

ORIGINAL ARTICLE

Outcomes of Open Versus Laparoscopic Surgery for Colorectal Cancer in the Emergency SettingBARKHA KUMARI¹, TALHA ASLAM², MALIK MUHAMMAD HAMDAN TAFHEEM³, MUHAMMAD NAUMAN ASHRAF⁴, AFTAB AHMAD BAIG⁵, SARDAR MUHAMMAD NASEER UDDIN⁶¹Postgraduate Trainee, Department of Surgery, Civil Hospital, Karachi²Medical Officer, Hashim Medical City Hospital, Hyderabad³Medical Officer, Aziz Bhatti Shaheed Teaching Hospital, Gujrat⁴Senior Registrar, Surgical Unit 2, Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan⁵Assistant Professor, Department of General Surgery, Akhtar Saeed Medical and Dental College, Lahore⁶Surgical Unit A, Lady Reading Hospital, PeshawarCorresponding author: Malik Muhammad Hamdan Tafheem, Email: hamdantafheem007@gmail.com**ABSTRACT****Aim:** The study aim is to do the comparison of oncological and short-term results of open and laparoscopic surgery for colorectal cancer in emergency setting.**Study Design:** This retrospective cohort research was held in the Department of Surgery, Civil Hospital, Karachi and Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan for two-years duration from January 2020 to December 2021.**Patients and Methods:** after approval of this study and an informed consent agreement was signed by each participant. We performed an emergency analysis on 55 consecutive patients who received emergency open (n=40) or laparoscopic (n=15) resection for colorectal cancer.**Results:** The gender, age, BMI, American Society of Anesthesiologists (ASA) score, tumor location and prior abdominal surgery history were not significantly different between the laparoscopic and open groups. The T4 pathological tumors were more frequent in the open surgery group (50% vs. 13.3%; p=0.031) than in the laparoscopic group. The open surgery group also experienced high proportion of perforation (42.5% vs. 33.3%) and obstruction (47.5% vs. 26.7%) cases. In the laparoscopic group, bleeding or anemia were much common (33.3% vs. 7.5%; p=0.032). The laparoscopic group did not experience any open conversions. The open surgery group had a high pervasiveness of Hartmann's surgery (35%), whereas the laparoscopic group had high pervasiveness of low anterior resection (26.7%; p=0.064). The complication ration at 30-days for laparoscopy (37.5%) and open surgery (33.3%) was comparable (p=0.900).**Conclusions:** In some individuals with colorectal cancer, emergency laparoscopic surgery has advantages in relation of short-term and oncologic outcomes. As a result, skilled laparoscopic surgeons may actively consider using laparoscopy in life-threatening situations.**Keywords:** Laparoscopy, colorectal cancer, and emergency.**INTRODUCTION**

Positive short-term effects of laparoscopy for colorectal cancer include decreased narcotic use, faster dietary initiation, and shorter hospital stay¹⁻². In addition, various randomized trials have supported the oncological safety of laparoscopy³⁻⁴. However, because emergency laparoscopy is frequently left out of clinical studies, nothing is known about the outcome of this procedure for colorectal cancer. A well-recognized risk factor for post-operative mortality and morbidity following colectomy is emergency surgery⁵. Laparoscopic surgery is technically challenging and need high learning curve, laparoscopic colorectal surgery needs a well-organized surgical team as well as the precise surgical tools. Laparoscopy for colorectal cancer is thus primarily regarded elective in clinical practise and is rarely utilised in life-threatening circumstances⁶. Only 543 (0.6%) of the 102,236 major emergency colorectal surgeries carried out in hospitals affiliated with the UK National Health Service between 1996 and 2006 were laparoscopic. For a number of benign abdominal illnesses, such as cholecystitis, appendicitis, diverticulitis, or gynecological issues, current recommendations encourage the use of emergency laparoscopy. However, a dearth of information makes it difficult to determine the advantages of emergency laparoscopy in persons with colorectal cancer⁷. The laparoscopic surgery in individuals with benign bowel illnesses such inflammatory bowel disease or diverticulitis has been examined in earlier studies. One study examining the effectiveness of laparoscopy in treating benign and malignant colorectal disorders have been reported by several authors⁸. Laparoscopy has been found to be safe and practical in emergency scenarios for short-term results in four comparative studies of urgent excision of colorectal cancer by laparoscopy or open surgery; however, no oncology outcomes have been reported⁹⁻¹⁰. The resulting problems, such as colorectal cancer with obstruction and perforation, result in challenging surgical circumstances including fragile, distended, easily bleeding or edematous bowel. If procedural complications are expected,

surgeons do not want to pursue a laparoscopic method¹¹. Though, even in emergency situations, we predict that the reduced surgical stress following laparoscopy in some patients enables a quicker short-term recovery than open surgery¹². Additionally, laparoscopy can have comparable oncological effects. The study aim is to do the comparison of oncological and short-term results of open and laparoscopic surgery for colorectal cancer in emergency setting.

METHODS

This retrospective cohort research was held in the Department of Surgery, Civil Hospital, Karachi and Sheikh Zayed Medical College/ Hospital, Rahim Yar Khan for two-years duration from January 2020 to December 2021 after approval of this study and an informed consent agreement was signed by each participant. 60 patients who underwent urgent surgery for colon cancer were recruited. Patients who had undergone a significant therapeutic colorectal resection and had colorectal cancer with histological confirmation met the eligibility requirements. This study excluded patients who had undergone repeated visceral resections, R2 resection (macroscopic residual disease), or surgeries without resection or bypass of colorectal cancer.

Study objectives: The main goal was to assess how open and laparoscopy surgical procedure for colorectal cancer in the emergency room compared in terms of short-term results.

In patients receiving open and emergency laparoscopic surgical procedure for colorectal cancer, secondary endpoints evaluated oncological outcomes.

Two colorectal surgeons performed the surgeries and surgeon decided whether to perform laparoscopic or open surgery. Patients and their relatives received thorough explanations of the laparoscopic and open procedures, and all patients gave their informed consent. Standard bowel preparation was not done due to the emergency surgery, and the surgeon decided the length of antibiotic medication based on the postoperative clinical course. Standard surgical techniques were used to accomplish the

complete meso-colic excision for total meso-rectal excision and colon cancer for rectal cancer. Following surgery, chemotherapy was administered for all stage II, stage III, or stage IV patients in accordance with National Comprehensive Cancer Network (NCCN) recommendations. The oxaliplatin/irinotecan, capecitabine, fluorouracil with or without folinic acid or in grouping with targeted medications were all used as part of chemotherapy regimens. Patients with rectal cancer in stages II and III received adjuvant radiation. All surgery patients were followed up annually for two years and then at 3- or 6-month intervals.

The classification of Clavien-Dindo for complications occurred postoperative help to determine further treatment within 30 days after surgical procedure.

The pre-planned surgical procedures completion using a standard laparotomy incision was referred to as conversion to open surgery. If necessary within 48 hours of the first surgery, treatment—such as blood transfusion or an intensive care unit (ICU) was documented.

SPSS 20.0, was applied for all statistical analyses. Frequencies and proportions were used to analyze categorical variables, and the Fisher's exact test or Chi-square test were applied for comparing results. The Mann-Whitney U test was applied to assess continuous variables, which are defined as the S.D and mean. The Kaplan-Meier method was applied for the survival analysis, along with log-rank testing. P-value less than 0.05 was considered significant.

RESULTS

A total of 55 colorectal cancer patients who required urgent surgery were examined based on whether they underwent primary open (n=40) or laparoscopic (n=15) surgery. The gender, age, BMI, American Society of Anesthesiologists (ASA) score, tumor location and prior abdominal surgery history were not significantly different between the laparoscopic and open groups. The T4 pathological tumors were more frequent in the open surgery group (50% vs. 13.3%; p=0.031) than in the laparoscopic group. Table 1 provides an overview of specific patient features.

Table-1: shows the patients demographic features

	Open (n=40)(%)	Laparoscopy (n=15) (%)	p-Value
Age (years), mean (SD)	64± 11.2	61±10.5	0.901
Gender			
Male	28 (70)	7 (58.3)	0.128
Female	12 (30)	5 (41.7)	
ASA score			
1	3 (7.5)	6 (40)	0.177
2	20 (50)	7 (46.6)	
3	15 (37.5)	1 (6.7)	
4	2 (5)	1 (6.7)	
BMI (kg/m ²), mean (SD)	24±4.8	21±6.1	0.545
T4 tumor (+)	20 (50)	2 (13.3)	0.031
Previous laparotomy (+)	4 (10)	1 (6.7)	0.318
Preoperative chemoradiation (+)	2 (5)	0 (0)	0.553
Tumor location			
Right colon	10 (25)	6 (40)	0.234
Left colon	8 (20)	1 (6.7)	
Sigmoid colon	14 (35)	5 (33.3)	
Rectum	6 (15)	2 (13.3)	
Multiple	2 (5)	1 (6.7)	

The open surgery group also experienced high proportion of perforation (42.5% vs. 33.3%) and obstruction (47.5% vs. 26.7%) cases. In the laparoscopic group, bleeding or anemia were much common (33.3% vs. 7.5%; p=0.032).

The laparoscopic group did not experience any open conversions. The open surgery group had a high pervasiveness of Hartmann's surgery (35%), whereas the laparoscopic group had high pervasiveness of low anterior resection (26.7%; p=0.064). In

the open surgery group, tumors of stage II were much prevalent (37.5%) and in the laparoscopic group, stage I/II cancers were prevalent (33.3%) (p=0.004). There was no difference between two groups in terms of the histological grade, number of lymph nodes removed or positive circumferential margin. The open surgery group had increased tumor diameter (7 cm vs. 4 cm; p=0.022) (Table III).

Table-2: shows the causes of emergency surgeries

	Open N (%)	Laparoscopy N (%)	p-Value
Obstruction	19 (47.5)	4 (26.7)	0.032
Perforation	17 (42.5)	5 (33.3)	
Bleeding, anemia	3 (7.5)	5 (33.3)	
Prolapse, bowel ischemia	1 (2.5)	1 (6.7)	

Table-3: shows the histopathology results and Surgical factors

	Open	Laparoscopy (%)	p-Value
Type of operation			
Hartmann	14 (35)	2 (13.3)	0.064
LAR	3 (7.5)	4 (26.7)	
Proctocolectomy	3 (7.5)	1 (6.7)	
AR, Left colectomy	6 (15)	3 (20)	
Total, subtotal colectomy	8 (20)	0 (0)	
Right colectomy	6 (15)	3 (20)	
Transverse colectomy	0 (0)	2 (13.3)	
Operative time (min), mean (SD)	172 ±51	182± 91	0.710
Estimated blood loss (ml), mean (SD)	90 ± 112	145 ± 184)	0.294
TNM classification			
0	0 (0)	2 (13.3)	0.004
1	1 (2.5)	4 (26.7)	
2	15 (37.5)	5 (33.3)	
3	13 (32.5)	3 (20)	
4	11 (27.5)	1 (6.7)	
Histologic grade			
G1, G2	34 (85)	12 (80)	0.902
G3, other	6 (15)	3 (20)	
Circumferential margin			
≤1 mm	7 (17.5)	0 (0)	0.058
Lymph node yield (no.), mean (SD)	21± 11.2	14±10.1	0.121
Distal margin (cm), mean (SD)	13± 9.4	10± 8	0.324
Tumor diameter (cm), mean (SD)	7± 4	4 ±1	0.022

The complication ration at 30-days for laparoscopy (37.5%) and open surgery (33.3%) was comparable (p=0.900). The death rate was zero in both groups. In the group that underwent open surgery, admission to the intensive care unit (ICU) occurred more frequently (77.5% vs. 13.3%; p<0.001). In the open surgery group, 65% of patients received chemotherapy, compared to 26/7% in the laparoscopic group (p=0.097).

The mean time from surgery to chemotherapy was briefer after laparoscopy (36 days) than after open surgery (40 days, p = 0.387), this variance was not significant statistically. The median stay in hospital (19 days vs. 15 days, p=0.039) and time to diet tolerance (9 days vs. 7 days, p=0.032) were also less in the laparoscopic group. (Table IV).

Table-4: shows the short-term outcomes of patients

	Open N (%)	Laparoscopy N (%)	p
30-day complication (+)	15 (37.5)	5 (33.3)	0.900
Clavien-Dindo score			
1,2	12 (30)	3 (20)	0.301
3,4,5	4 (10)	1 (6.7)	
Type of complication			
Pulmonary	4	2	
Wound	2	2	

Leakage	0	2	
Obstruction	2	1	
Urinary	2	0	
Other	5	1	
ICU admission (+)	31 (77.5)	2 (13.3)	<0.001
Blood transfusion (+)	19 (47.5)	7 (58.3)	0.831
Adjuvant chemotherapy (+)	26 (65)	4 (26.7)	0.097
Time to chemotherapy initiation (days), mean (SD)	40 ±9.2	36± 11.8	0.387
Time to toleration of diet (days), mean (SD)	9 ± 3	7 ± 4	0.032
Hospital stay (days), mean (SD)	19 ± 6.8	15± 6	0.039

Both groups experienced the same overall number of cancer-related recurrences and fatalities. The 5-year relapse-free survival rates were, respectively, 25(62.5%) in open surgery and 12(80%) in Laparoscopic surgery group ($p = 0.148$).

DISCUSSION

This study main conclusion is that emergency laparoscopy patients have high short-term results in relations of attaining a tolerable diet in less time and with a shorter stay in hospital. In terms of recurrence and cancer-specific free survival, emergency laparoscopy has demonstrated oncological outcomes comparable to open surgery¹³. Even though emergency laparoscopy for colorectal cancer has produced promising results in this study but not all patients should have laparoscopy. The two main factors that lead to open conversion during elective laparoscopic surgery are the tumor's fixation to the neighboring organ and the problem of dissecting a locally progressed malignancy¹⁴⁻¹⁵. Additionally, a ruptured tumour with significant faecal contamination may prevent proper surgical exposure and make laparoscopic removal of contamination challenging in patients. Therefore, careful selection of patient is required when determining when to do a laparoscopic surgery¹⁶. Before deciding to undergo surgery, we performed preoperative CT scans wherever practical. Laparoscopy is advised for individuals who have a small tumour, a short-term blockage, and a moderately dilated small intestine¹⁷. In emergency cases, surgeons frequently encounter more challenging technical issues, such as extended operating hours, an unorganized surgical team, or exhaustion from late-night work. In this investigation, two colorectal surgeons with 10 years of laparoscopic procedures underwent the procedure¹⁸⁻¹⁹. Therefore, we think that not all colorectal surgeons should perform an emergency laparoscopy. However, surgeons with the right education and surgical experience might feel at ease performing laparoscopic surgery in an emergency. It has not been thoroughly assessed if immediate laparoscopy is superior to open surgery for colorectal cancer. Catani et al. found lesser median stay in hospital (7 vs. 9 days) and decreased postoperative morbidity (0% vs. 15%). In cases with Hinchey grades III and IV diverticular perforation, there were two conversions²⁰⁻²¹.

Ballian et al compare 341 laparoscopic colon resections (26.6% colorectal cancer) versus 3211 open colon resections (14.4% colorectal cancer)²². He found that compared to laparoscopy, postoperative morbidity and mortality were comparable, and there was a longer surgical duration and shorter hospital stay. Nash et al. assessed 68 individuals who received open colectomy ($n=32.6$ for colorectal cancer) and urgent minimally invasive surgery ($n=36.5$ for colorectal cancer)²³. In the open surgery group, colonic perforation or obstruction was much prevalent²⁴. The postoperative morbidity was similar, and the minimally invasive method was linked to longer operating times and fewer instances of lengthy hospital stays (>7 days).

Laparoscopy has been related with longer recovery period but less blood loss, as well as a quicker return to normal mobility. Our findings agree with those of these investigations²⁵.

The 30-day complication rate, lymph node removal, and resection margin length of oncological parameters were comparable in the laparoscopic and open groups. This study results are also similar to this study.

CONCLUSION

In conclusion, emergency laparoscopy, as opposed to open surgery, has short-term advantages for some colon cancer patients, including a quicker time to reach a tolerable diet and a shorter hospital stay. Laparoscopy's oncological results were comparable with open surgery, as was to be expected. These findings suggest that emergency laparoscopy, like elective laparoscopy for colorectal cancer, may offer advantages in relation of short-term and oncologic outcomes. So, skilled laparoscopic specialists may take a more active interest in using laparoscopy in emergency cases. Future, more comprehensive research will be helpful in further assessing the importance of laparoscopy for urgent colorectal cancer and the most suitable selection criteria for patients who will benefit from a laparoscopic approach.

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