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

Ali İhsan Sağlam,1 Murat Yıldırım,2 Bülent Koca,2 Namık Özkan2

1Department of General Surgery, Tokat Public Hospital, Tokat, Türkiye
2Department of General Surgery, Tokat Gaziosmanpaşa University Faculty of Medicine, Tokat, Türkiye

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/m². 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.[3] This method remains paramount in rectal cancer treatment for curative resection, staging, prognosis, and subsequent therapeutic decisions.[4]
Recently, the use of minimally invasive surgery in onco-
logical procedures has increased, attributed to benefits
such as quicker recovery, earlier bowel function resump-
tion, 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 tech-
nique, which involved the excision of the posterior ele-
ments 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 can-
cer treatment.\[6\] Over the past 20 years, surgical resection,
primarily due to the introduction of TME, has seen signif-
icant 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 “sa-
cred plane.” In the era of TME, the precision and safety of
mesorectal dissection and achieving clear resection mar-
gins are key pathological indicators of surgical quality.
Indeed, a negative circumferential resection margin and
complete TME correlate with lower rates of local and dis-
tal 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 com-
pared laparoscopic and open approaches for rectal cancer
resection, found that laparoscopic resection offered more
favorable short-term outcomes than open resection, with-
out significant differences in oncological results.\[10\]

In this study, we aim to evaluate the short-term outcomes
of 81 patients who underwent laparoscopic rectal resec-
tion 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. Pa-
tient files were retrospectively reviewed. Recorded data
included demographic characteristics, diagnoses, tumor
distribution, diameters, stages, surgery duration, num-
ber 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 multidisci-
plinary tumor council. Informed consent, detailing the
surgery and potential complications, was obtained from
all patients. Preoperative preparations included admin-
istering liquid food one day before surgery, appropriate
bowel preparation, and prophylaxis for deep vein throm-
bosis 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 intro-
duced 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 soft-
ware package was utilized. Descriptive statistics were pre-
sented 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/m². The surgical procedures included abdominoper-
ineal resection (APR) in 16 cases, anterior resection in 13
cases, low anterior resection in 45 cases, and intersphinct-
teric 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).

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

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

**Table 2. Tumor and patient data**

<table>
<thead>
<tr>
<th><strong>n</strong></th>
<th><strong>Minimum</strong></th>
<th><strong>Maximum</strong></th>
<th><strong>Mean</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor diameter (cm)</td>
<td>81</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Tumor localization- anal verge distance (cm)</td>
<td>81</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Surgery time (min)</td>
<td>81</td>
<td>210</td>
<td>420</td>
</tr>
<tr>
<td>Intensive care stay (days)</td>
<td>81</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>81</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>Lymph node</td>
<td>81</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Pathological lymph node</td>
<td>81</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>Start eating liquid food</td>
<td>81</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Start eating normal food</td>
<td>81</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>
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.[15] 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.[16] 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.[17] 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. Stottlemeier 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, co-morbid 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 comparable to the literature in terms of complication rates and parameters.

Disclosures

Ethics 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.

Conflict of Interest: None declared.

Funding: This research received no grant from any funding agency in the public, commercial or not-for-profit organisations.


References


23. Mekenkamp LJ, van Krieken JH, Marijnen CA, van de Velde CJ, Nagtegaal ID; Pathology Review Committee and the Co-operative Clinical Investigators. Lymph node retrieval in rectal cancer is dependent on many factors - the role of the tumor, the patient, the surgeon, the radiotherapist, and the pathologist. Am J Surg Pathol 2009;33:1547–53.