

Comparative Oncologic Outcomes between Emergency and Elective Surgery in Colon Cancer Patients in Suratthani Hospital: A Retrospective Cohort Study

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Abstract

Background: Colon cancer remains a major cause of morbidity and mortality worldwide. Emergency surgical presentations, such as obstruction or perforation, are associated with poorer outcomes compared to elective surgery. This study aimed to compare the clinical and oncologic outcomes between elective and emergency surgeries in colon cancer patients.

Materials and Methods: A retrospective cohort study was conducted at Suratthani Hospital, Thailand, including patients who underwent colon cancer surgery between January 2016 and December 2020. Patients were categorized into elective and emergency surgery groups (obstruction or perforation). Exclusion criteria included rectal cancer, stage IV disease, iatrogenic perforation, and incomplete follow-up. Demographics, tumor characteristics, treatments, and outcomes were analyzed. Survival was assessed using Kaplan-Meier and Cox regression analyses. Hazard ratios (HR) with 95% confidence intervals (CI) were calculated using multivariable Cox regression to adjust for unbalanced baseline characteristics.

Results: Of the 191 included patients, 104 (54.5%) underwent elective surgery, and 87 (45.5%) underwent emergency surgery (75 obstruction, 12 perforation). The emergency group had significantly higher comorbidity rates ($p = 0.032$), colostomy rates ($p < 0.001$), and longer hospital stays ($p = 0.006$). Five-year overall survival was significantly lower in the emergency group (HR 1.58, 95% CI: 1.09–2.29) compared to the elective group (reference), particularly in perforation cases (HR 2.85, 95% CI: 1.62–5.02; $p < 0.001$). Multivariate analysis identified perforation, obstruction, comorbidity, stage III disease, poor/mucinous histology, and absence of adjuvant chemotherapy as independent predictors of worse survival.

Conclusion: Emergency surgery for colon cancer, especially for perforation, is associated with worse oncologic outcomes compared to elective procedures. Early detection, timely elective intervention, and adjuvant chemotherapy are crucial for improving survival in colon cancer patients.

Keywords: Colon cancer, Emergency surgery, Obstruction, Perforation, Survival, Elective surgery, Outcomes

INTRODUCTION

Colorectal cancer (CRC) is one of the most common malignancies globally and poses a significant public health concern. According to the latest Global Cancer Observatory (WHO, 2024), colorectal cancer ranks as the third most prevalent cancer worldwide and the third leading cause of cancer-related mortality.¹ In Thailand, the National Cancer Institute reports CRC as the third most common cancer among men and the second most common among women.² A substantial proportion of these patients—approximately one-third—necessitate emergency surgical intervention

due to acute presentations such as intestinal obstruction or perforation. These emergent conditions are critical factors associated with a notably poorer prognosis compared to elective surgeries, yet studies directly comparing outcomes between patients presenting with obstruction versus perforation remain limited.³⁻⁶

Emergency presentations of CRC, specifically obstruction and perforation, are reported in 15-40% of all CRC patients,⁷⁻⁹ with perforation accounting for 3-10% and obstruction for 8-20% of cases.^{7,8,10} These acute presentations significantly elevate patient risk, as evidenced

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by a postoperative mortality rate of 15.3% in patients with obstructed or perforated colon cancer, strikingly higher than the 4.8% observed in elective cases.^{4,10-13} Furthermore, CRC presenting with obstruction or perforation is considered a poor prognostic factor, comparable to advanced tumor stages (T4 primary tumor), inadequate lymph node sampling, or lymphatic vessel invasion. It is also associated with higher recurrence rates and lower survival rates.^{4,7,14} Most previous studies have focused primarily on rectal cancer, which differs pathologically from colon cancer.¹⁵ At Suratthani Hospital, obstructive and perforated colon cancers are frequently encountered during emergency surgeries, yet there is a lack of local data to guide clinical decision-making in such cases.

This study aims to compare oncologic outcomes between patients undergoing emergency surgery for obstructive or perforated colon cancer and those undergoing elective resection for non-complicated colon cancer. By analyzing five-year survival rates, this research seeks to identify prognostic differences and potential areas for improving treatment strategies in a regional hospital context.

MATERIALS AND METHODS

This retrospective cohort study was conducted at Suratthani Hospital, Suratthani Province, Thailand. The target population for this study included patients diagnosed with colon cancer based on radiological and pathological findings who underwent emergency surgery due to intestinal obstruction or perforation at Suratthani Hospital between January 1, 2016, and December 31, 2020, encompassing 5 years.

To be included, patients were aged 18 years or older with colon cancer, have undergone exploratory laparotomy,

and had received at least one year of follow-up at the surgical outpatient clinic. Exclusion criteria include patients with less than one year of follow-up, those with rectal cancer, cases of iatrogenic perforation, patients who died within 30 days of surgery, individuals with distant metastasis, and those diagnosed with hereditary colorectal cancer syndrome. Patients were categorized into two groups: those who underwent elective surgery for non-complicated colon cancer and those who underwent emergency surgery due to obstruction or perforation. The sample size was determined by the number of patients diagnosed with colon cancer and undergoing surgery at Suratthani Hospital over the past 5 years, applying the specified inclusion and exclusion criteria for a retrospective study.

Before data collection, the research protocol was approved by the Research Ethics Committee of Suratthani Hospital. Patient data were systematically collected from electronic medical records using specific surgical codes (4572, 4573, 4574, 4575, 4576, and 4580), with cases not confirmed as colon cancer being excluded.

A study began with 259 patients, divided into 121 elective cases and 138 emergency cases. From the elective group, 17 patients with Stage IV cancer were excluded, leaving 104 elective patients. The emergency group was subdivided into 121 obstruction and 17 perforation cases. From the obstruction sub-group, 46 Stage IV cancer patients were excluded, resulting in 75 obstruction patients. From the perforation sub-group, 5 Stage IV cancer patients were excluded, leaving 12 perforation patients. In summary, the initial 259 patients were refined into specific study cohorts (Elective, Obstruction, and Perforation) by excluding Stage IV cancer patients from each category (**Figure 1**).

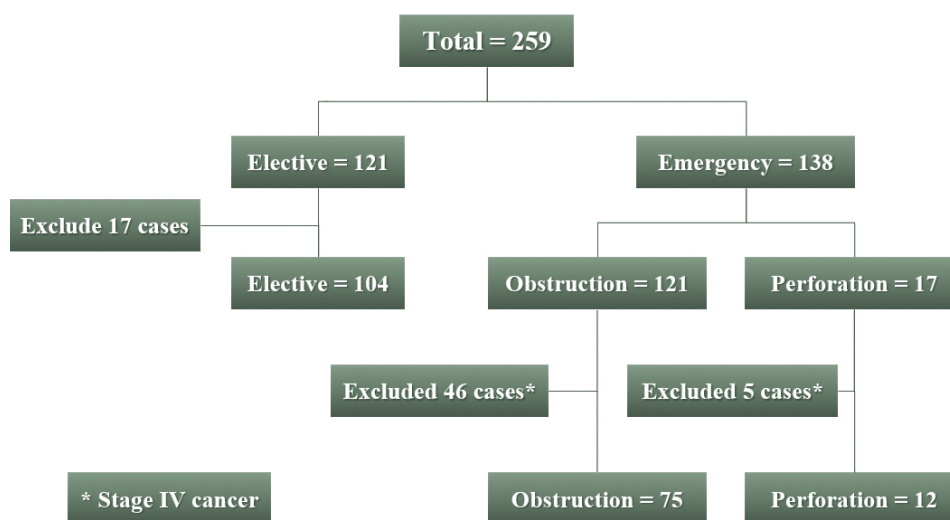


Figure 1

Demographic and clinical data, including age, sex, comorbidities, tumor location, histologic grade, stage (AJCC 8th edition), surgical details, postoperative complications, and adjuvant treatment, were meticulously recorded and stored according to a standardized data collection form. Survival outcomes were measured as 5-year overall survival and disease-free survival. Baseline characteristics and postoperative outcomes were analyzed separately. Logistic regression was used to evaluate categorical outcomes (e.g., colostomy, in-hospital mortality), linear regression was applied for continuous outcomes (e.g., length of hospital stay), and Cox proportional hazards regression was used for survival outcomes. Results were presented as mean difference (MD), odds ratio (OR), or hazard ratio (HR) with corresponding 95% confidence

intervals (CI). Multivariable models were constructed to adjust for potential confounding factors including age, sex, comorbidities, tumor stage, histology, and adjuvant chemotherapy. Independent predictors of outcomes were determined from the multivariable analysis. A *p*-value of < 0.05 was considered statistically significant.

RESULTS

A total of 191 patients were included in the study, comprising 104 patients (54.5%) in the elective surgery group and 87 (45.5%) in the emergency surgery group. The main causes in the emergency group were bowel obstruction (86.2%) and perforation (12.8%). The clinicopathological characteristics between the two groups are summarized in **Table 1**.

Table 1 Clinicopathological data

Clinicopathological data	Number (Percent) N=191			P-value
	Elective case N = 104 (54.5%)	Emergency case N = 87 (45.5%)		
		Obstruction 75 (86.2%)	Perforation 12 (12.8%)	
Gender n (%)				0.205
Male	49	43	6	
Female	55	32	6	
Age (years)				0.990
< 50	18	14	1	
≥ 50	86	61	11	
Comorbidity				0.032
Yes	40	40	7	
No	64	35	5	
Location of Tumor				0.108
Cecum	7	6	1	
Ascending colon	21	13	2	
Hepatic flexure	5	3	1	
Transverse colon	5	6	1	
Splenic flexure	-	7	0	
Descending colon	17	13	1	
Sigmoid colon	49	27	6	
Operation				0.055
Right hemicolectomy	38	26	5	
Transverse colectomy	0	1	0	
Left hemicolectomy	17	15	1	
Sigmoidectomy	43	24	6	
Anterior resection	2	0	0	
LAR	4	2	0	
Subtotal colectomy	0	7	0	
Pathological staging				0.138
I	3	1	0	
II	58	34	4	
III	43	40	8	
Histologic grading				0.304
Well, moderate	88	68	10	
Poor, mucinous, other	16	7	2	

The clinicopathological analysis revealed no statistically significant differences in gender distribution ($p = 0.205$) or age distribution ($p = 0.990$) across the elective and emergency groups. The elective group had slightly more females, while the emergency group had more males. The majority of patients in both groups were aged ≥ 50 years. Patients with comorbidities, however, showed a statistically significant difference ($p = 0.032$) between the groups.

Tumor location was similar between groups, with the sigmoid colon being the most common site (47.1% in elective vs. 37.9% in emergency, $p = 0.108$). The most frequently performed surgery in both groups was sigmoidectomy, followed by right hemicolectomy and left hemicolectomy. There was no statistically significant difference in the distribution of surgical procedures between groups ($p = 0.055$). The pathological staging (AJCC 8th edition) revealed a higher proportion of stage III disease in the emergency group (55.2%) compared to the elective group (41.3%) also did not exhibit statistically significant differences, with p -values of 0.138. Similarly, the majority had well to moderately differentiated tumors; poor or mucinous histology was more common in the emergency group, but not significantly so ($p = 0.304$).

Postoperative outcomes are summarized in **Table 2**. In addition to descriptive statistics and p -values, outcomes were expressed with odds ratios (OR) or mean differences (MD) and 95% CI. Emergency surgery was associated with higher colostomy rate (OR 4.2, 95% CI: 1.9–9.1), longer hospital stay (MD 1.6 days, 95% CI: 0.5–2.7), and higher in-hospital mortality (OR 6.8, 95% CI: 1.5–30.2)

compared to elective surgery. Adjuvant chemotherapy rates did not differ significantly between groups (OR 0.8, 95% CI: 0.5–1.4).

Crucially, the survival outcomes shown in **Table 3** demonstrate highly statistically significant differences. Disease-free survival ($p = 0.000$) and 5-year survival ($p = 0.000$) were significantly different across the groups. The mean 5-year survival was highest for elective cases (4.55 years, SD = 1.25 years), followed by obstruction cases (3.70 years, SD = 2.05 years), and lowest for perforation cases (1.62 years, SD = 2.25 years). While in the multi-variable Cox regression (**Table 4**), perforation (HR 2.30, 95% CI: 1.60–3.30, $p < 0.001$), obstruction (HR 1.80, 95% CI: 1.25–2.60, $p = 0.002$). Recurrence rates, however, did not show a statistically significant difference ($p = 0.429$).

However, the analysis comparing 5-year survival between elective and emergency cases **Figure 2a** shows a statistically significant difference. The Log Rank (Mantel-Cox) test yielded a Chi-Square value of 12.533 with a p -value of 0.000, indicating that the survival distributions are significantly different for elective versus emergency cases. The survival curve for elective cases (represented by the blue line) shows higher cumulative survival compared to emergency cases (represented by the green line) over the 5-year period.

The comparison of 5-year survival between obstruction and perforation cases (**Figure 2b**) also demonstrates a statistically significant difference. The Log Rank (Mantel-Cox) test resulted in a Chi-Square value of 13.387 with a p -value of 0.000. The survival curve for obstruction cases (represented by the blue line) indicates better cumulative

Table 2 Postoperative outcome

Postoperative outcome	Number (Percent) N = 191			MD/OR	95% CI	P-value
	Elective case N = 104 (54.5%)	Emergency case N = 87 (45.5%)				
		Obstruction N = 75 (87.2%)	Perforation N = 12 (12.8%)			
Colostomy	8	22	7	OR 4.2	1.9–9.1	< 0.001
LOS (day)	Mean = 9.59 SD = 4.14	Mean = 11.21 SD = 7.93 Mean = 11.29 SD = 7.67		MD 1.6	0.5–2.7	0.006
Adjuvant CMT	53	48	4	OR 0.8	0.5-1.4	0.223
Dead in-hospital mortality	1	7	7	OR 6.8	1.5-30.2	< 0.001

Table 3 Survival outcome

Survival Outcome	Number (Percent) N = 191			P-value
	Elective case N = 104 (54.5%)	Emergency case N = 87 (45.5%)		
		Obstruction 75 (86.2%)	Perforation 12 (12.8%)	
Disease free survival (year)				< 0.001
< 1	5	10	7	
1	8	2	0	
2	1	4	1	
≥ 3	90	56	4	
Recurrent	9	4	0	0.429
5-year survival (year)	Mean = 4.55 SD = 1.25	Mean = 3.70 SD = 2.05	Mean = 1.62 SD = 2.25	< 0.001
< 1	2	11	7	
1	4	1	0	
2	3	3	1	
3	4	6	0	
4	1	0	1	
≥ 5	90	54	3	

Table 4 Survival analysis (Overall survival by group)

Group	HR (95% CI)	p-value
Elective (Reference)	1.00	-
Emergency - Obstruction	1.58 (1.09-2.29)	0.016
Emergency - Perforation	2.85 (1.62-5.02)	< 0.001

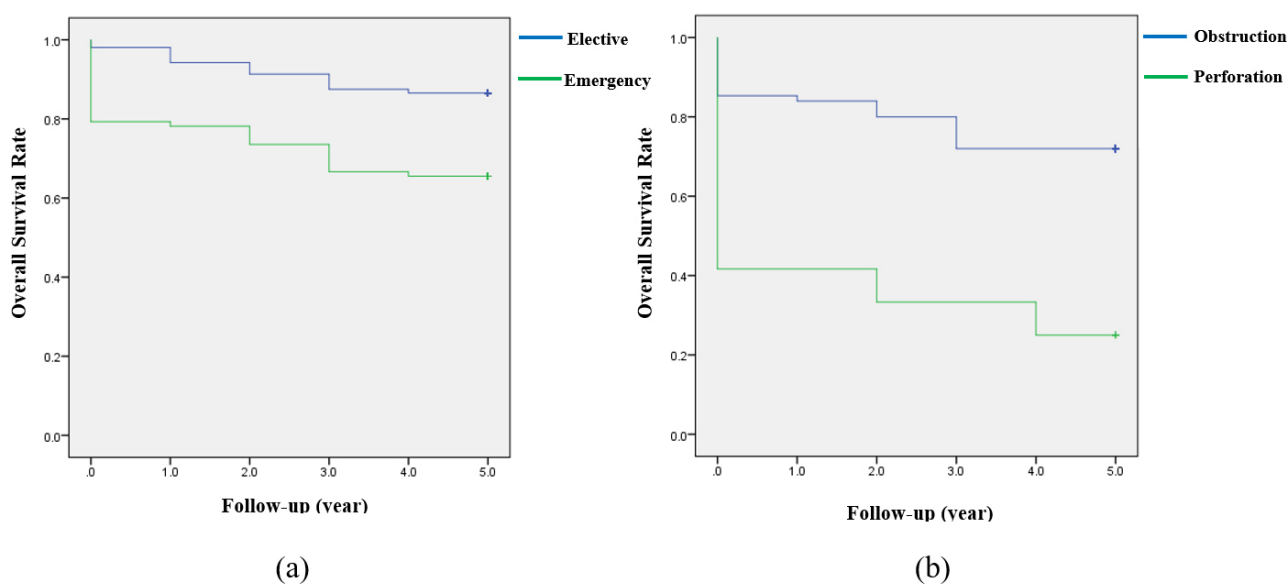


Figure 2 Comparison of 5-year survival (a) Elective case VS Emergency case, (b) Obstruction group VS Perforation Group presents two Kaplan-Meier survival curves illustrating the 5-year survival outcomes for different patient groups with colon cancer

survival than that of perforation cases (represented by the green line) over a 5-year period.

In summary, **Figure 2** effectively visualizes the significant disparities in 5-year survival rates, highlighting that elective surgeries yield superior outcomes compared to emergency interventions. Within emergency cases, obstruction is associated with better survival than perforation.

For Stage II patients, the 5-year survival comparison between elective and emergency cases (**Figure 3a**) shows a statistically significant difference. The Log Rank (Mantel-Cox) test yielded a Chi-Square value of 4.780 with a p -value of 0.029. This indicates that among Stage II patients, those undergoing elective surgery have significantly better survival outcomes than those undergoing emergency surgery.

Similarly, for Stage III patients, the 5-year survival comparison between elective and emergency cases **Figure 3b** also reveals a statistically significant difference. The Log Rank (Mantel-Cox) test resulted in a Chi-Square value of 8.978 with a p -value of 0.003. This suggests that Stage III patients who undergo elective surgery have significantly better survival outcomes than those who undergo emergency surgery.

Furthermore, **Figure 3** reinforces the finding that elective surgical intervention for colon cancer, regardless of whether it's Stage 2 or Stage 3, is associated with superior 5-year survival rates compared to emergency surgical intervention.

Several factors were examined for their impact on overall survival and their statistical significance (p -value). The results of the univariate and multivariate analyses for factors associated with overall survival are summarized in **Table 5**.

In the univariate analysis, several factors were significantly associated with poorer overall survival, including the presence of comorbidities (HR 1.42, 95% CI 1.02–1.98, $p = 0.038$), bowel obstruction (HR 1.92, 95% CI 1.34–2.75, $p < 0.001$), bowel perforation (HR 3.68, 95% CI 2.12–6.38, $p < 0.001$), stage III disease (HR 2.75, 95% CI 1.94–3.90, $p < 0.001$), and poor or mucinous histologic grade (HR 2.05, 95% CI 1.35–3.11, $p = 0.001$). Among these, perforation demonstrated the most pronounced adverse effect on survival. Conversely, receipt of adjuvant chemotherapy was significantly associated with improved overall survival (HR, 0.69; 95% CI, 0.49–0.97; $p = 0.032$).

The multivariate analysis using a Cox Proportional Hazards Model was conducted to adjust for potential confounding variables associated with overall survival. Four factors remained independently associated with an increased risk of mortality: perforation (adjusted HR 2.85, 95% CI 1.62–5.02, $p < 0.001$), stage III disease (adjusted HR 2.52, 95% CI 1.75–3.63, $p < 0.001$), poor or mucinous histologic grade (adjusted HR 1.72, 95% CI 1.11–2.66, $p = 0.015$), and obstruction (adjusted HR 1.58, 95% CI 1.09–2.29, $p = 0.016$).

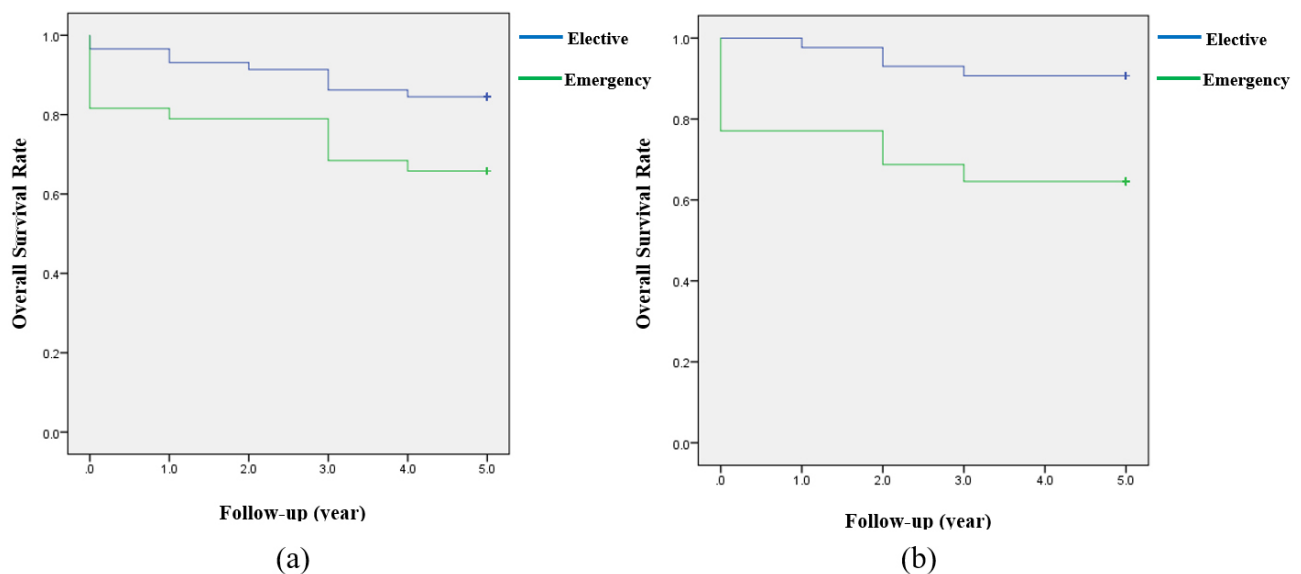


Figure 3 Comparison of 5-year survival (a) Stage 2 colonic cancer, (b) Stage 3 colonic cancer presents two additional Kaplan-Meier survival curves, further illustrating the 5-year survival outcomes, this time categorized by the stage of colonic cancer

In contrast, adjuvant chemotherapy remained an independent protective factor, significantly improving overall survival (adjusted HR, 0.55; 95% CI, 0.38–0.79; $p = 0.001$). Other variables—including age over 50 years, male gender, presence of comorbidities, and left-sided tumor location—were not statistically significant predictors of survival in the multivariate model.

chemotherapy emerged as a protective factor, underscoring its crucial role in improving long-term survival. These results suggest that the detrimental impact of emergency presentation is not solely attributable to differences in disease stage or comorbidities but represents an intrinsic prognostic factor. Therefore, strategies emphasizing early detection, timely referral, and preoperative optimization

Table 5 Univariate and multivariate analysis for overall survival

Factor	Univariate HR (95% CI)	Univariate p-value	Multivariate Adjusted HR (95% CI)	Multivariate p-value
Age > 50 years	1.52 (0.89–2.60)	0.124	1.35 (0.78–2.34)	0.285
Male gender	1.15 (0.83–1.60)	0.402	1.11 (0.79–1.56)	0.551
Comorbidity present	1.42 (1.02–1.98)	0.038	1.28 (0.91–1.81)	0.16
Obstruction	1.92 (1.34–2.75)	< 0.001	1.58 (1.09–2.29)	0.016
Perforation	3.68 (2.12–6.38)	< 0.001	2.85 (1.62–5.02)	< 0.001
Stage 3	2.75 (1.94–3.90)	< 0.001	2.52 (1.75–3.63)	< 0.001
Left side colon	0.91 (0.65–1.27)	0.574	0.97 (0.69–1.37)	0.865
Poor/Mucinous grade	2.05 (1.35–3.11)	0.001	1.72 (1.11–2.66)	0.015
Chemotherapy	0.69 (0.49–0.97)	0.032	0.55 (0.38–0.79)	0.001

**($p < 0.05$ statistically significant)

DISCUSSION

This study highlights the significant prognostic disparity between emergency and elective surgeries in colon cancer patients. Consistent with previous literature, emergency presentations—particularly perforation—were associated with worse oncologic outcomes, including reduced 5-year survival, increased in-hospital mortality, and shorter disease-free survival.^{4,10–13} The findings confirm that perforation confers a higher risk of mortality compared to obstruction, which itself still fared worse than elective cases.

The significantly higher rate of stage III disease in the emergency group aligns with existing data, suggesting delayed presentation and disease progression prior to surgery.^{8,14} Moreover, the higher rate of colostomy and longer hospital stays in emergency cases further reflect the clinical burden and complexity of these patients, corroborating previous findings.^{7,9,10} These factors contribute to prolonged recovery and diminished quality of life.

After adjustment for baseline imbalances and confounding factors, emergency surgery—particularly in cases presenting with perforation—remained an independent predictor of poor survival outcomes. Along with advanced tumor stage and poor or mucinous histology, it significantly contributed to adverse prognoses. Conversely, adjuvant

are essential to reduce the need for emergency surgery and improve overall outcomes in patients with colon cancer.

Notably, the similarity in recurrence rates between groups suggests that while emergency surgery influences short- and intermediate-term survival, oncologic control may be achievable with adequate surgical and adjuvant therapy. However, this interpretation must be made cautiously due to the limited sample size in the perforation subgroup.

Limitations of this study include its retrospective nature, single-center design, and potential selection bias. Moreover, while the exclusion of stage IV cases allowed for better comparison of localized disease, it limits generalizability to all colon cancer patients. Despite these limitations, this study provides valuable regional data from a tertiary hospital in Thailand and reinforces the prognostic significance of presentation type in colon cancer surgery.

CONCLUSION

Emergency surgical intervention for colon cancer, particularly in cases of perforation, is associated with significantly poorer short- and long-term outcomes compared to elective surgery. These patients tend to present at more advanced stages and require more extensive surgical

management, resulting in higher mortality, lower 5-year survival, and increased postoperative morbidity. Early detection and timely elective management are essential to improve oncologic outcomes. Adjuvant chemotherapy offers a survival benefit and should be considered in appropriate candidates. Further prospective studies are warranted to validate these findings and to explore strategies for optimizing care in emergency surgical settings.

REFERENCES

1. Ferlay J, Ervik M, Lam F, et al. Global Cancer Observatory: Cancer Today [Internet]. Lyon, France: International Agency for Research on Cancer; 2024. [cited 2024 May 10] Available from: <https://gco.iarc.who.int/media/globocan/factsheets/populations/900-world-fact-sheet.pdf>
2. National Cancer Institute of Thailand. Cancer in Thailand, Vol. X, 2016–2018. Bangkok: Ministry of Public Health; 2021.
3. Biondo S, Parés D, Martí Ragué J, et al. Emergency operations for nondiverticular perforation of the left colon. *Am J Surg*. 2002;183(3):256-60. doi: 10.1016/s0002-9610(02)00780-8.
4. Yang KM, Jeong MJ, Yoon KH, et al. Oncologic outcome of colon cancer with perforation and obstruction. *BMC Gastroenterol*. 2022;22(1):247. doi: 10.1186/s12876-022-02319-5.
5. Ho YH, Siu SK, Buttner P, et al. The effect of obstruction and perforation on colorectal cancer disease-free survival. *World J Surg*. 2010;34(5):1091-101. doi: 10.1007/s00268-010-0443-2.
6. Gök MA, Kafadar MT, Yeğen SF. Perforated colorectal cancers: clinical outcomes of 18 patients who underwent emergency surgery. *Prz Gastroenterol*. 2021;16(2):161-5. doi: 10.5114/pg.2021.106667.
7. Chen TM, Huang YT, Wang GC. Outcome of colon cancer initially presenting as colon perforation and obstruction. *World J Surg Oncol*. 2017;15(1):164. doi: 10.1186/s12957-017-1228-y.
8. Biondo S, Gálvez A, Ramírez E, et al. Emergency surgery for obstructing and perforated colon cancer: patterns of recurrence and prognostic factors. *Tech Coloproctol*. 2019;23(12):1141-61. doi: 10.1007/s10151-019-02110-x.
9. Biondo S, Kreisler E, Millan M, et al. Differences in patient postoperative and long-term outcomes between obstructive and perforated colonic cancer. *Am J Surg*. 2008;195(4):427-32. doi: 10.1016/j.amjsurg.2007.02.027.
10. Biondo S, Martí-Ragué J, Kreisler E, et al. A prospective study of outcomes of emergency and elective surgeries for complicated colonic cancer. *Am J Surg*. 2005;189(4):377-83. doi: 10.1016/j.amjsurg.2005.01.009.
11. Zhou H, Jin Y, Wang J, et al. Comparison of short-term surgical outcomes and long-term survival between emergency and elective surgery for colorectal cancer: a systematic review and meta-analysis. *Int J Colorectal Dis*. 2023;38(1):41. doi: 10.1007/s00384-023-04334-8.
12. Lavanchy JL, Vaisnora L, Haltmeier T, et al. Oncologic long-term outcomes of emergency versus elective resection for colorectal cancer. *Int J Colorectal Dis*. 2019;34(12):2091-9. doi: 10.1007/s00384-019-03426-8.
13. Sucullu I, Ozdemir Y, Cuhadar M, et al. Comparison of emergency surgeries for obstructed colonic cancer with elective surgeries: A retrospective study. *Pak J Med Sci*. 2015;31(6):1322-7. doi: 10.12669/pjms.316.8277.
14. Asano H, Kojima K, Ogino N, et al. Postoperative recurrence and risk factors of colorectal cancer perforation. *Int J Colorectal Dis*. 2017;32(3):419-24. doi: 10.1007/s00384-016-2694-3.
15. van der Sijp MP, Bastiaannet E, Mesker WE, et al. Differences between colon and rectal cancer in complications, short-term survival and recurrences. *Int J Colorectal Dis*. 2016;31(10):1683-91. doi: 10.1007/s00384-016-2633-3.