

PROCEEDINGS

LAPAROSCOPIC VERSUS ROBOTIC RECTAL RESECTIONS. COMPARATIVE ANALYSIS OF PERIOPERATIVE RESULTS

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ABSTRACT

INTRODUCTION: Globally, the minimally invasive approach in colorectal surgery is accepted as more effective compared to open surgery in terms of better perioperative results with comparable oncological long-term ones. Laparoscopy in low rectal resection is challenging, even for experienced surgeons and is related to a high conversion rate. Robotic surgery has advantages in rotations of the instruments, 3D image, ergonomic position of the surgeon, precise movements, and intelligent systems for electrosurgery. The advantages are more visible in dissections in narrow spaces, such as the pelvis. On the other hand, the operating theater price of robotic surgery is higher compared to conventional laparoscopy. There are still limitations of both techniques in cases of advanced rectal cancer, obesity patients, and previous major surgery. Collected data in the literature show lower conversion rates in robotic rectal resections.

AIM: The aim of this article is to conduct a comparative analysis of the perioperative results of a personal series of patients with laparoscopic and robotic rectal resections. We aim to assess the levels of perioperative complications and conversion rate.

MATERIALS AND METHODS: This study is based on an individual series of 76 minimally invasive rectal resections divided into two subgroups—46 laparoscopic resections and 30 robotic ones. An assessment is performed on perioperative results using all clinical methods

RESULTS: There were no differences between the patients according to gender and age distribution. The male to female ratio was approximately 2:3. In the group of laparoscopic operations, 21 were high anterior rectal resections. In the group of robotics, the number of high resections was only 4. The conversion rate for the laparoscopic group was 23.9% compared with 12.9% for the robotic one. The mortality rate was 0% for both techniques. The perioperative morbidity rate was 11.4% for the laparoscopic group and 19.2% for the robotic one. The median operative time the laparoscopic group vs. the robotic group was 144.7 min vs. 194.7 min; the median hospital stay—6.0 vs. 6.2 days; the median blood loss—34.7 vs. 43.9 mL; the extracted lymph nodes—12.2 vs. 8.8, respectively.

CONCLUSION: Robotic rectal resections have a lower conversion rate. It seems to have higher morbidity rate with the other perioperative results being comparable to conventional laparoscopy. The prevalence of low rectal resections in the group of robotic operations might explain this fact.

Keywords: robotic resection, rectal, laparoscopic, conversion

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INTRODUCTION

Globally, the minimally invasive approach in colorectal surgery has been widely adopted, especially in recent years, with numerous studies proving the effectiveness of the technique in terms of perioperative outcomes - shorter hospital stay, faster recovery, lower complication rates, and equivalent to open surgery long-term oncological outcomes. However, the application of laparoscopy in rectal resections is challenging, even for experienced surgeons, as evidenced by the associated high conversion rates.

Robotic surgery offers advantages over conventional laparoscopy in terms of robotic instrument mobility, three-dimensional visualization, surgeon ergonomic posture, precise movements, and intelligent electrosurgery systems. The advantages of the approach are especially pronounced when working in tight spaces, such as the pelvis. Accumulated data in the literature demonstrate the effectiveness of the approach compared to conventional laparoscopy especially in terms of conversions. However, the cost of robotic surgery remains high. The constant development of robotic consoles and surgical instruments make the methodology promising and provides opportunities for increasingly precise and safe surgical dissection in the treatment of rectal cancer. However, locally advanced cases, massive peritoneal adhesions, obesity and other circumstances limiting the possibilities of conventional laparoscopy and robotic surgery in the treatment of rectal cancer remain a challenge.

AIM

The aim of this article is to perform a comparative analysis of the perioperative results in an individual series of patients with laparoscopic and robotic rectal resections, evaluating the effectiveness of both methods, the rates of perioperative complications and conversions.

MATERIALS AND METHODS

The present study is based on an individual series of 76 minimally invasive rectal resections performed, which were divided into two groups—46 laparoscopic resections and 30 robotic rectal resections. A comparative analysis of the perioperative results was conducted, using all methods of clinical assessment. The study is part of a larger individ-

ual study on the effectiveness and safety of the minimally invasive approach compared to the open one in colorectal surgery.

RESULTS

Inclusion criteria in the present study were elective rectal surgery for rectal cancer with localization in the upper, middle, and lower rectum. Excluded from the study were patients with evidence of advanced intestinal obstruction, palliative colostomies, complicated with local or diffuse peritonitis cases. Neoadjuvant therapy was conducted in all patients with localization of rectal cancer in the region of the distal and middle rectum. An analysis of the perioperative results was done according to the following criteria: sex, age, operative time, perioperative blood loss, type of operative intervention, perioperative complications, hospital stay, rates of conversions, indication for conversion, and number of extracted lymph nodes.

Group of laparoscopic rectal resections

The group included 46 patients with conventional multiport laparoscopic approach. In 35, rectal resection was completed laparoscopically. Eleven patients were converted during the operation. The group conversion rate was 23.9%. The analysis of the patients in the group by gender showed a predominance of men (33, or 71.7%) to women (13, or 28.2%). The average age of the patients was 68.5 years (39–93 years). The types of operations performed laparoscopically are shown in Table. 1

Table 1. Types of laparoscopic resections.

Type of Laparoscopic Procedure	Number
High anterior resection with TSME*	21
Low anterior resection without ileostomy	5
Low anterior resection with ileostomy	5
Miles procedure	4

*TSME—*tumor-specific mesorectal excision*

No patients died in the perioperative period in the group. The perioperative mortality rate was 0%.

In the perioperative period, complications were registered in 4 patients. The perioperative morbidity was 11.4%. The registered perioperative complications were the following: two cases of postoperative

relative intestinal obstruction, treated conservatively, and 2 cases of anastomotic leakage. The average operative time in the group was 144.7 minutes (60–345 min). The average operative blood loss was 34.7 mL. The average number of excised lymph nodes in the pathological specimen was 12.2. The average hospital stay was 6.0 days.

Conversions during laparoscopic surgery were performed in 11 patients. According to the indications, the most common ones were locally advanced T4 carcinoma, postoperative adhesions, and adhesions the pelvis with obliteration of the dissection plans due to neoadjuvant radiation.

Robotic rectal resection group. The group included 30 patients operated on with da Vinci SI and da Vinci XI robotic consoles. In 26 patients, the operation was performed entirely robotically. Four patients were converted. The conversion rate was 12.9%. The analysis by gender and age showed the following: 23 men (76.6%) and 7 women (23.3%) were treated. The average age in the group was 66.5 years (44–83 years). The type of robotic resections performed is shown in Table. 2.

Table 2. Types of robotic resections.

Type of Robotic Resection	Number
Low anterior resection with ileostomy	12
High anterior resection with TSME	4
Abdominal transanal resection with ileostomy	3
Miles procedure	7

No patients died in the robotic resection group. The perioperative mortality was 0%.

Complications in the perioperative period were registered in 5 patients. The perioperative morbidity was 19.2%. The following complications were recorded: two patients with postoperative ileus necessitating reoperation, one patient with urethral lesion, one patient with hemorrhage from the anastomosis, and one anastomotic leakage treated conservatively. The average operative time in the group was 194.7 min (120–340 min). The average blood loss was 43.9 mL. The median hospital stay was 6.2 days. The median number of extracted lymph nodes in the pathologi-

cal specimen was 8.86. All conversions in the group were performed for large or locally advanced T4 rectal cancer.

DISCUSSION

A careful examination of the data shows that in the group of robotic operations there is a predominance of patients with interventions performed mainly for distal rectal cancer, and for laparoscopies—patients with more proximal localizations. This is related to the fact that the most difficult and complex laparoscopic colorectal surgery is the low anterior resection, which has become a routine one recently in the surgeons' practice (1). Relatively soon after the standardized laparoscopic approach in low rectal localizations, we started using the Da Vinci robotic console, whose advantages are precisely in this area—the articulating arms, the three-dimensional image in the operative field, the length of the instruments, and the devices for electrosurgery (2,3). In the present study, there were slightly higher rates of perioperative complications, longer operative time, and a lower total number of extracted lymph nodes in the robotic surgery group, but without statistical significance, with equivalent hospital stay, intraoperative blood loss, and significantly lower conversion rates. According to some earlier reports in the literature, there is no difference in perioperative outcomes between laparoscopic and robotic rectal surgery (4,5), and it should be clarified that they are based on the use of older surgical robotic consoles with more limited capabilities. Despite the slightly lower number of lymph nodes extracted in robotic surgery, there was no evidence of positive distal or circumferential resection lines in either group. Equivalent oncological outcomes were reported in the multicenter ROLLARR trial (6) in the absence of a significant difference in perioperative complications. Multiple studies have reported no difference between robotic and laparoscopic rectal resections in perioperative and oncologic outcomes, except for significantly lower conversion rates in the robotic surgery groups, longer operative time, and higher cost (6–9). In the present study, the data confirm that of the literature sources with the exception of the slightly higher rates of perioperative complications, which are probably due to the relatively small experience.

CONCLUSION

Robotic rectal resections are associated with lower conversion rates with equivalent oncological safety, non-significantly higher rates of perioperative complications compared with laparoscopic ones, and longer operative time at a higher cost of treatment.

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