

PROCEEDINGS

LAPAROSCOPIC TOTAL MESORECTAL EXCISION AFTER 450 CASES

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ABSTRACT

INTRODUCTION: The laparoscopic technique is widely adopted in the surgical treatment of colorectal carcinoma. Thus, patients benefit from the usual short-term advantages of minimally invasive surgery over classical open surgery, with comparable long-term oncological results.

AIM: The study presents the experience of the Clinic for General and Endoscopic Surgery of St. Ivan Rilski University Hospital in Sofia, with laparoscopic radical rectal resections for rectal carcinoma over a 14-year period and more than 450 completed laparoscopic interventions.

MATERIALS AND METHODS: From January 2009 until December 2022, 454 laparoscopic curative rectal resections for rectal carcinoma were performed. Only patients with cT1–cT3 tumors, without distant metastases, were included in the study.

RESULTS: The studied group included 301 (66.3%) men and 153 (33.7%) women, aged between 34 and 86 years, with an average BMI of 26 kg/m² (21–32 kg/m²). According to the localization of the tumor in the rectum, the patients were divided as follows: proximal 1/3 (10–15 cm)—148 (32.6%); middle 1/3 (5–10 cm)—203 (44.7%), and distal 1/3 (<5 cm)—103 (22.7%). A total of 277 (61%) patients underwent neoadjuvant chemoradiation. Eighty-five (18.7%) of the operated were in the 1st stage, 159 (35%)—in the 2nd stage, 219 (46.3%)—in the 3rd stage. Conversion was necessary in 23 cases (5.1%). The average duration of the operative intervention was 180 minutes (120–420 min), and the blood loss was 80 mL (20–800 mL). Intestinal passage was restored on average on the 2nd postoperative day (1–7 days). The average postoperative hospital stay was 5 days (3–17 days). Complications occurred in 35 patients (7.7%). The operated patients were followed up for an average of 36 months (3–60). The overall recurrence rate was 15.6%.

CONCLUSION: Laparoscopic rectal resections for carcinoma are safe interventions, characterized by less postoperative pain, less blood loss, faster bowel recovery, shorter hospital stay, and excellent cosmetic results with comparable to open surgery oncological outcomes.

Keywords: *laparoscopy, rectal carcinoma, TME*

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INTRODUCTION

The laparoscopic technique has been implemented widely in the surgical treatment of colorectal carcinoma. This allows patients to benefit from the usual advantages of minimally invasive surgery over classic open surgery, with comparable long-term outcomes in terms of cancer treatment. While the advantages of laparoscopy in the surgical treatment of colon carcinomas are unquestionably proven, laparo-



scopic rectal resections for neoplasms are still debatable regarding the ability of laparoscopy to achieve adequate oncological results. These contradictions are compounded by the technical difficulties that arise from the limited spaces in the small pelvis, the limitations of endoscopic staplers, the need to preserve the autonomic innervation, etc. In an effort to overcome technical limitations and improve oncological outcomes, transanal endoscopic and total mesorectal excision have been introduced into practice in recent years. The robotic approach for minimally invasive surgical treatment of rectal carcinoma is also becoming more and more widespread.

AIM

The study presents the experience of the Clinic of General and Endoscopic Surgery of St. Ivan Rilski University Hospital in Sofia with radical laparoscopic rectal resections for rectal carcinoma over a 14-year period and more than 450 completed laparoscopic cases.

MATERIAL AND METHODS

For the period January 2009–December 2022, 454 laparoscopic rectal resections for rectal carcinoma were performed. All the interventions were done with curative intention. Only patients with cT1–cT3 rectal tumors located within 15 cm from the anal verge and without distant metastases were included. A standard preoperative staging protocol was followed, including history and clinical examination, complete blood count, biochemistry and coagulation; CEA and CA19-9 tumor markers; colonoscopy with biopsy and histological examination; chest x-ray; ultrasound of abdominal organs; computed tomography (CT) of the abdomen and pelvis; magnetic resonance imaging (MRI) of pelvis or endoluminal transanal ultrasound. All patients with cT3 and/or cN+ tumors underwent neoadjuvant chemoradiation. In irradiated patients, the surgical intervention was performed no earlier than 8 weeks after the end of the therapy. We used standard operating technique with 4 trocars and a 30-degree scope. In all cases, we ligated the inferior mesenteric artery at 2 cm from the aorta, immediately before the branch of the left colic artery. We clipped and cut the inferior mesenteric vein, and ligated and cut below the lower edge of the pancreas. We mobilized the left colic flex-

ure selectively. The specimen was retrieved through a small Pfannenstiel incision or through the perineal wound. In anterior resections, we restored the integrity of the bowel continuity using the double stapling technique as described by Knight and Griffen (1). A diverting loop ileostomy was created for 1 month. Two drain tubes were placed in the pelvis. All patients were prospectively followed up for demographics, body weight and height, preoperative staging, operative time, intraoperative complications, and intraoperative blood loss, defined as the amount of fluid aspirated during the intervention minus the amount of irrigation fluid administered. In the postoperative period, the duration of hospital stay, the rate and type of postoperative complications, the hospital readmission rate within 30 days after discharge, hospital mortality, the histological characteristics of the tumor, the number of lymph nodes retrieved, the pathological stage of the tumor according to the 10th revision of the TNM classification (2), and the positive resection margins rate were noted.

The patients operated on were followed up according to WHO recommendations every three months for the first two years, then twice a year until the 5th year after surgery. The follow-up included clinical examination, examination of hematological and biochemical parameters, including CEA, x-ray of lungs, ultrasound of abdominal organs at each examination, and lower endoscopy and CT of abdomen and small pelvis once a year.

RESULTS

The study group included 301 (66.3%) male and 153 (33.7%) female patient, between 34 and 86 years of age, with an average BMI of 26 kg/m² (21–32 kg/m²). According to the localization of the tumor in the rectum, the patients were divided as follows: proximal 1/3 (10–15 cm)—148 (32.6%); middle 1/3 (5–10 cm)—203 (44.7%), and distal 1/3 (<5 cm)—103 (22.7%). A total of 277 (61%) patients had undergone neoadjuvant chemoradiation. Eighty-five (18.7%) of the operated on fell into stage I, 159 (35%) were stage II, and 219 (46.3%) were stage III. Conversion to formal laparotomy was necessary in 23 cases (5.1%). In all cases, a lower median laparotomy was sufficient. The reason for conversion in 21 patients was a tumor that was too large, not allowing its manipulation in the bony pelvis, and in two patients—uncontrollable

bleeding from the presacral venous plexus. The average duration of the operative intervention was 180 minutes (120–420 min), and the blood loss was 80 mL (20–800 mL). The bowel movement was restored on the 2nd postoperative day on average (1–7 days).

The average postoperative hospital stay was 6 days (5–17 days). Complications occurred in 35 patients (7.7%). In five patients it constituted in bleeding from various sources, requiring operative hemostasis; in 23—colorectal anastomosis leak, treated conservatively; in 5—postoperative intestinal obstruction. Perineal wound infection occurred in three patients with abdominoperineal resection (APR).

In 4 patients, microscopically positive resection lines (R1) were found. The patients operated on were followed up for an average of 36 months (3–60). The overall recurrence rate was 7.7%. Local recurrence was found in thirteen patients (2.9%)—in four after APR and in nine after low anterior resection. Distant metastases were verified in 30 patients (6.73%), five of whom also had local recurrence. All patients with relapse of the disease were in the third pathological stage at the time of the operative intervention.

DISCUSSION

Operative outcomes for this type of carcinoma have improved significantly over the past two decades due to the introduction of total mesorectal excision (TME) (3). Although the conclusions of various reports indicate that laparoscopic TME is safe and feasible, studies with sufficient numbers of patients, allowing the clinical validation of minimally invasive methods, are still few. Furthermore, published results from completed prospective randomized trials are somewhat contradictory regarding the ability to demonstrate non-inferiority of laparoscopic versus open operations. Some of them prove the superiority of classical open over laparoscopic surgery. Others report relatively equivalent results between minimally invasive and open surgery regarding procedural safety and postoperative survival. They also report a certain advantage of laparoscopy in terms of morbidity.

Two large contemporary multicenter studies (4,5)—ACOSOG and AlaCaRT, failed to demonstrate the noninferiority of laparoscopic approach compared to the open methods in terms of pathological outcomes. However, the oncological results

after a two-year follow-up of the operated patients with T1–T3 tumors did not differ in the two studied groups (6).

According to other large studies, the long-term results of patients with rectal carcinoma are very similar after open and laparoscopic surgery and support the standard application of minimally invasive approach (7). In selected patients with rectal carcinoma operated on by experienced surgeons, laparoscopic surgery provides safety, clear resection margins, and completeness of resection comparable to the open procedure. At the same time, the recovery period is shorter (8). Laparoscopic surgery for rectal carcinoma is associated with a shorter hospital stay, while the resected specimen is oncologically comparable to that obtained in open surgery (9). Unplanned conversions from laparoscopic to open surgery are an important indicator of the practical feasibility of the procedure. An incidence of 30% and more has been reported in earlier clinical trials, where the role of laparoscopic surgery in rectal carcinoma is still being questioned. No significant difference was found according to this criterion between single- and multicenter studies (10). However, there is a tendency to decrease these values in more modern series, which is explained by the accumulation of experience in the field of minimally invasive surgery. The COLOR II trial reported 114 (16%) conversions out of 695 laparoscopic operations. In the laparoscopic group included in COREAN, conversions were 2 (1%) out of 170. The data are comparable to the results of other current studies and far more acceptable than the initial ones. The first clinical results of the COLOR II trial showed that laparoscopic access was associated with reduced blood loss (200 mL (184–300 mL) vs. 400 mL (200–700 mL); $p < 0.0001$), longer operative time (240 min (180–300 min) vs. 188 min (150–240 min); $p < 0.0001$), less use of epidural analgesia, earlier restoration of bowel passage (2.0 days (1.0–3.0 days) vs. 3.0 days (2.0–4.0 days); $p < 0.0001$), and reduction of hospital stay by an average of one day. These data are comparable with other clinical trials including COREAN, COLOR, Braga et al., Gonzalez et al., Lujan et al. In the COLOR study, laparoscopic operations were associated with a reduction in operative trauma compared to the open group. Considering pelvic abscesses as clinical evidence of anastomotic insufficiency, there was a higher complication

rate compared to the groups in which this criterion did not appear (13% in the laparoscopic and 10% in the open group). These figures are in relatively the same range as in the CLASSIC trial (7% and 10%, respectively). A lower incidence was reported by Kang et al. and Morino et al.

COLOR II and CLASSIC trials reported a non-significant difference in the local recurrence rate, while according to Araujo et al. and Zhou et al., the results favor laparoscopic surgery. In general, there is no statistically significant difference in this criterion between the two groups, neither for distant nor for local recurrences (10). The CLASSIC trial and Zhou et al. did not show a significant difference in overall and carcinoma-related mortality. Three-year disease-free survival was comparable in the open and laparoscopic groups (COLOR, CLASSIC, Park et al.), as well as in patients with locally advanced disease who underwent neoadjuvant radiochemotherapy included in the COREAN trial. Short-term results from COREAN, however, showed a better quality of life in the first three months after laparoscopic surgery. Maintaining urinary and sexual function are also important aspects of quality of life. They depend on the preservation of the pelvic autonomic innervation during surgery for rectal carcinoma. CLASSIC, Braga et al., and Quah et al. showed no statistically significant difference in the frequency of urinary dysfunction. In the COREAN results, this difference was in favor of laparoscopic surgery in the first three months after surgery, but it was not maintained in the long term. According to the CLASSIC trial and Quah et al., there was also no statistically significant difference between the two groups in terms of sexual dysfunction in both men and women. The hospital stay for the COLOR II and COREAN trials was relatively the same and several days shorter than for the CLASSIC trial. Accelerated recovery after surgery (ERAS) protocols are not routinely implemented. Their effectiveness in patients with rectal carcinoma is subject to further study.

The data from COLOR III—an international multicenter randomized clinical trial comparing transanal TME (TaTME) with laparoscopic TME in intermediate and low-grade rectal carcinoma with the main focus being the involvement of the circumferential resection line, are expected with great interest. At the moment, it is believed that the difference

in this indicator is in favor of TaTME. Therefore, it is hypothesized that TaTME will prove to be the superior technique in terms of oncological outcome in intermediate and low rectal carcinomas (11).

When comparing the early results after laparoscopic and open surgery for tumors in the lower third of the rectum (LASRE trial), no significant differences were found in terms of achieving clean resection margins (12). The laparoscopic technique allows for more frequent sphincter-preserving intervention.

In the recent years, robotic minimally invasive surgery has increasingly entered the surgical treatment of rectal carcinoma. The results are encouraging, with available comparative studies favoring robotic surgery over classic laparoscopic surgery in terms of postoperative recovery, hospital stay, and postoperative oncological outcomes. The advantages of robotic platforms are particularly noticeable in tumors in the middle and lower third of the rectum, allowing the achievement of sphincter preservation in a greater number of cases (13). Despite excellent results, the high costs of robotic operations hinder the wide implementation of the technique in the surgical treatment of rectal carcinoma.

CONCLUSION

Laparoscopic rectal resections for carcinoma are safe interventions characterized by less postoperative pain, less blood loss, faster bowel recovery, shorter hospital stay, and excellent cosmetic effect, with oncological outcomes comparable to open surgery.

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