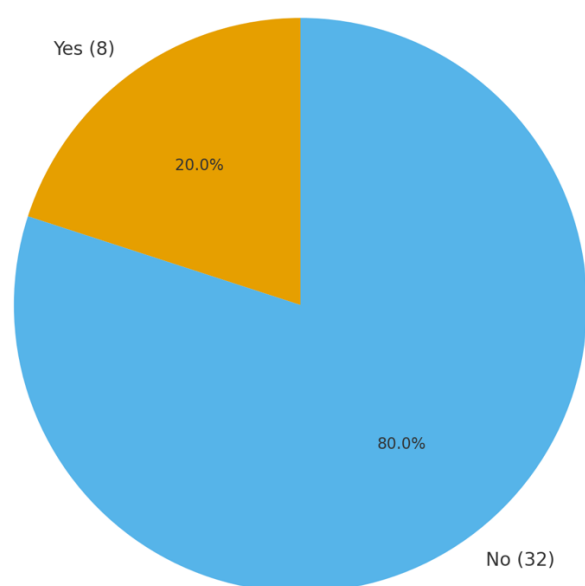
**Figure 1. Distribution of pathologic stage by presentation**



**Figure 2. Length of hospital stay by presentation**



**Figure 3. Stoma Creation by Surgical Approach and Presentation**



**Figure 4. Post-Operative Complications**

#### 4. DISCUSSION

##### Principal findings

In this study, emergency presentations constituted 20% of resections. Surgical approach was predominantly open overall, and stoma creation was common (55%). Oncologic quality metrics were reassuring: R0 resection in 100% and adequate lymph node harvest ( $\geq 12$ ) in 92.5% of cases. Complications occurred in 20% and anastomotic leak in 5%. No in-hospital mortality was observed. These outcomes contextualize the performance of a \ centre managing mixed elective and emergency CRC workloads.

##### Comparison with the literature

The proportion of emergency CRC presentations (~20%) aligns with the international literature [2]. Although emergency

CRC surgery is widely associated with higher perioperative risk and poorer long-term survival than elective surgery, our cohort's overall complication rate (20%), leak rate (5%), and zero in-hospital mortality compare favourably with ranges reported in multi-institutional series and meta-analyses (emergency mortality often 6–16%, complications 45–81%) [3,7]. The discrepancy likely reflects case-mix, perioperative pathways, and small emergency sample size (n=8), highlighting caution in over-interpreting between-group patterns.

Regarding oncologic adequacy, our R0 rate (100%) aligns with guideline expectations that curative surgery targets margin-negative resection and formal lymphadenectomy [4]. Our adequate nodal harvest (92.5% overall) is high, though lower in emergencies (75%) than electives (96.9%) (Table 2B). Literature on lymph node yield in emergency CRC is mixed: a recent meta-analysis across ~354,000 patients reported comparable yields between emergency and elective surgery, whereas single-centre experiences show variability but demonstrate that adequate nodal retrieval is achievable even in acute settings [3,8]. In our context, slightly lower adequacy in emergencies may reflect physiologic instability, edema/inflammation, and time constraints, factors repeatedly cited as challenges in emergency oncologic surgery [9].

Our approach profile—predominantly open in emergencies—conforms to contemporary guidance: minimally invasive resection is generally avoided when there is perforation, diffuse peritonitis, or hemodynamic compromise [5]. Likewise, the higher stoma propensity in emergencies (Table 2A) is consistent with the need to mitigate risk in physiologically stressed patients; where feasible in left-sided obstruction, SEMS as a bridge to surgery can reduce stoma rates and facilitate laparoscopic resection without compromising short-term outcomes [9].

Interestingly, our median LOS was 6 days in emergencies versus 7 days in electives (Table 3), whereas larger datasets often report longer LOS after emergency surgery. This counter-trend likely reflects unit-level discharge practices, procedure selection (e.g., more diversions), and the small emergency sample, and should not be generalized beyond similar settings [2].

### Implications for practice and systems

Our data suggest that even in a resource-constrained referral environment, key oncologic standards (R0, lymph node adequacy) can be maintained for most patients, including many acute presentations. Continued emphasis on timely diagnosis, pre-habilitation pathways for electives, judicious stoma and diversion use in emergencies, and selective adoption of bridge-to-surgery strategies (where expertise and resources permit) may further optimize outcomes [3,9].

## 5. CONCLUSION

In this study, emergency resections accounted for one-fifth of colorectal cancer operations. While emergency cases were more often open and more likely to involve stoma formation, oncologic quality was largely preserved (100% R0; 92.5% with  $\geq 12$  nodes;). Early outcomes were acceptable with a 20% overall complication rate, 5% anastomotic leak, and no in-hospital mortality. These findings highlight what a regional referral unit can achieve when standard oncologic principles are prioritized, even under acute conditions.

## 6. LIMITATIONS.

The study is single-centre with a small emergency cohort (n=8), limiting precision and generalizability; it is observational, subject to residual confounding; and it reports short-term outcomes without long-term survival or functional endpoints. Site heterogeneity (colon and rectal procedures) and unmeasured factors (e.g., nutritional status, sepsis severity) may also influence outcomes. Future work should include larger, multicentre cohorts, long-term oncologic endpoints, and exploration of care pathways (e.g., SEMS bridge-to-surgery) tailored to resource-limited settings.

### CONFLICT OF INTEREST

None

### SOURCES OF FUNDING

None.

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