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PROCEEDINGS

ROBOTIC COLORECTAL SURGERY INITIAL RESULTS AFTER 183 CASES

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ABSTRACT

INTRODUCTION: Colorectal cancer is the third most common malignancy (6.1%) worldwide among men and women, and the second reason for death. The current treatment is based on locoregional therapy: surgery, radiotherapy, and systematic treatment like chemotherapy. Now it is well known that laparoscopic/robotic surgery is equal, or even superior, to the open one in colorectal procedures.

AIM: The aim of this study was to analyze and share our initial results in robotic colorectal surgery and compare them with literature data

MATERIALS AND METHODS: A retrospective study was conducted in order to review our first 183 patients with colorectal cancers operated by a robot-assisted and totally robotic techniques. Gender, age, diagnosis and surgical indications, type of surgery, surgical time, conversion, bleeding, post-operative complications, and hospital stay were analyzed and described.

RESULTS: The mean age of the patients was 67.87±14.10 years, 101 (58.38%) of them were male and 72 (41.62%) female. The most common localization for the tumor was the rectum—62 (35.83%), followed by the sigmoid—26 (15.02%), left colon—23 (13.29%), cecum—19 (10.98%), rectosigmoid—12 (6.93%), ascending colon—12 (6.93%), right flexure—10 (5.78%), left flexure—4 (2.33%), transverse colon—4 (2.33). The mean blood loss was 165.45±82.85 mL and the mean operative time was 195.20±82.40 min. The average length of hospital stay was 7.22±4.08 days.

CONCLUSION: Our research shows that robotic colorectal surgery can be performed successfully with good short-term outcomes due to the advantages of the DaVinci system and personal laparoscopic experience. One of the disadvantages of robotic surgery is prolonged operative time, which we think could be improved with the accumulation of experience.

Keywords: *colorectal cancer, robotic surgery*

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INTRODUCTION

Colorectal cancer is third most common malignancy (6.1%) worldwide among men and women, and the second reason for death. Current treatment is based on locoregional treatment surgery, radiotherapy, and systematic treatment, such as chemotherapy. The last two could be neo or adjuvant (1). The total mesorectal excision (TME) in rectal cancer

is considered to be the gold standard in rectal cancer surgery after its introduction by Heald.

The minimally invasive procedures in colorectal surgery have already started to replace the conventional ones due to their safety and oncologic efficiency. Now it is well known that laparoscopic and robotic surgery are equal, or even superior, to the open in colorectal procedures (2).

Robotic surgery was developed to satisfy the surgeons' needs to the area of colorectal surgery and to offer a new and safer method to the patients. Robotic systems have many advantages. They provide a better visualization with three-dimensional imaging, dexterity due to flexible instruments, and advantage to navigate narrow spaces such as the pelvis. Limitations to robotic surgery includes increased cost and length of procedures especially in the first few cases (3,4).

AIM

The aim of this study was to analyze and share our initial results in robotic colorectal surgery and compare them with literature data

MATERIALS AND METHODS

A retrospective study was conducted in order to review our first 183 patients with colorectal cancers operated by a robot-assisted technique. Gender, age, diagnosis and surgical indications, type of surgery, surgical time, conversion, bleeding, post-operative complications, and hospital stay were analyzed and described. A literature review was performed on the role of robotic surgery in colorectal cancer.

Routine bowel preparation and antibiotic prophylaxis was performed on all of the patients. For right-sided colon cancer, right ileocolic artery and right branch of medial colic artery and veins were cut and clipped with high ligation for right-sided colon tumors. The dissection was carefully performed cranially to prevent injury to the duodenum. All anastomoses were made intracorporeally. The specimen was removed by infra-umbilical minilaparotomy.

For left-sided colon, sigmoid and rectal tumors, high ligation or low ligation of the inferior mesenteric artery was done, the inferior mesenteric vein was clipped bellow the pancreas. Sharp pelvic dissection was performed according to the total mesorectal excision principles using mono- and bipolar coagulation. Dissection was performed to the pelvic floor. In anterior resection cases, the rectum was divided by robotic stapler and the specimen was removed by a pararectal or Pfannenstiel incision and anastomosis was created with a circular stapler. The integrity of anastomosis was checked by air-leakage test. In patients with high leakage score (low anastomosis, male patients, patients with neoadjuvant therapy, advanced age), temporary loop ileostomy was created. In left colectomies, after inframesocolic medial-to-lateral splenic flexure mobilization with ligation of the inferior mesenteric vein (IMV) and low tie of the inferior mesenteric artery (IMA), subsequent gastrocolic transection was done with bipolar energy-sealing device. After evaluation of the oncological resection borders, the proximal and distal colon was transected by robotic or laparoscopic endo GIA and intracorporal anastomosis, again with endo GIA was created.

In abdominoperineal resections cases, after pelvic dissection, the proximal colon was transected (in the level of descending sigmoid colon) by endo GIA™ stapler, and the perineal part of the procedure started, with permanent colostomy being created.

The mean age of the patients was 67.87±14.10 years, 101 (58.38%) were males and 72 (41.62%) females. The most common localization for the tumor was the rectum 62 (35.83%), followed by the sigmoid—26 (15.02%), left colon—23 (13.29%), cecum—19 (10.98%), rectosigmoid—12 (6.93%), ascending colon—12 (6.93%), right flexure—10 (5.78%), left flexure—4 (2.33%), and transverse colon—4 (2.33%). Right colectomy was the most common procedure, followed by low anterior resection with 34 (19.65%) cases, anterior resection—28 (16.19%), sigmoid resection—26 (15.03%), left colectomy—23 (13.29%), abdominoperineal resections—12 (6.93%), and others. The mean blood loss was 165.45±82.85 mL and the mean operative time was 195.20±82.40 min. No severe intraoperative complications occurred. There was not conversion. Post-operative complications developed in seven patients, of whom two had wound infection; three of them had symptomatic anastomotic leakage grade C and required re-surgery. Two patients died due to septic complications after anastomotic leakage. The average length of hospital stay was 7.22±4.08 days. The characteristics of the patients are given in Table 1. In the histopathological

Table 1. Demographic characteristics of the patients.

Male	101 (58.38%)
Female	72 (41.62%)
Age, years, mean ± SD	67.87 ± 14.10 years
Rectum	62 (35.83%)
Cecum	19 (10.98%)
Rectosigmoid	12 (6.93%)
Sigmoid	26 (15.02%)
Ascending colon	12 (6.93%)
Right flexure	10 (5.78%)
Transverse colon	4 (2.33%)
Left colon	23 (13.29%)
Left flexure	4 (2.33%)
Synchronous tumors	1 (0.58%)
Low anterior resection	34 (19.65%)
Abdominoperineal resection	12 (6.93%)
Anterior resection	28 (16.19%)
Right hemicolectomy	41 (23.69%)
Extended right hemicolectomy	4 (2.34%)
TRANSVERSE colon resection	2 (1.15%)
Left hemicolectomy	23 (13.29%)
Sigmoid resection	26 (15.03%)
Colectomy	1 (0.58%)
Hartmann	2 (1.15%)
Postoperative complications	
Anastomotic leakage	11/170 (6.47%)
Anastomotic leakage grade C	3/170 (1.76%)
Anastomotic leakage after LAR	4/34 (11.76%)
Anastomotic leakage after left colectomy	2/23 (8.69%)
Anastomotic leakage after right colectomy	1
Mortality due to septic complications	2 (3.0%)
Mean blood loss	165.45 ± 82.85 mL
Mean operative time	195.20 ± 82.40 min
Length of hospital stay	7.22 ± 4.08 days
Number of lymph nodes	16.8 ± 4.4
Stage I	29 (16.76%)
Stage II	67 (38.74%)
Stage III	77 (44.50%)

evaluation, the mean total number of lymph nodes removed was 16.8 ± 4.4. There were no positive surgical margins in any of the patients. The most common tumor stage was Stage III—77 (44.50%), followed by Stage II—67 (38.74%), and Stage I—29 (16.76%).

DISCUSSION

The present study describes the short-term outcomes of 183 consecutive colorectal cancer cases performed at the Kaspela University Hospital, Plovdiv. Most of the robotic surgeons reported a very low conversion rate for colorectal surgeries. This is in accordance with our study, which did not report a case of conversion. Usually, the major factors for conversion are bleeding, high BMI, difficult orientation, lack of progress, and others adverse events. Multiple analyses showed no difference in the conversion rate between obese and non-obese patients undergoing robotic colorectal surgery. This is due to the enhanced ergonomics and increased degrees of freedom in a tight operative space afforded by robotic platforms, for example in obese men with a narrow pelvic inlet or when surgical planes are limited by extensive adhesions (4,5).

The number of removed lymph nodes is an important marker for the prognosis of the disease and of course the circumferential margin in rectal patients (6,7,8). The number of harvested lymph nodes in a series of 44 patients by De Souza et al. (9) was 14, and in a series of 143 patients by Pigazzi et al. (10) it was 14.1. The average number of lymph nodes removed in the current study was 16.8, which was consistent with the studies in the literature.

Anastomotic leakage is the most devastating complication in rectal surgery. This is the "price" that is paid for anal sphincters preservation. There was an anastomotic leakage in 7 (11.29%) of our patients with rectal resection. In these cases, we did not use diverting ileostomy. Our criteria for ostomy creation is high leakage score. To evaluate it, we used a PROCOLE score (Prognostic Colorectal Leakage—weight of the factors for calculation of the prognostic index of anastomotic leak). Pigazzi et al. reported almost the same leakage rate (10.5%) (11). Unfortunately, in 3 (4.83%) of our patients, leakage was significant and needed re-surgery due to diffuse peritonitis, which goes in agreement with the percentages (10.4%) reported by Hellan et al. (8).

Owing to the precise dissection and to the significant magnification, the blood loss in our study was 165.45±82.85 mL. Many robotic surgeons reported the same results for blood loss not exceeding 200 mL (12). Several studies indicate that the blood loss is significantly lower for robotic surgery compared to conventional and laparoscopic, due to the better visualization of structures, the pneumodissection that facilitates work in embryonic planes, and the wrist motion of instruments that allows gentle dissection of structures and vessels (13,14).

The prolonged time is one of the major disadvantages of robotic surgery. In the present study, the mean time the operation took was 195.20±82.40 min and the median console time was 140±32.10 min, which is less than the time reported by Spinoglio et al. (15). In our cases, the surgery time was less than that reported by many author, which is mainly due to our major experience in laparoscopic colorectal surgery.

The average length of hospital stay was 7.22±4.08 days, a result which is comparable to that reported by Pigazzi et al. and other researchers (8.3 days). Of course, this time is longer in complicated cases. And again many surgeons explain the shorter hospital stay in uneventful cases with the advantages of robotic surgery (10,15).

CONCLUSION

Our research shows that robotic colorectal surgery can be performed successfully with good short-term outcomes due to the advantages of the Da Vinci system and personal laparoscopic experience. One of the disadvantages of robotic surgery is prolonged operative time that we think could be improved with the accumulation of experience.

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