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Full Length Article

Preliminary results of robotic colorectal surgery at the National Cancer Institute, Cairo University



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KEYWORDS

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Abstract *Background:* The available literature on minimally invasive colorectal cancer demonstrates that laparoscopic approach is feasible and associated with better short term outcomes than open surgery while maintaining equivalent oncologic safety. Reports have shown that robotic surgery may overcome some of the pitfalls of laparoscopic intervention.

Objective of the work: To evaluate early results of robotic colorectal surgery, in a cohort of Egyptian patients, regarding operative time, operative and early post-operative complications, hospital stay and pathological results.

Patients and methods: A case series study which was carried out in surgical department at National Cancer Institute, Cairo University. Ten Egyptian cases of colorectal cancer (age ranged from 30 to 67, 5 males and 5 females) were recruited from the period of April 2013 to April 2014. Robotic surgery was performed to all cases.

Results: Three patients had low anterior resection, three anterior resection, one total proctectomy, one abdominoperineal resection, one left hemicolectomy and one colostomy. The study reported no mortalities and two morbidities. The mean operative time was 333 min. The conversion to open was done in only one patient. A total mesorectal excision with negative circumferential margin was accomplished in all patients, distal margin was positive in one patient. Mean lymph nodes removed was 10.7. Mean hospital stay was 7.4 days.

Conclusion: To the best of our knowledge, this is the first study reporting the outcomes of robotic colorectal cancer intervention in Egyptian patients. Our preliminary results suggest that robotic-assisted surgery for colorectal cancer can be carried out safely and according to oncological principles.

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Introduction

The most important advance in rectal surgery over the last 30 years was development of total mesorectal excision (TME). TME is associated with reduction of local recurrence rate to less than 10% and improve survival [1].

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The development of minimally invasive approach in colorectal disease began with first report of laparoscopic assisted colectomy in 1991 [2]. The available literature on minimally invasive TME for rectal cancer demonstrates that laparoscopic TME is feasible and associated with better short term outcomes than open surgery while maintaining equivalent oncologic safety [3]. The proposed advantages of minimally invasive colorectal surgeries (MIC) over open colectomies include improved intra operative visualization of pelvis, less stress on patient, less post-operative pain, improved cosmesis, shorter duration of ileus and briefer hospitalization [4].

More recently, robotic assisted laparoscopic colorectal surgery has become an intriguing technique most beneficial for procedures requiring rectal resection. This technology provides visualization and reach for these complex pelvic procedures [5]. The 1st robotic assisted colorectal resection was reported in Japan by Hashizume et al. in 2002 [6].

The use of robotics for the treatment of rectal cancer has recently been shown to be feasible [7–10]. The general advantages of the Da Vinci robotic system are a three-dimensional view, hand-tremor filtering, fine dexterity, and motion scaling, providing an absolute benefit when the operative field is narrow and fixed and sharp dissection is necessary [11].

There are no available data on the outcome of robotic intervention in cancer surgery in developing countries and the only data available are those of American, European and Asian experiences.

Within this context, the present study aims to report our initial experience with robotic colorectal surgery in a series of 10 consecutive Egyptian patients, regarding operative time, operative & early post-operative complications, hospital stay and pathological results.

Patients and methods

A case series study included 10 cases of colorectal cancer. Patients were recruited from the surgical department of the National Cancer Institute, Cairo University and operated by Robot da Vinci Si Surgical System (Intuitive Surgical, USA) over a period of one year. Their age ranged from 30 to 67 years. They were 5 males and 5 females. The patients provided informed consent. Patients with previous laparotomy, patients presented with intestinal obstruction, patients with severe cardiac or pulmonary disease were excluded from robotic surgery. The study was approved by local ethics committee.

All rectal cancer patients with T3d, T3c, T4, N2, obturator, internal iliac, presacral lymph nodes and extensive intravascular mural invasion were subjected to long course preoperative neoadjuvant chemo-irradiation. Accordingly five patients received preoperative neoadjuvant treatment.

Patient demographics, pathological, operative and perioperative outcomes were recorded prospectively into our departmental database and analyzed.

Surgical technique

For tumors of the upper rectum, a partial mesorectal excision (PMSE) is done and for tumors of the mid and low rectum, total mesorectal resection was done (TME). In cases of very low tumors without invasion to the rectal sphincters, inter-

sphincteric or total proctectomy resection with specimen extraction through the anus and hand sewn coloanal anastomosis was performed. Abdominoperineal resection (APR) was proposed to patients with sphincter invading lesions or with very low tumors.

Full robotic technique was done in all cases. The operation was carried out with the aid of the four-arm Da Vinci robotic system. The patient was placed in a modified lithotomy position and then tilted into a steep Trendelenburg position with the left side maximally elevated. The Da Vinci system is docked (Fig. 1) coming in over the patient's left hip at an acute angle of about 30° in relation to the operating table. The two working ports were placed 12–14 cm from symphysis pubis in midclavicular line (Fig. 2). The two working arms usually carry a grasper on the left connected to bipolar cautery and hook with monopolar cautery on the right. The third robotic arm on the patient left side carries another grasper and is used for additional retraction. Medial to lateral mobilization with high ligation of inferior mesenteric artery (IMA) and vein (IMV) was carried out with clips (Figs. 3 and 4), then dissection continue in retroperitoneal space dropping the left ureter and left gonadal vessels. Mobilization of splenic flexure is done if needed. After completion of colon mobilization, dividing the peritoneum in front of sacral promontory going in the retro rectal space, then dissection continues circumferentially along the mesorectal fascia down to the planned rectal section line.

Arms two and three, under control of the surgeon's left hand are used for dissection and retraction of the bladder or rectum as needed (Figs. 5 and 6).

Once the distal transection cut is prepared the assistant divides the distal rectum using articulating linear stapler through a 12 mm laparoscopic port inserted in the right lower quadrant (Fig. 7).

Delivery of the specimen through Pfannenstiel incision, dividing the proximal sigmoid at the proper distance, then introduction of the anvil of EEA (end to end anastomosis circular stapler), then purse string suture is done at the cut end (Fig. 8). Creating pneumoperitoneum again and end to end anastomosis was done using a EEA (Fig. 9).

Results

A total of 10 patients underwent robotic colorectal resections. patient clinical data are listed in Table 1. Mean age for patients was 47.4 years (range 30–67), equal number of male and female patients were involved. The patient BMI ranges from 24.8 to 39.5 with median 29.21. All patients presented with bleeding per rectum, 6 patients (60%) presented with rectal mass and 3 cases (30%) presented with change in bowel habits. Regarding tumor location, most patients (60%) had tumors in the lower rectum (<7 cm), upper rectum tumors were in 3 patients (30%) and one patient (10%) presented with tumor in the descending colon.

The histopathologic data are presented in Table 2. Distal margin was positive in one patient (10%), circumferential margin was negative in all cases. Half of patients (50%) were stage II, 3 cases were stage I (30%), while 2 patients were stage III. Mean distal margin was 4.6 cm (range 0–15) and mean number of lymph nodes removed was 10.7 (range 5–23).

Regarding operative data; one patient (10%) was estimated to be inoperable, 3 patients (30%) underwent low anterior

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