



Comparison of the Characteristics of Patients Undergoing Elective and Emergency Surgery for Crohn's Disease: A Single-Center Retrospective Cohort Study

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ABSTRACT

Aim: Most patients with Crohn's disease (CD) have a lifetime threat of emergency or elective surgery. These patients tend to have a high risk of postoperative complications. This study aims to compare the preoperative and operative characteristics and postoperative complications of patients who underwent emergency and elective surgery for CD.

Method: Patients with CD aged ≥ 18 years who underwent emergency and scheduled surgery between January 2016 and April 2021 in a single-center general surgery clinic were included in this study. The patients' demographic characteristics, comorbidities, drugs used, indications for surgery, preoperative laboratory findings, surgery type, anastomosis method, blood transfusion, infection parameters, surgical procedures, need for a postoperative intensive care unit, length of hospital stay, early postoperative complications, need for reoperation, and early surgical mortality were evaluated retrospectively from the hospital files.

Results: The study included 25 patients within the date range determined retrospectively. There were 18 (72%) men and 7 (28%) women, and the mean age was 37.7 ± 12.5 years. Eleven (44%) patients were operated on under emergency conditions, and 14 (56%) patients were surgically treated under elective circumstances. An ostomy was performed in 5 (20%) of the emergency surgery patients.

Conclusion: Postoperative serious complications (Clavien-Dindo grade ≥ 3) still occur at high rates in patients operated on for CD. Ostomy indication and a longer hospital stay are more common in patients undergoing emergency surgery.

Keywords: Crohn's disease, surgery, early complication

Introduction

As a long-standing inflammatory bowel disease (IBD), Crohn's disease (CD) can affect all parts of the gastrointestinal tract and result in major complications, such as stenoses, fistulas, and abscesses.¹ Despite advances in medical treatment, up to 80% of patients with CD have a lifetime risk of surgery and bowel resection.² According to the literature, 10%-37% of patients with CD experience postoperative complications following surgery.^{3,4} Many evaluations have reported that bowel resection in patients with CD has a different risk profile when compared with groups of patients without IBD. In particular, higher

incidences of intra-abdominal septic problems, including enteric fistulas and intra-abdominal abscesses, have been reported.⁵ In addition, anti-tumor necrosis factor (anti-TNF) and other drugs used in CD have been shown to affect wound healing negatively.^{6,7} Despite the advances in diagnostic methods, unfortunately, a significant portion of patients with CD are diagnosed with perforation, intra-abdominal abscesses, and ileus under emergency conditions, such as during an emergency operation.⁸ Due to these negative factors specific to CD, postoperative complications and the factors affecting these maintain their importance.¹ Our study compares the early



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postoperative outcomes of patients undergoing emergency and elective surgery for CD.

Materials and Methods

Patients who underwent elective surgery because of the diagnosis of CD in the general surgery clinic of the authors' hospital and patients whose diagnosis of CD was not known preoperatively but was confirmed in the pathology specimen postoperatively were evaluated in the study. Patients with CD aged ≥ 18 years who underwent emergency or elective surgery in the general surgery clinic between January 2016 and April 2021 were included in the study. Patients who underwent surgery due to a fistula, stricture, perforation, and mass image according to the status and complications of CD were included. Patients with a previous history of abdominal surgery were excluded. Patients who had an ostomy without resection, simultaneous perianal surgery, and intra-abdominal abscess drainage without resection were excluded. The patients' demographic characteristics, comorbidities, drugs used, indications for surgery, preoperative laboratory findings, surgery type, anastomosis type, blood transfusion, infection parameters, surgical procedures, need for a postoperative intensive care unit, length of hospital stay, early postoperative complications, need for reoperation, and early surgical mortality were reviewed retrospectively from the hospital files. Preoperative computed tomography was routinely taken in all patients. Oral contrast was used for a possible fistula diagnosis in elective patients (Figures 1-3). Postoperative complications were assessed according to the Clavien-Dindo classification.⁹ Patients classified as a Clavien-Dindo grade ≥ 3 because of serious complications were included in the study. Surgery-related mortality was deemed as mortality within 30 days of surgical intervention.

The authors' University of Health Sciences Turkey, İstanbul Haseki Training and Research Hospital's Ethics Committee approved the study (approval number: 84-2021, date: 08.09.2021).

Statistical Analysis

Analysis of the statistics was calculated using SPSS 15.0, which was designed for Microsoft Windows. Regarding the

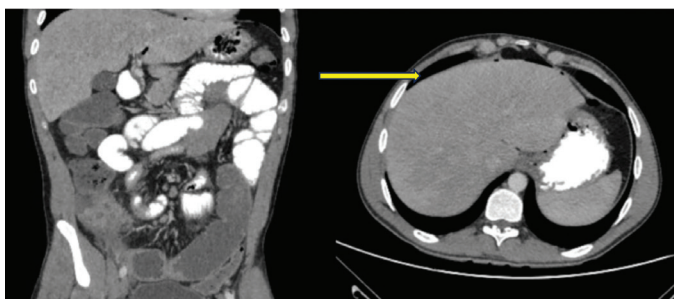


Figure 1. Perforation and free air in the abdomen due to Crohn's disease. Computed tomography image

descriptive statistical analysis, numbers and/or percentages were employed for the categorical variables. The numerical variables consisted of the mean, standard deviation, minimum, maximum, and median. The distributions in the groups were collated using the chi-squared test. The likeness of the numerical variables between the two independent groupings was made using the Student's t-test if the data were normally distributed and the Mann-Whitney U test when this was not the case. The level of significance was accepted as $p < 0.050$.

Results

The study was completed with 25 patients within the date range determined retrospectively. There were 18 (72%) men and 7 (28%) women, and the mean age was 37.7 ± 12.5 . While 11 (44%) patients were operated on due to emergency conditions, the remaining 14 (56%) were operated on under elective conditions. The mean surgery time was 149 ± 42.4 minutes. The mean hospital stay was found to be 11.9 ± 8.7 days. The average preoperative white blood cell, mean preoperative C-reactive protein (CRP), and mean preoperative albumin values were 8.6 ± 3.9 , 86.0 ± 91.9 , and 3.0 ± 0.7 , respectively. While 16 (64%) patients received preoperative treatment for CD, 9 (36%) patients had not received that treatment. Among the patients who received treatment, 8 (32%) were using 5-aminosalicylates, 3 (12%) anti-TNF, and 5 (20%) immunosuppressant agents (Table 1).

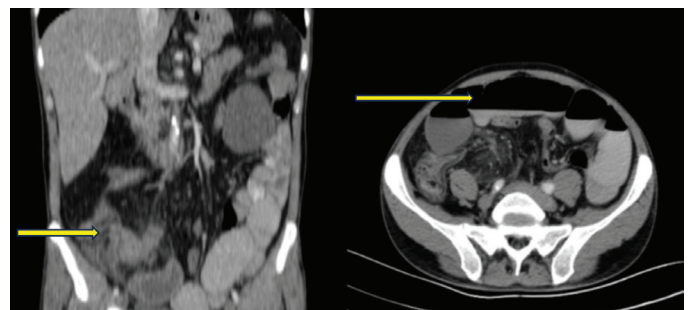


Figure 2. Stricture and mechanical bowel obstruction due to Crohn's disease. Computed tomography image

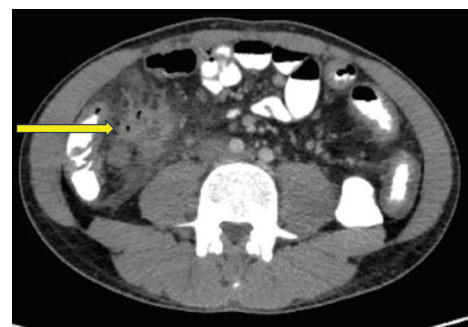


Figure 3. Intra abdominal abscess due to Crohn's disease. Computed tomography image

All patients underwent open surgery. A segmental small bowel resection along with right hemicolectomy was carried out on 2 patients in the emergency surgery group. An anastomosis was employed in 20 (80%) patients, and an ostomy was performed in 5 (20%). All patients with an ostomy were in the emergency surgery group. Ostomies were opened as an end ileostomy. Intraoperatively 2 units of erythrocyte suspension was given to 1 of the 2 patients in the emergency group, and 2 units of erythrocyte suspension was given to 1 patient on the 1st day postoperatively (Table 2). In the early period postoperatively, complications were observed in 5 patients, which consisted of an intra-abdominal abscess in 3 patients and an anastomotic leakage in 2 patients (Clavien-Dindo grade ≥ 3) (Table 3). Two patients with an anastomotic leakage were reoperated. Patients who were operated on due to an anastomotic leak were in the emergency surgery group and underwent right hemicolectomy. Since an anastomosis would be risky, an end ileostomy was performed. Mortality occurred in 1 patient.

Discussion

This study compared the operative and postoperative early complications between emergency and elective patient groups operated on for CD.

Surgery for CD carries an elevated risk for complications, such as an infected wound, anastomotic leakage, and intra-abdominal sepsis.¹⁰ Although the patient group in our study had a lower mean age and morbidity, they had similar postoperative complication rates as a patient group undergoing similar surgery for cancer.¹¹ Complications such as intra-abdominal sepsis and anastomotic leakage can cause life-threatening results. In a study of 79 patients by Ghoneima et al.¹², anastomotic leakage and intra-abdominal sepsis were observed in 11 (13.9%) patients. Similarly, Zuo et al.¹³ found intra-abdominal septic complications in 39 (11.3%) patients in a large study of 344 patients who underwent ileocecal resection and anastomosis. Again, Galata et al.¹⁴ found 29 (23%) major complications (Clavien-Dindo grade ≥ 3) in a study of 126

Table 1. Preoperative demographic data

		Total	Surgery		p
		n (%)	Emergency n (%)	Elective n (%)	
Sex	Female	7 (28)	3 (27.3)	4 (28.6)	1.000
	Male	18 (72)	8 (72.7)	10 (71.4)	
Age median \pm SD		37.8 \pm 12.6	39.3 \pm 11.1	36.6 \pm 13.9	0.605
Preoperative WBC		8.6 \pm 3.9	9.8 \pm 5.0	7.7 \pm 2.6	0.269
Preoperative CRP		86.0 \pm 91.9	109.3 \pm 88.1	67.6 \pm 93.9	0.071
Preoperative albumin		3.0 \pm 0.7	2.8 \pm 0.8	3.1 \pm 0.5	0.329
Preoperative medication	No medication	9 (36)	3 (27.3)	6 (42.9)	0.714
	5 ASA	8 (32)	5 (45.5)	3 (21.4)	
	Anti-TNF	3 (12)	1 (9.1)	2 (14.3)	
ASA	Immunosuppression	5 (20)	2 (18.2)	3 (21.4)	0.790
	1	5 (20)	2 (18.2)	3 (21.4)	
	2	19 (76)	8 (72.7)	11 (78.6)	
Location of the disease	3	1 (4)	1 (9.1)	0 (0.0)	0.656
	Ileocecal	18 (72)	7 (63.6)	11 (78.6)	
	Terminal ileum	7 (28)	4 (36.4)	3 (21.4)	
Surgery indication	Stricture	9 (36)	1 (9.1)	8 (57.1)	<0.001
	perforation	9 (36)	9 (81.8)	0 (0.0)	
	Fistula	4 (16)	1 (9.1)	3 (21.4)	
	Mass	3 (12)	0 (0.0)	3 (21.4)	

SD: Standard deviation, WBC: White blood cell, CRP: C-reactive protein, ASA: American Society of Anesthesiologists, TNF: Tumor necrosis factor

cases. Kanazawa et al.¹⁵, on the other hand, found major complications in 17 (2.7%) patients out of 663, which was lower compared with previous studies. Our study found major complications in 5 (20%) patients, consistent with the literature.

Many factors affecting postoperative complications in patients with CD have been investigated.¹⁶ Among these factors, preoperative CRP and albumin values were found to affect surgical outcomes other than CD.^{17,18} Similarly, in many studies, preoperative CRP and albumin values were found to be correlated with postoperative complications in CD.^{12,13,19} Yamamoto et al.¹¹ emphasized that preoperatively low albumin levels, steroid usage, and the presence of an abscess or a fistula during laparotomy significantly elevated the possibility

of major complications following surgery. Our study found no significant difference in preoperative albumin and CRP values when the emergency and elective surgery groups were compared. No statistically significant differences were found when the emergency and elective groups were compared in terms of major complications.

The need for an ostomy in CD-related surgery has increased compared with non-CD-related surgeries. For complicated CD, rates of up to 35% are reported in the literature.²⁰ The rate of complications is higher in emergency surgeries than in elective surgeries. Celentano et al.²¹, in their study, found that 22% of patients with CD required an ostomy in emergency surgeries and 11.5% in elective ones. Similarly, Sakurai Kimura et al.²² found that an ostomy was performed in 39.4%

Table 2. Operative demographic data

		Total	Surgery		p
		n (%)	Emergency n (%)	Elective n (%)	
Type of surgery	Ileocecal resection	13 (52.0)	6 (54.5)	7 (50)	0.635
	Right hemicolectomy	9 (36.0)	3 (27.3)	6 (42.9)	
	Combined resection	3 (12.0)	2 (18.2)	1 (7.1)	
Anastomosis type	No anastomosis	5 (20)	5 (45.5)	0 (0.0)	0.015
	Side-to-side	17 (68)	5 (45.5)	12 (85.7)	
	End-to-side	3 (12)	1 (9.1)	2 (14.3)	
Anastomosis technique	No anastomosis	5 (20)	5 (50)	0 (0)	0.001
	Manual	5 (20)	0 (0)	5 (33.3)	
	Staple	15 (60)	5 (50)	10 (66.6)	
Operation time (minute)		149.2±42.4	146.4±478	151.4±39.4	0.719
End ileostomy		5 (20)	5 (20)	0 (0)	0.001

Table 3. Postoperative demographic data

		Total	Surgery		p
		n (%)	Emergency n (%)	Elective n (%)	
Early complication	(-)	20 (80)	7 (63.6)	13 (92.9)	0.133
	(+)	5 (20)	4 (36.4)	1 (7.1)	
	Intra-abdominal abscess	3 (12.0)	2 (18.2)	1 (7.1)	
	Anastomotic leak	2 (8.0)	2 (18.2)	0 (0.0)	
Duration of stay (day)		11.9±8.7	17.0±10.1	7.9±4.5	0.028
Postoperative intensive care		1 (4)	1 (9.1)	0 (0)	0.440
Blood transfusion		2 (8)	2 (18.2)	0 (0)	0.183
Re-operation		2 (8.0)	2 (18.2)	0 (0)	0.183
Mortality		1 (4.0)	1 (9.1)	0 (0)	0.440

of emergency surgeries and 18.5% of elective surgeries. In our study, all 5 (20%) patients who underwent ostomy were in the emergency group. When emergency surgeries were evaluated, the rate of 45% was found to be higher than in the related literature.

Study Limitations

Since the laparoscopic approach in the surgical management of CD in our clinic was less routine than in patients without CD, our laparoscopic case number was low, and, therefore, laparoscopy was not included in our study. Unfortunately, this was a weakness of the study. Additionally, the retrospective methodology and the small number of patients were other limitations of our study.

Conclusion

Postoperative serious complications (Clavien-Dindo grade ≥ 3) still occur at high rates in patients operated on for CD. We found that the indication for an ostomy and a longer hospital stay were more common in patients who underwent emergency surgery.

Ethics

Ethics Committee Approval: The authors' University of Health Sciences Turkey, İstanbul Haseki Training and Research Hospital's Ethics Committee approved the study (approval number: 84-2021, date: 08.09.2021).

Informed Consent: Retrospective study.

Authorship Contributions

Surgical and Medical Practices: H.B., S.Ç.Ö., H.A., A.H., Concept: H.B., M.A., Design: H.B., F.E., Data Collection or Processing: M.A., A.H., A.K., D.Y., Analysis or Interpretation: H.B., S.Ç.Ö., Literature Search: H.B., H.A., Writing: H.B., D.Y.

Conflict of Interest: No conflict of interest was declared by the authors.

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