SHORT-TERM OUTCOMES OF LAPAROSCOPIC LOW ANTERIOR RESECTION SURGERY IN THE TREATMENT OF RECTAL CANCER

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ABSTRACT

Objectives: To evaluate the clinical, paraclinical features and early results of laparoscopic low anterior resection surgery in the treatment of rectal cancer at People's hospital 115. ***Methods:*** A retrospectively descriptive study on 51 patients who underwent laparoscopic low anterior resection surgery in the treatment of rectal cancer between June 2020 and June 2023 at People's hospital 115. ***Results:*** The mean age of the patients was 63 years. The average operative time was 241.84 ± 65.66 minutes. The average blood loss was 102.94 ± 32.26ml. The average hospitalization time was 16.18 ± 5.14 days. The rate of patients with early complications after surgery was 5.9%, there are 2 cases of anastomotic leaks (3,9%) and be treated with surgery. The average number of lymphadenectomy was 4.50 ± 4.26 nodes. Rate conversion to the open approach was 0%, there was no deaths. Classify initial results: Good 96 %, intermediate 4 %, bad 0 %. The operation time related to BMI, and the anastomotic leak related to the method cleansing of the colon. ***Conclusion:*** Laparoscopic low anterior using stapling devices was a safe, feasible, and effective surgery in the treatment of rectal cancer with a high success rate (96%), a low rate of complications (5,9%), quick recovery and short hospital stay.

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I. INTRODUCTION

Rectal cancer (RC) is one of the most commonly encountered pathologies with a high mortality rate worldwide. In Vietnam, RC accounted for ranks second among gastrointestinal cancers. Although the rectum is a digestive tract segment of about 15cm in length, RC was 1.5 times more prevalent than colon cancer and it took the fifth of all types of cancer with a mortality rate of 4.1% [1]. The current treatment for RC is multimodal, including surgery, chemotherapy, radiotherapy, and supportive care. Among them, surgery remains the primary treatment [2]. Laparoscopic anterior resection for RC has been demonstrated feasible by numerous authors worldwide, providing favorable outcomes in terms of aesthetics, postoperative pain reduction, and decreased genitourinary complications, while still adhering to oncological surgical principles [3]. Alongside the advance of minimally invasive surgical equipments, particularly laparoscopic staplers facilitating deeper rectal anastomosis with a lot of advantages. However, this is a technique that also has several challenges and is usually only performed at a tertiary surgical centers with good laparoscopic surgical equipments and instruments.

We aim to assess the safety and feasibility of the laparoscopic low anterior resection as well as the initial outcomes of this technique in the treatment of rectal cancer at People's hospital 115.

II. MATERIALS AND METHODS

1.1. Study design

We conducted a retrospective analysis in 51 patients who were diagnosed with rectal cancer and underwent laparoscopic low anterior resection with the use of a circular side stapling technique between June 2020 and June 202. The excluded criteria was incomplete medical records. The protocol of the procedure: Most patients underwent rectal cleansing with Fortrans or Fleet soda. We usually use four trocars entering to the abdominal cavity. The most common incision sites for specimen retrieval were the left pelvic, supra-pubic, and midline below the umbilicus. All patients had preservation of the autonomic nerves. All patients had a drain placed in front of the sacrum and adjacent to the anastomosis. Active colonic irrigation was performed in selective patients.

2.2. Data Collection and Analysis

We collected the patients' data from medical records including age, gender, symptoms, location of tumors, histopathology of tumors, surgical time, complications and hospital stay length. We utilized t-test and Mann-Whitney-U tests to evaluate the quantitative variables, and Chi-square or Fisher's exact for categorical variables. Data were analyzed by using SPSS 26.0 software (SPSS Inc, Chicago, USA). Significance was defined as $p < 0.05$

2.3. Ethical approval

The study was approved by the Ethics Committee of 115 People's Hospital under decision No. 2198/QĐ-BVND115 dated September 29, 2023.

III. RESULTS

51 patients underwent laparoscopic low anterior resection using circular stapling for the treatment of rectal cancer from June 2020 to June 2023, the following results were recorded:

2.4. Characteristics of the Study Population

The most common age groups were 51-60 and 61-70. The median age was 62.45 ± 11.89 (33-86) years. Comparing average ages between genders showed no statistically significant difference ($p = 0.343$). The male-to-female ratio was 2.64. The prevalence of overweight patients (BMI: 25 – 29.9) and obese patients (BMI ≥ 30) was 23.6%. Symptoms: bloody mucus stools were the chief complaint of most patients' hospital admissions (51%), and other common symptoms included abdominal pain and feeling discomfort when defecating. The majority experienced symptoms for ≤ 3 months (88.2%). Rectal examination revealed palpable masses in 25 patients (49.0%).

Characteristics of tumors: Most tumors were located 6 – 12 cm from the anal verge (96.1%). Preoperative biopsy results showed that the majority of tumors were adenocarcinoma (90.2%) and the majority of tumors were moderately differentiated glandular adenocarcinoma (98%) postoperatively (table 1,2.). Evaluation of the stage of rectal cancer postoperative showed the majority of patients were in stage III (45.1%) and IV (39.2%).

Table 1. ***Location of tumors relative to the anal verge***

Location (cm)	Number of Patients	Percentage %
>12cm	2	3,9
6-12cm	49	96,1
Total	51	100,0

Table 2. ***Preoperative histopathological characteristics***

Histopathological Type	Number of Patients	Percentage (%)
Other	1	2.0
Adenocarcinoma	46	90.2
Ulcerative adenocarcinoma	3	5.9
Mucinous adenocarcinoma	1	2.0
Total	51	100.0

Table 3. ***Histopathological Differentiation of Tumor Cells***

Postoperative Result	Number of Patients	Percentage%
Poorly differentiated	1	2.0
Moderately differentiated	50	98.0
Total	51	100.0

2.5.Short-term surgical results

The average surgical duration was 241.84 ± 65.66 minutes (120 – 420 minutes). The mean blood loss was 102.94 ± 32.26 ml. The average number of lymph nodes harvested was 4.50 ± 4.26. The mean hospital stay was 16.18 ± 5.14 days (8 – 30 days). The cutting distance below and above the tumor (the upper margin distance was 9.91 ± 4.66 cm and the low margin distance was 3.50 ± 1.49cm) (table 4), pathology assessed that no malignant cells were left. The average number of lymphadenectomy was 4.50 ± 4.26 nodes. There were no cases converted to open surgery. No postoperative mortality was observed. The rate of early postoperative complications was 5.9%. The majority of patients achieved good surgical outcomes (96%), with no patients experiencing poor surgical outcomes.

Table 4. ***Distance of Lower and Upper Tumor Margins***

Margin Distance (cm)	Minimum	Maximum	Mean	Standard Deviation
Upper margin	2.0	20.0	9.91	4.66
Lower margin	1.0	6.0	3.50	1.49

2.6. Investigation of Factors Related to Treatment Outcomes

The relationship between surgical duration and BMI showed statistically significant differences (p = 0.004), with patients with BMI > 23 having longer surgical durations compared to those with BMI ≤ 23 (table 5)

Relationship between Anastomotic Leakage Complications and Bowel Cleansing Method: The rate of anastomotic leakage complications in the group of patients undergoing bowel cleansing with enema was significantly higher than in the group of patients using oral laxatives for bowel cleansing (p = 0.00).

Table 5. ***Relationship between Surgical Duration and BMI***

BMI (kg/m2)	Moderate Surgical Duration (minutes)	Standard Deviation	p-value
≤ 23	214.33	58.909	0.004
>23	266.30	62.459	

IV. DISCUSSION

Among the 51 patients in our study group, the average age was 62.45 ± 11.89; the youngest patient was 33 years old, and the oldest was 86 years old. Patients over 40 years old accounted for 96.1%, with the peak occurring in the age groups of 51–60, 61–70, and 71–80. There were 37 male patients (72.5%) and 14 female patients (27.5%), with a male-to-female ratio of 2.64. The age difference between the two genders was not statistically significant ($p > 0.05$). Our findings regarding age and gender in this study are consistent with recent domestic studies [4]. The proportion of patients under 40 years old in this study was 3.9%, lower than the 5.4% reported by Tuan Le Anh [5].

Our results showed that 88.2% of patients were admitted for surgical treatment within ≤3 months of experiencing their first symptoms. Similar to Tuan Le Anh , the average time to diagnosis is about 4.5 ± 3.2 months, with the majority of patients being diagnosed in less than 6 months, accounting for 86.5% [5].

In our study, the presence of rectal bleeding symptoms was a significant indicator, with most patients (49.0%) paying attention to these symptoms and it was the main reason for most patients to require the medical examination (51.0%). These nonspecific symptoms might be overlooked if not considered, and since most patients were not concerned about these manifestations, the majority did not seek medical attention. Common functional symptoms in order of occurrence were rectal bleeding (58.8%), abdominal pain (60.8%), bloody stools (33.3%), constipation (17.6%), diarrhea (13.7%), anal pain (5.9%), tenesmus, and other symptoms (3.9%). Abdominal pain and anal pain are signs of advanced-stage disease when the tumor is large and invasive. Compared to the clinical table of previous domestic studies, the authors also made similar observations [5].

We noted that 45 patients (88.2%) had simultaneous biopsy results during endoscopy. Although colonoscopy is the most sensitive and specific method for diagnosing rectal cancer, with up to a 14% error rate reported, only 36/51 patients (70.6%) underwent low anterior resection, which is lower than in the study of Ho Long Hien (2016) with 97.7% [7]. The percentage of patients undergoing preoperative abdominal CT scans in our study was much lower at 21.6% than the results of Thang Hoang Manh (2022) where 100% of patients underwent preoperative abdominal CT scans [8].

Among the 51 patients, adenocarcinoma accounted for 90.2%, ulcerated adenocarcinoma 5.9%, and infiltrating adenocarcinoma 2%. This result is similar to Tuan Le Anh's study, with adenocarcinoma accounting for the majority at 89.2% and ulcerated adenocarcinoma at 10.8% [5]. The majority of tumors were located 6–12 cm from the anal verge (96.1%), and rectal palpation identified the tumor in our study in 27.5% of cases. Moderately differentiated adenocarcinoma accounted for the majority (98%), consistent with other studies [5]. Stages T3 and T4 accounted for 94.2%, lymph node metastasis was 62.7%, and distant metastasis was 0%, indicating that most patients in this study presented with advanced disease.

In our study, patients over 70 years old accounted for 19.6%. In studies on the feasibility and safety of laparoscopic rectal resection, Marks J.H. et al. reported that patients over 70 years old were associated with surgical complications and perioperative

mortality when undergoing open rectal resection. When comparing the two age groups (over 70 and under or equal to 70) regarding length of hospital stay, there was no statistically significant difference ($p > 0.05$). We found that elderly patients (over 70 years old) could tolerate low anterior resection with machine anastomosis well without increasing the rate of surgical complications.

Obesity can be a challenge for surgeons performing rectal cancer surgery. Nowadays, obesity has become a public health issue, with the prevalence of obesity (BMI ≥ 30 kg/m2) in France being 10.7%, and in the US, it increased from 13.5% to 20.3% over 10 years. Abdominal surgery in obese patients poses technical challenges due to difficulties in exposure in the abdominal and pelvic regions. Obesity is also listed as a risk factor for surgical site infection, non-healing wounds, incisional hernias, and increased rates of anastomotic leakage. In our study, the correlation between complications and BMI showed no statistically significant difference between the two groups of patients with BMI ≤ 23 and BMI > 23 ($p > 0.05$). However, when comparing the average surgery time between these two BMI groups, we found that the surgery time in the BMI > 23 group was longer than in the BMI ≤ 23 group, which was statistically significant ($p = 0.004$).

Typically, in laparoscopic rectal cancer surgery, the application of mechanical anastomosis is divided into three types: Complete laparoscopic surgery, supportive laparoscopic surgery, and laparoscopic surgery with hand assistance. The choice of type depends on the surgeon, even supportive laparoscopic surgery still requires minimal abdominal opening to remove specimens and perform a portion of the open surgery. In our study, the majority of surgeries belonged to the supportive laparoscopic surgery type, with specimens primarily taken through an open midline incision (59.9%), midline and left iliac fossa incision (19.6%).

The operative time of minimally invasive colorectal surgery is usually longer than open surgery, but this is offset by faster postoperative recovery. The average operative time for the laparoscopic surgery, as reported by Poon J.T.C. and colleagues, ranges from 180 to 260 minutes. In two randomized comparative studies on minimally invasive colorectal surgery with similar outcomes, Hiep Tran Dinh (2022) reported an average laparoscopic surgery operative time of 209.9 ± 43.8 minutes. The operative time of minimally invasive colorectal surgery is closely related to the surgeon's experience and some pathological characteristics such as tumor size and disease stage. In our study, the average operative time was 241.84 ± 65.66 minutes, with the shortest being 120 minutes and the longest being 420 minutes. Most studies, both domestic and international, show that the average operative time for laparoscopic surgery is between 200 and 480 minutes. Operative time plays an important role in postoperative outcomes. Cheng H (2018) synthesized literature showing that prolonged surgery in colorectal surgery increases complications such as wound infection, bleeding, anastomotic leakage, and ileus. In our study, the survey related to operative time and factors showed a significant correlation with BMI.

Blood loss in laparoscopic surgery ranged from 30 ml to 250 ml in reports, and all comparative and randomized studies reported a reduction in blood loss with laparoscopic surgery. In our study, the average duration of

postoperative analgesic use was 8.25 days, with non-addictive analgesics used intravenously or orally combined with addictive analgesics for the first 3-4 days and non-addictive oral analgesics thereafter. The average postoperative hospital stay was 7.90 ± 1.89 days, ranging from 8 to 30 days. Compared to Long Vo Tan 's study, where the postoperative hospital stay for patients undergoing laparoscopic colorectal resection was 8 ± 2 days, our results were similar. In addition to surgical complications and mortality, conversion to open surgery is also considered a criterion for evaluating the feasibility of minimally invasive colorectal surgery. Our results from 51 cases of low anterior resection with laparoscopic surgery showed no cases of conversion to open surgery or mortality.

In our study, the complication rate was 5.9%, with an anastomotic leakage rate of 3.9%. Poon et al. reported a complication rate of 30.2%, with an anastomotic leakage rate of 4.8%. Previous studies by this author have shown that anastomotic leakage increases the risk of recurrence after surgery, with male patients and those undergoing neoadjuvant chemoradiotherapy being risk factors for anastomotic leakage. The reported incidence of anastomotic leakage varies from 1 to 17%, with a majority around 10%, and the high incidence of this complication is a concern in minimally invasive colorectal surgery. According to Alverdy (2021), the incidence of rectal anastomotic leakage ranges from 6% to 30% depending on risk factors and different definitions of colorectal anastomotic leakage. Correlation analysis of anastomotic leakage with age, gender, and BMI in this study showed no statistical significance ($p > 0.05$). Similarly, correlation analysis of anastomotic leakage with factors such as disease stage, technique, and diversion stoma creation showed no statistical significance ($p > 0.05$). The incidence of anastomotic leakage in the group of patients undergoing high rectal stump cleansing was significantly higher than in the group using only bowel preparation ($p < 0.05$). Studies analyzing the role of proactive diversion stoma concluded that proactive diversion stoma does not reduce the incidence of anastomotic leakage but only reduces the severity clinically and the rate of reoperation for anastomotic leakage. In our study, the rate of proactive diversion stoma creation was 25.5%. This result is lower than Kien Quach Van 's study (2019) [14] at 48.9%.

In this study, we followed up and recorded no intraoperative or postoperative in-hospital deaths. Surgical outcomes assessment: Most patients had good surgical outcomes (96%), with the remaining having fair outcomes (4%), and no poor outcomes were recorded. Our results are comparable to those of authors like Hung Mai Duc [15] (Good 89.9%, fair 10.1%). Operative time was related to BMI: The average operative time for patients with BMI > 23 was longer than for those with BMI ≤ 23 by about 50 minutes (266.30 ± 62.459 minutes vs. 214.33 ± 58.909 minutes), which was statistically significant ($p = 0.004$). This result is consistent with other studies by authors such as Kien Quach Van [14] and Hung Mai Duc [15]. Anastomotic leakage was associated with bowel preparation ($p = 0.0000005$), and our results were consistent with Hung Mai Duc 's study [15].

V. CONCLUSION

Complete laparoscopic rectal resection with anastomosis is a safe, feasible, and

effective surgery in the treatment of rectal cancer, with high success rates and low early postoperative complication rates. Early results demonstrate the advantages of laparoscopic surgery over open surgery. Long-term outcomes require further studies with larger sample sizes and longer follow-up periods.

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