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Short-term results of laparoscopic surgeries in rectal cancer: Single center experience

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ABSTRACT

Introduction: The laparoscopy technique is widely recognized for its numerous benefits in rectal surgery. This study assesses the short-term outcomes of 81 patients who underwent laparoscopic rectal resection.

Materials and Methods: The study included 81 patients who underwent laparoscopic rectal surgery at the General Surgery Clinic of Tokat Gaziosmanpaşa University Faculty of Medicine Hospital from January 2019 to January 2022. The evaluation focused on demographic data, surgical details, tumor TNM staging, and early postoperative complications.

Results: A total of 81 patients with malignant lesions underwent laparoscopic rectal surgery. The median age was 64.4 years (range: 35-86), with 54 patients (66.6%) being male and 27 (33.3%) female. The average BMI was 27.8±3.1 kg/m^2. Surgical procedures included abdominoperineal resection (APR) in 16 cases, anterior resection in 13, low anterior resection in 45, and intersphincteric resection in 7 cases. The average surgery duration was 264 minutes (range: 189-435). Stage T3 tumors were present in 47 patients (58%). Neoadjuvant chemoradiotherapy was administered to 68 patients (83.9%). The median number of lymph nodes retrieved was 12 (range: 4-43), with all patients achieving negative surgical margins. The postoperative hospital stay averaged 8.5 days (range: 4-48). Early postoperative complications occurred in 15 patients (18.5%), including wound infection in 9, anastomotic fistula in 3, anastomotic site bleeding in 1, parastomal hernia in 1, and perianal abscess in 1. Intraoperative complications occurred in 3 patients, involving ureter injury, iliac artery injury, and diaphragm injury in one patient each. There were no mortalities in this series of patients.

Conclusion: This study demonstrates that laparoscopic rectal surgery is a safe procedure, characterized by a low complication rate, short hospital stays, and effective surgical resection and lymph node dissection.

Keywords: Complications, Laparoscopy, Rectal Surgery

Introduction

Colorectal cancer ranks as the third most common malignant tumor worldwide.[1] Approximately one-third of all colorectal cancers are rectal cancers.[2] The treatment of curable, locally advanced rectal cancer (stage II-III) primarily involves surgical resection.[1] This method remains paramount in rectal cancer treatment for curative resection, staging, prognosis, and subsequent therapeutic decisions.[3]

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Recently, the use of minimally invasive surgery in oncological procedures has increased, attributed to benefits such as quicker recovery, earlier bowel function resumption, and shorter hospital stays, as evidenced in prior meta-analyses.[4] Minimally invasive surgery for colorectal cancer has now gained widespread acceptance globally and is extensively utilized in numerous centers.[5]

In 1986, Professor RJ Heald introduced Total Mesorectal Excision (TME) in a publication in The Lancet. This technique, which involved the excision of the posterior elements of the rectum and endopelvic fascia, resulted in an exceptionally low regional recurrence rate in 115 patients. TME is now considered the gold standard in rectal cancer treatment.[6] Over the past 20 years, surgical resection, primarily due to the introduction of TME, has seen significant improvements in outcomes. This technique reduces tumor recurrence by ensuring the complete removal of mesorectal tissues and preventing the radial spread of cancer cells.[7] A critical aspect of mesorectal excision is the initial stage, particularly the identification of the "sacred plane." In the era of TME, the precision and safety of mesorectal dissection and achieving clear resection margins are key pathological indicators of surgical quality. Indeed, a negative circumferential resection margin and complete TME correlate with lower rates of local and distal recurrence and improved long-term survival.[8]

Large randomized clinical trials have demonstrated that laparoscopic TME is associated with reduced blood loss, quicker bowel movement recovery, and shorter hospital stays compared to open surgery.[9] Although the routine application of laparoscopy remains a subject of debate and study, the COLOR II and COREAN studies, which compared laparoscopic and open approaches for rectal cancer resection, found that laparoscopic resection offered more favorable short-term outcomes than open resection, without significant differences in oncological results.[10]

In this study, we aim to evaluate the short-term outcomes of 81 patients who underwent laparoscopic rectal resection in our clinic.

Materials and Methods

This study included eighty-one patients who underwent laparoscopic rectal surgery at the General Surgery Clinic of Tokat Gaziosmanpaşa University Faculty of Medicine Hospital between January 2019 and January 2022. Patient files were retrospectively reviewed. Recorded data included demographic characteristics, diagnoses, tumor localization, diameters, stages, surgery duration, number of dissected lymph nodes, hospitalization duration, intensive care unit stay, time to initiation of liquid and normal food intake, comorbidities, stoma status, need for blood transfusion, and any developed complications.

Cases that began laparoscopically but were converted to open surgery for reasons other than complications (such as adhesions) were excluded from the study. Prior to surgery, all patients were discussed in the multidisciplinary tumor council. Informed consent, detailing the surgery and potential complications, was obtained from all patients. Preoperative preparations included administering liquid food one day before surgery, appropriate bowel preparation, and prophylaxis for deep vein thrombosis and antibiotics.

Pneumoperitoneum was established using carbon dioxide gas to maintain a pressure of approximately 12-14 mmHg. The number and placement of trocars varied based on the surgical procedure. In abdominoperineal resection (APR) cases, the specimen was removed anally. For patients with rectal tumors below the peritoneal reflection and those who received neoadjuvant radiotherapy, a protective loop ileostomy was created in the right lower quadrant of the abdomen. Depending on the patient's general condition and the safety of the anastomosis, liquid food was introduced on the 1st or 2nd postoperative day. Subsequently, the diet was gradually escalated based on the patient's gas and stool output. Patients were discharged upon full recovery, and any early complications were recorded.

Statistical Analyses

For the analysis of data in this study, the SPSS 20 software package was utilized. Descriptive statistics were presented as mean ± standard deviation. The Chi-square test was employed for the analysis of categorical variables.

Results

In this study, laparoscopic rectal surgery was performed on 81 patients with malignant lesions. The median age of the patients was 64.4 years, ranging from 35 to 86 years. Of these patients, 54 (66.6%) were male, and 27 (33.3%) were female. The average Body Mass Index (BMI) was 27.8±3.1 kg/m^2. The surgical procedures included abdominoperineal resection (APR) in 16 cases, anterior resection in 13 cases, low anterior resection in 45 cases, and intersphincteric resection in 7 cases. T3 stage was noted in 47 patients (58%). A majority of the patients, 68 (83.9%), received

neoadjuvant chemoradiotherapy. Early postoperative complications were observed in 15 patients (18.5%), including wound infection in 9 patients, anastomotic fistula in 3, anastomosis site bleeding in 1, parastomal hernia in 1, and perianal abscess in 1 patient. Intraoperative complications occurred in 3 patients, consisting of ureter injury in 1, iliac artery injury in 1, and diaphragm injury in 1. There were no mortalities reported in this series of patients (Table 1).

Table 1. Demographic data, surgery types, stage and complications

Age (mean, range)	64.4 (42-86)
	n (%)
Gender	
Famale	27 (33.3)
Male	54 (66.6)
Tumor stage	
1	6 (7.4)
2	25 (30.8)
3	47 (58)
4	3 (3.7)
Intraoperative complications	3 (3.7)
Ureter injury	1 (1.2)
Iliac artery injury	1 (1.2)
Diaphragmatic injury	1 (1.2)
Postoperative complications	15 (18.5)
Wound infection	9 (11.1)
Anastomotic leak	3 (3.7)
Bleeding	1 (1.2)
Parastomal hernia	1 (1.2)
Perianal abscess	1 (1.2)

The average surgery duration was 264 minutes, with a range of 189 to 435 minutes. Neoadjuvant chemoradiotherapy was administered to 68 (83.9%) patients. The median number of lymph nodes retrieved was 12, ranging from 4 to 43. All patients achieved negative surgical margins. The postoperative hospital stay averaged 8.5 days, with a range of 4 to 48 days (Table 2).

For patients who developed anastomotic fistula, complications were managed non-surgically due to the presence of protective loop ileostomy. In the patient who experienced anastomosis line bleeding on the first postoperative day, bleeding control was achieved through colonoscopy-guided intervention. The patient who developed an early parastomal hernia underwent hernia repair surgery. Regarding intraoperative complications, ureteral injury was primarily repaired with the involvement of the urology team. The patient with iliac artery injury underwent primary repair in collaboration with cardiovascular surgery. The diaphragm injury was laparoscopically repaired during the operation. Wound infections were managed with oral antibiotics and local treatments.

In our clinic, the protocol for closing protective ileostomies following rectal tumor surgery involves a waiting period of approximately six months after the completion of adjuvant treatment. Consistent with this practice, the protective loop ileostomies in our current patient series were closed on average six months post-treatment.

Discussion

Despite being a peripheral university hospital in a region with a low population rate, our clinic has successfully performed rectal cancer surgeries using minimally invasive laparoscopic techniques for approximately 15 years.

Table 2. Tumor and patient data

	n	Minimum	Maksimum	Mean
Tumor diameter (cm)	81	1	8	3.41
Tumor localization-anal verge distance (cm)	81	1	19	8.7
Surgery time (min)	81	210	420	264
Intensive care stay (days)	81	0	6	1.41
Hospital stay (days)	81	4	48	8.39
Lymph node	81	8	40	12
Pathological lymph node	81	0	34	5
Start eating liquid food	81	1	5	1.5
Start eating normal food	81	2	7	3.6

The outcomes of our laparoscopic rectal cancer surgeries align with findings reported in the literature.

The laparoscopic approach for colorectal cancer has gained increasing acceptance worldwide.[11] Since its introduction in 1991, a growing body of high-quality evidence indicates that laparoscopic treatment of colon carcinoma is on par with open techniques. Furthermore, evidence strongly suggests that both short- and long-term safety and quality outcomes in patients treated laparoscopically surpass those in patients undergoing open surgery.[12]

In our study, laparoscopic minimally invasive surgery was performed on all 81 patients, 77 of whom had T1-T3 stage rectal tumors. The ALaCarT Randomized Clinical Trial, a multicenter study involving 475 patients with T1-T3 rectal adenocarcinoma located less than 15 cm from the anal verge, compared laparoscopic (237 patients) and open (238 patients) rectal resection. This study found similar survival and complication rates between laparoscopic and open surgeries, with a higher risk of successful resection in patients with T1-T3 rectal tumors.[13] Various studies in the literature have reported that the complication rate of laparoscopic colorectal surgery ranges from 1.5% to 36%.[14] Among these complications, anastomotic leakage is the most significant. It is a dreaded postoperative complication in colorectal cancer surgery, with an incidence ranging from 2% to 4% in large series, and it adversely affects the patient's postoperative recovery, quality of life, and survival.[13] In our study, the rate of anastomotic leakage was 3.7%, which is consistent with the figures reported in the literature.

In laparoscopic low anterior resection, the use of prophylactic ileostomy is considered beneficial for preventing anastomotic leakage, especially in patients with a low level of anastomosis, those undergoing concurrent neoadjuvant radiotherapy, or those at high risk of anastomotic leakage due to vascular insufficiency.[15] However, the optimal timing for this procedure remains a subject of debate. Given the higher complication rate associated with surgeries performed during chemotherapy, most surgeons prefer to wait until the completion of adjuvant treatment.[16] In line with this approach, we performed protective loop ileostomies on all rectal cancer patients undergoing low resection and receiving neoadjuvant therapy. These stomas were closed approximately six months later, following the end of adjuvant treatment.

While laparoscopic colorectal surgery facilitates earlier recovery and hospital discharge, literature reports vary regarding the length of hospital stay. Stottmeier et al.[17] reported an average hospital stay of 5 days among 102 consecutive patients undergoing laparoscopic rectal cancer surgery. In a larger study, Rossive et al.[18] observed that in their series of 882 patients, the average hospital stay was 3 days, with 10% of patients being discharged within the first 48 hours. In contrast, the average hospital stay for our patients was 8.39 days. We believe that one of the factors contributing to this extended duration was the presence of major complications in five of our patients.

Surgical quality indicators such as Total Mesorectal Excision (TME) quality, negative circumferential resection margins (CRM), negative distal resection margins, and the number of lymph nodes (LNs) removed are crucial surrogate markers for local recurrence in rectal cancer.[19] The tumor-node-metastasis (TNM) classification system, widely used for staging colorectal cancer, categorizes patients into different prognostic groups based on primary tumor thickness, lymph node (LN) invasion, and distant metastasis.[20] A higher number of positive LNs and advanced stage are associated with a poorer prognosis. Consequently, the number of dissected LNs is vital in determining the pN category and the need for adjuvant chemotherapy.[21]

The American Joint Committee on Cancer (AJCC) guidelines recommend that at least 12 LNs should be collected and examined from the resected specimen for accurate staging.[22] However, achieving this benchmark can be challenging, as the number of LNs removed is influenced by various factors, including the patient's age, gender, comorbid diseases, tumor size and location, degree of differentiation, lymphoid reaction, and preoperative chemoradiotherapy (CRT).[23] Preoperative CRT, in particular, can impact LN retrieval in resected specimens. Studies have shown that the total number of LNs removed in patients undergoing preoperative CRT is often fewer than 12. This reduction is attributed to LN atrophy, fibrosis, and lymphocyte depletion caused by radiotherapy and/or chemotherapy. In a cohort study, more than 12 LNs were obtained in only 40.5% (107/264) of the patients.[24] In our study, the median number of lymph nodes obtained was 12.

Conclusion

This study demonstrates that laparoscopic rectal surgery can be considered a safe option, as evidenced by its low complication rate, short hospital stay, and the adequacy

of surgical resection and lymph node dissection. Laparoscopic colorectal surgery offers satisfactory outcomes compared to open surgery, fulfilling oncological principles while providing better cosmetic results, earlier recovery, and higher patient satisfaction.

As a result, we aimed to show that laparoscopic surgery for rectal cancer can be safely performed in a peripheral university hospital.

Considering our short-term results, we have obtained results comperable to the literature in terms of complication rates and parameters.

Disclosures

Ethichs Committee Approval: This study included eighty-one patients who underwent laparoscopic rectal surgery at the General Surgery Clinic of Tokat Gaziosmanpaşa University Faculty of Medicine Hospital between January 2019 and January 2022. Patient files were retrospectively reviewed.

Peer-review: Externally peer-reviewed.

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