

Management of Colorectal Cancers in a Public Sector Hospital: A Lower-Middle-Income Country Experience

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ABSTRACT

Background: Colorectal cancer is the third most common cancer worldwide. Treatment options depend on the stage of the disease, the patient's performance status, and increasingly, the molecular makeup of the tumor. Dedicated high-volume centers achieve the best oncological outcomes for these cancers.

Objective: To analyze the surgical outcomes of laparoscopic and open surgery for colorectal cancer tumors at Lahore General Hospital, Pakistan, a lower-middle-income country.

Methodology: This prospective observational study was conducted on 199 colorectal cancer patients between January 2017 and December 2022. Surgeons performed all procedures at one center, focusing on laparoscopic or open surgery approaches. Patients were divided into Group A for laparoscopic surgery (93, 47%) and Group B for open surgery (106, 53%). Surgeons evaluated the operative outcomes based on the tumor site. Post-surgery, patients received adjuvant therapy from medical and radiation oncologists. Ultrasonography and CT scans were performed as needed.

Results: In this study, the mean age was 44±15 years for Group A and 47±16 years for Group B. Among Group A, 57 (75%) were male and 19 (25%) female, while in Group B, 84 (68%) were male and 39 (32%) female. The mean operative time was 214.52±34.17 minutes in Group A and 180.85±24.68 minutes in Group B (p=0.035). The hospital stay was 8±3 days in Group A and 10±4 days in Group B (p=0.023). The 30-day mortality rate was 1% in Group A and 3% in Group B (p=0.0165). Anastomotic leaks occurred in 3% of Group A and 5% of Group B (p=0.081).

Conclusion: In our study, the operative time was shorter for open surgery, but the hospital stay was shorter for laparoscopic surgery. SSI, anastomosis leakage, intra-abdominal sepsis, and re-operations showed no significant difference between the groups.

Keywords: Colorectal cancer, open surgery, laparoscopic surgery, comparison, short-term outcomes, Pakistan, lower-middle-income country.

INTRODUCTION

Colorectal cancer (CRC) ranks as the third most common cancer globally, accounting for approximately 10% of all cancer cases and standing as the second leading cause of cancer-related mortality worldwide [1, 2]. Although CRC death rates have declined since 1990, they remain a significant cause of cancer mortality, with CRC as the third leading cause of cancer-related death in women and the second in men, showing a decline of approximately 1.2% annually [3]. The incidence in Pakistan mirrors global statistics, with CRC being the third most common cancer in females and second in males [4].

Treatment for CRC varies by the disease stage, patient performance status, and increasingly by the molecular profile of the tumor. Multidisciplinary care provides the best approach for effective management of these cancers. Surgery is the primary treatment modality,

complemented by chemotherapy and radiation as either adjuvant or neoadjuvant therapies. Optimal outcomes are most often achieved in high-volume centers that specialize in colorectal cancer, where resolute teams ensure the best possible oncological results [5-10].

Unfortunately, Pakistan faces a shortage of specialized colorectal centers, with limited colorectal training and few resolute colorectal surgeons, most of whom practice privately. There are currently no specialized colorectal units in public sector hospitals [11]. In response to this need, Lahore General Hospital established a dedicated surgical oncology service in 2017, which included divisions for colorectal, breast, and hepato-pancreato-biliary (HPB) services. We also initiated a colorectal study group, through which we developed local guidelines for managing CRC in Pakistan. This study aims to share our data and outcomes on managing colorectal cancers within a public sector hospital in one of the country's largest cities [12].

METHODOLOGY

This prospective observational study was conducted at Lahore General Hospital from January 2017 to December

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2022. Institutional review board (IRB) approval was obtained from the hospital's dean of surgery.

The study included all 214 patients with colorectal cancer who underwent surgery during the study period. Patient demographics, including age, gender, tumor location, and tumor stage, were recorded.

Patients were grouped based on the type of surgery performed: Group A for laparoscopic surgery and Group B for open surgery. This grouping was non-random and based on surgeon preference and the availability of laparoscopic equipment. Emergency cases were also included. All surgeries were performed by members of the same surgical team. Postoperative complications, early oncological outcomes such as margin status and lymph node yield, and type of surgery were recorded. Long-term outcomes, including recurrence and survival, were beyond the scope of this study.

Data was analyzed using SPSS version 21. Frequencies and percentages were calculated for categorical variables, while numerical variables were reported as means ± standard deviation. Age comparisons across groups used the one-way ANOVA test. Categorical variables were compared with the Chi-square test, and a p-value ≤ 0.05 was considered statistically significant.

RESULTS

Over six years, 214 patients with colorectal cancer underwent surgery. Of these, 15 patients had unresectable tumors and only underwent diagnostic laparoscopy or stoma formation; the remaining 199 patients had complete tumor resections and were included in the study. The number of cases per year is illustrated in Fig. (1).

The median age for the patients was 45 years (range: 16-78), with 141 males (71%) and 58 females (29%). Among the 199 patients, 93 (47%) underwent laparoscopic surgery, while 106 (53%) were treated with open surgery. There were 10 laparoscopic cases converted to open surgery due to intraoperative challenges, and these

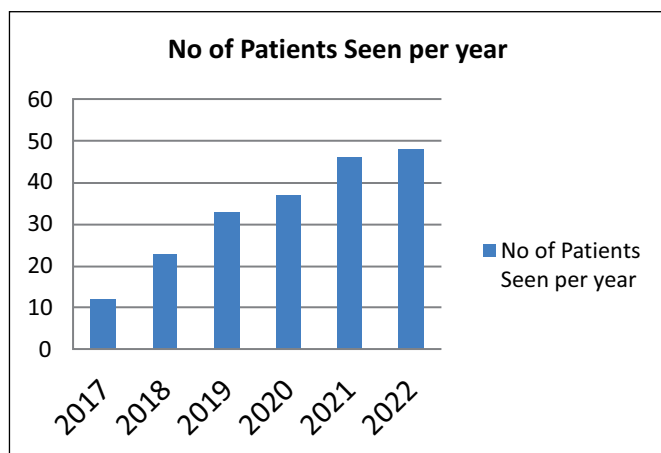


Fig. (1): No. of cases per year.

Table 1: Demographics of patients operated with colorectal cancer.

Demographics	All Patients	Lap (n=93)	Open (n=106)	p-value
Age(years)	45	44+15	47+16	0.866
BMI	26	27.52+6.14	26.18+4.91	0.455
Gender, n(%)				
Male	141 (71%)	57 (75%)	84 (68 %)	0.189
Female	58 (29%)	19 (25 %)	39 (32 %)	
Location of tumor, n(%)				
Rectum	92 (46%)	48 (52%)	44 (42%)	0.023
Sigmoid	42 (21%)	20 (22%)	22 (21%)	
Cecum	17 (9%)	7 (8%)	10 (9%)	
Hepatic flexure	12 (6%)	3 (3%)	9 (8%)	
Transverse	4 (2%)	2 (2%)	2 (2%)	
Rectosigmoid	13 (7%)	5 (5%)	8 (8%)	
Left colon	12 (6%)	5 (5%)	7 (7%)	
Synchronous	7 (3%)	3 (3%)	4 (3%)	
Stage of disease at presentation				
Stage 1	0	0	0	0.258
Stage 2	104 (52%)	47 (51%)	57 (54%)	

Table 2: Type of surgeries.

Surgery	All Patents (n=199)	Lap (n=93)	Open (n=106)	p-value
Procedure, n(%)				
Anterior Resection	50 (25%)	24 (26%)	26 (25%)	0.142
APR	29 (15%)	17 (18%)	12 (11%)	
ELAPE	12 (6%)	8 (9%)	4 (10%)	
Hartman Procedure	18 (9%)	4 (4%)	14 (13%)	
Sigmoid Colectomy	38 (19%)	20 (22%)	18 (17%)	
Right Hemi Colectomy	17 (9%)	6 (6%)	11 (11%)	
Extended Right Hemi Colectomy	16 (8%)	6 (6%)	10 (9%)	

Table 3: Comparison of outcomes in both groups.

Operative Outcomes	Overall	Lap	Open	p-value
Operative time, mean±SD	192.52 +29.24	214.52 +34.17	180.85 +24.68	0.035
Length of hospital stay, mean±SD	9±3	8±3	10±4	0.023
Complications, n(%)				
SSI	30 (15%)	8 (9%)	22 (21%)	0.087
Intra-abdominal sepsis	10 (5%)	3 (3%)	7 (7%)	0.186
Anastomosis leakage	8 (4%)	3 (3%)	5 (5%)	0.081
Re-operation	7 (4%)	2 (2%)	5 (5%)	0.304
30-days mortality	4 (2%)	1 (1%)	3 (3%)	0.165
Oncological Outcomes				
Median LNs	14	13	14	0.305
Proximal Margin positive	0	0	0	-
Distal Margin positive, n(%)	3 (1.5%)	1 (1.1%)	2 (1.9%)	0.081
CRM positive	4 (2.0%)	1 (1.1%)	3 (2.8%)	0.183
Completeness of TME (91 patients)	88/91	48/49	40/42	0.232

patients were included in the open group. Tumor locations were distributed as follows: rectum (46%), sigmoid or rectosigmoid (28%), right colon (15%), transverse or left colon (8%), and synchronous tumors (3%). Table 1 on page 6 shows the demographics, and Table 2 on page 7 details the types of surgeries performed.

Operative outcomes highlighted that the laparoscopic group had a longer operative time (214 minutes) than the open group (180 minutes), with a significant p-value of 0.035. However, patients in the laparoscopic group had shorter hospital stays (8 days versus 10 days; $p=0.023$). Oncological outcomes, such as margin status, CRM positivity, and lymph node yield, did not differ significantly between the laparoscopic and open surgery groups, as shown in Table 3.

DISCUSSION

Colorectal cancer is a leading malignancy in Pakistan [13]. Advances in total mesorectal excision (TME) and radiotherapy have reduced perioperative morbidity and recurrence rates to below 10%, with survival rates exceeding 70% [14]. Achieving these outcomes is more feasible in high-volume centers, defined as centers performing 40 or more major resections annually. With an increasing number of cases, our center qualifies as a high-volume facility and has demonstrated acceptable perioperative outcomes [15, 16].

The median age of our patients (45 years) was notably lower than the 60-65 years commonly reported in international studies, such as that by Virostko *et al.* [17]. In Pakistan, CRC trends toward affecting younger individuals, with one of our youngest cases being a 16-year-old with advanced rectal cancer. Studies indicate that younger patients may present with more advanced diseases and worse outcomes [18].

Male predominance in our sample (67%) contrasts with findings by Brener *et al.* [19] potentially due to cultural and economic barriers in Pakistan that impact women's access to healthcare, compounded by limited female surgical providers.

Rectal cancer was the most common tumor site, followed by the sigmoid and cecum, aligning with previous findings [19]. Most patients presented with stage 3 disease, while stage 1 cases were absent, due to the lack of early screening programs. In the absence of symptom-driven diagnosis, patients are often present at advanced stages. This study excluded stage 4 patients from the analysis.

While open surgery remains more common in our institution, there is a gradual shift towards laparoscopic procedures. Barriers to the broader adoption of laparoscopy include limited equipment, emergency presentations, advanced disease stages, and training gaps. Currently, laparoscopic rates at international centers exceed 80%, which we hope to achieve as our staff gains experience [20].

The conversion rate from laparoscopy to open surgery was 10%, in line with international standards, and driven by factors such as advanced disease, technical issues, and equipment limitations [20].

For outcome comparison, patients were divided into laparoscopic and open groups, though group assignment was non-random and based on surgeon preference. Although the laparoscopic approach had longer operative times, it was associated with shorter hospital stays, consistent with international studies [21]. The open group exhibited higher rates of wound infections and intra-abdominal sepsis, though no significant differences were found for anastomotic leakage, re-operation, or mortality.

Oncological outcomes, including lymph node yield and margin positivity, showed no significant differences between the groups [22]. While we did not measure disease-free survival (DFS) or overall survival (OS), multiple randomized controlled trials (RCTs) have demonstrated that laparoscopic surgery does not negatively impact survival outcomes [23]. The phase 3 COLOR study and RCTs such as ACOSOG Z6051 and AlaCaRT have shown comparable oncological results between laparoscopic and open surgeries with better recovery in laparoscopic cases [23].

With case numbers exceeding 40 annually, Lahore General Hospital now serves as a referral center for CRC, and plans are underway to develop a colorectal training program. Although patient follow-up remains challenging, we aim to conduct a future study on DFS, OS, and recurrence rates in our patients. We advocate for laparoscopic surgery as the preferred option for colorectal cancer when feasible and continue to develop cost-effective techniques for resource-limited settings [24].

CONCLUSION

Our study found no statistically significant differences between laparoscopic and open surgery groups in terms of operative time or length of hospital stay. However, the laparoscopic group exhibited lower rates of wound infections, anastomotic leaks, intra-abdominal sepsis, and re-operations, underscoring its advantages in perioperative outcomes.

ETHICS APPROVAL

Ethics approval was obtained from the Institutional Ethical Review Board (Ref. No. 690/SU-I/LGH). All procedures performed in studies involving human participants followed the ethical standards of the institution and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

AVAILABILITY OF DATA

Data is available from the corresponding author on a reasonable request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Declared none.

AUTHORS' CONTRIBUTION

Hassan Mohsin: Data collection compilation, analysis, and write-up.

Awais Amjad Malik: Data processing analysis and write-up.

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Anwar Zeb: Data processing analysis and write-up.

Aun Jamal: Data processing analysis and write-up.

Suleman Asif: Data analysis.

Rohma Akhtar: Data collection, compilation and analysis.

Talha Talib: Data collection, compilation, and analysis.

Imran Khokhar: Supervised analysis and final write-up.

Tausief Fatima: Supervised analysis and final write-up.

Muhammad Farooq Afzal: Supervision of analysis and final write-up.

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