

Short-term surgical outcomes of laparoscopic colorectal cancer resection in Assiut University Hospital

Hussein I. Ahmed, Mahmoud R. Shehata, Hany A.E. Ali, Ahmed M. Ali, Tarek A. Mostafa

Department of General Surgery, Faculty of Medicine, Assiut University, Assiut, Egypt

Correspondence to Hussein I. Ahmed, MBBS, MSc, Department of General Surgery, Faculty of Medicine, Assiut University, Assiut, Egypt
Postal Code: 71511; Tel: +201097675971; e-mail: Husinfarah28@gmail.com

Received 21 November 2018

Accepted 19 December 2018

Journal of Current Medical Research and Practice

May-August 2019, 4:188–191

Background

Laparoscopic surgery has progressively replaced open colorectal surgery in recent decades owing to better short-term outcomes. The current study was designed to detect the short-term surgical outcomes of laparoscopic colorectal cancer resection.

Patients and methods

A prospective study was conducted including 30 patients diagnosed with surgically treatable colorectal cancer in Department of General Surgery, Assiut University Hospital.

Results

A total of 30 patients underwent laparoscopic colonic or rectal resections between January 2017 and January 2018. They were followed up for 1 year. There were significantly improved short-term surgical outcomes in the form of less blood loss, earlier return of bowel function, and decreased hospital stay. Histological examination revealed that proximal and distal margins were free of tumor cells in all surgical specimens.

Conclusion

Laparoscopic colorectal cancer resection provides many clinical benefits in the form of small incision, shorter hospital stay, faster recovery, and faster return of intestinal function. In addition, it shows no significant increase of intraoperative and/or postoperative complications, and with similar oncological radicality, morbidity and mortality rates, compared with open surgery.

Keywords:

colorectal cancer, laparoscopic resection, oncologic outcomes

J Curr Med Res Pract 4:188–191

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2357-0121

Introduction

Colorectal cancers are considered to be the third frequent cancers in men, and the second in women, with an incidence of ~20.1 per 100 000 males and 14.6 per 100 000 female, globally [1]. The characteristics of colorectal cancer in Egypt according to the results of National Cancer Institute in 2005 are relative frequency of 10–12 per 100 000, more in males 3: 1, and more than 30% under the age of 45 years [2]. Laparoscopic colectomy has been applied to benign and malignant diseases since 1991 [3]. Moreover, it has progressively replaced open colorectal surgery in recent decades owing to better short-term outcomes, such as less pain, reduced blood loss, and improved recovery time [4]. Laparoscopic techniques in rectal cancer are more difficult than ones performed for colonic cancer owing to difficult exposure in a narrow pelvis, nearby nerve structures, and difficult intestinal resection [5]. Problems with anastomoses, difficulties in rectal resections, narrow pelvis, bulky tumors, adhesions, and obesity are among the most commonly reported reasons for conversion and can represent relative contraindications to laparoscopy [6]. In our study, we are aiming to detect the short-term surgical outcomes of laparoscopic colorectal cancer resection.

Patients and methods

Patients

A prospective study was conducted including 30 patients with operable and resectable colorectal cancer diagnosed and managed in General Surgery Department, Assiut University Hospital. Ethical Review Board in Assiut Faculty of Medicine approved the study, and a consent was taken from the patient.

Inclusion criteria

The study included patients indicated for curative resection of colorectal cancer (T1 to T3, no distant metastasis).

Exclusion criteria

The following were the exclusion criteria:

(1) Bulky tumors [>6 cm on computed

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tomography (CT)] or cancer invasion into adjacent organs

- (2) Patients with distant metastases
- (3) Pregnancy
- (4) Coagulopathy
- (5) Patients presented in other emergency settings (perforation, hemorrhage, and intestinal obstruction).

Preoperative workup

Preoperative workup included the following:

- (1) History and clinical examination (including per rectal (PR) examination)
- (2) Laboratory investigations including complete blood count, kidney and liver functions, random blood glucose, prothrombin time and prothrombin concentration, and carcinoembryonic antigen
- (3) Radiological investigations including CT chest, abdomen, and pelvis, and MRI pelvis
- (4) Colonoscopic examination and biopsy
- (5) Written consents were taken from patients explaining the details of surgery, the advantages of minimally invasive surgery, and concepts of fast track surgery, clarifying the possible complications of surgery and the possibility of conversion to open surgery
- (6) Colonic preparation was done by 2–3 l of polyethylene glycol and metronidazole.

Intraoperative protocol and surgical technique

- (1) The four-port technique was used; the ports were inserted at the subumbilical region (12 mm), right upper quadrant (5 mm), right lower quadrant (12 mm), and left lower quadrant (12 mm)
- (2) The medial to lateral approach was adopted
- (3) Inferior mesenteric vein was controlled at the inferior border of the pancreas and divided between two clips
- (4) Inferior mesenteric artery was dissected and then divided between two clips placed 1.5 cm distant from aorta in order not to injure hypogastric nerves
- (5) Total mesenteric excision was performed
- (6) Specimens were retrieved via the Pfannenstiel incision
- (7) Resection and anastomoses were achieved by double stapling (Endoscopic GIA stapler; Ethicon Products)
- (8) The planned lengths of proximal and distal margins of resections were greater than 5 cm for all colonic resections
- (9) The planned length of proximal margin of resection for rectal resections was greater than 5 cm, and the average length of distal margin of resection for rectal resections was greater than 2 cm.

Follow-up data

Postoperative histopathology (grading, pathological staging, total number of lymph nodes and number of metastatic lymph nodes, proximal margin, distal margin, radial margin, and lymphovascular invasion), operative time, intraoperative complications, conversion to open and its cause, amount of blood loss, amount of blood transfusion, time in days to pass first flatus and to pass first motion, postoperative pain duration and type of analgesia, and duration of postoperative hospital stay.

Short-term outcomes

The short-term outcomes included abdominal or pelvic abscess, wound infection, sexual dysfunction, weak anal tone, deep venous thrombosis, or pulmonary embolism.

Statistical analysis

Statistical analysis was performed with SPSS 'ver. 21' (SPSS Inc., Chicago, Illinois, USA). Data were expressed as mean, SD, number, and percentage.

Results

The study was conducted on 30 patients of colorectal cancer, in whom laparoscopic approach was done, with the following parameters:

- (1) Regarding sex, 10 (33%) patients were males and 20 (66%) patients were females
- (2) Regarding age, the age ranged from 29 to 87 years old, with mean age of 60.18 ± 11.266 years
- (3) Regarding the site of tumor and extent of resection, as shown in Table 1, the commonest site was the rectum (56.67%) followed by the sigmoid colon (33.3%), and the operations performed were eight low anterior resections of Dixon, three ultralow anterior resections, 10 sigmoidectomies, three left hemicolectomies, three abdominoperineal resections, and three transanal pull-through
- (4) Regarding staging, according to American Joint Committee against Cancer staging (7th ed.), tumors are distributed as shown in Fig. 1. It shows that 67% of the tumors were in stage 3, whereas 20% of them were in stage 2 and the remaining 13% were in stage 1

Table 1 Site of tumor and extent of resection

Site of tumor	Extent of resection (type of procedure)	Number of cases (%)
Left colon	Left hemicolectomy	3 (10)
Sigmoid colon	Sigmoidectomy	10 (33.3)
Rectum		
Upper rectum	Low anterior resection	8 (26.67)
Mid rectum	Ultralow anterior resection	3 (10)
Lower rectum	Abdominoperineal resection	3 (10)
	Transanal pull-through	3 (10)

Figure 1

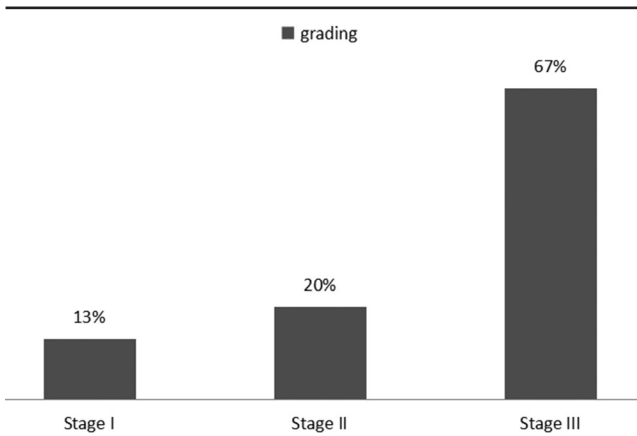


Chart showing percentage of tumors in each stage according to American Joint Committee against Cancer.

- (5) Regarding grading, according to histological grading, tumors are either well differentiated, moderately differentiated, or poorly differentiated. Tumors are distributed as in Fig. 2. It shows that 54% of the tumors were moderately differentiated
- (6) Regarding operative and postoperative details, operative time, duration of postoperative analgesia (days), time of passing flatus (hours), time of first bowel motion, and duration of hospital stay (days) were recorded, as shown in Tables 2 and 3
- (7) Regarding complications of surgery, in our study, seven complications occurred as follows: two patients experienced intraoperative bleeding, one owing to injury of inferior mesenteric artery and was controlled by clips and the other owing to injury of the mesentery during port insertion and was controlled by gauze compression. One patient had wound infection and controlled by repeated dressing. One patient developed pelvic abscess and drained by a pigtail insertion under CT guidance. Weak anal tone occurred in one patient. Only one patient developed sexual dysfunction and improved after 6 months. One patient died in our study owing to pulmonary embolism
- (8) Regarding conversion to open surgery, in our study, three (10%) patients required conversion to open surgery owing to suspected sacral infiltration, suspected uterine infiltration, and large bulky tumor, and complete resection was done.

Discussion

Laparoscopic colectomy was an evolving technique since 1990. Its short-term benefits have been proved including decreased blood loss, decreased postoperative pain, early regain of intestinal function, and shorter hospital stay. Add to that, several randomized controlled trials, prospective, retrospective studies,

Figure 2

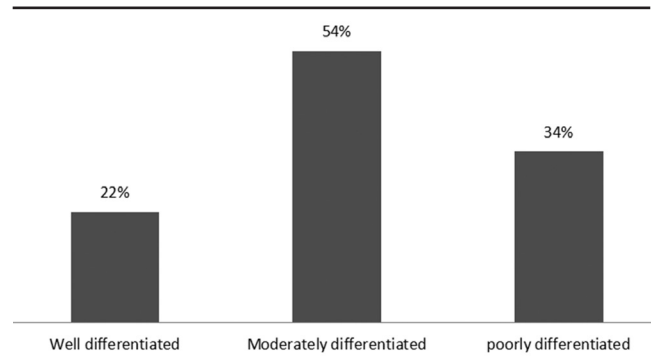


Chart showing histological grading of tumors.

Table 2 Operative details for patients

	Mean	SD
Operative time (min)	212.6	43.216
Analgesia (days)	5.3	1.832
Passing flatus (h)	55.2	22.327
First bowel motion (h)	65.54	23.904
Hospital stay (days)	7	1.761

Table 3 Complications of surgery

Complications	Frequency	%
Bleeding	2	6.67
Wound infection	1	6.67
Pelvic abscess	1	3.3
Weak anal tone	1	3.3
Pulmonary embolism and death	1	3.3
Sexual dysfunction	1	3.3
Total	7	23.3

and case series have been published to address the short-term outcomes of laparoscopic resection. In our study, the operations performed were eight low anterior resections, three ultralow anterior resection, 10 sigmoidectomies, three left hemicolectomies, three abdominoperineal resections, and three transanal pull-through. Reported operating time of 183 ± 61 min [7]. Showed that the mean surgical time was reported to be between 180 and 260 min [8]. Revealed the mean operating time was reported to be 245 ± 75 min [9]. Similar results were reported by Ng *et al.* [10], who reported a mean operating time of 213 ± 59 min. Comparing our results with other studies, our mean operating time (212.6 ± 43 min) was not different from them. In our study, recovery of intestinal function was assessed by measuring the time to pass first flatus and the time to first bowel motion. We found that the mean time to pass first flatus was 2.3 ± 0.9 days. The mean time of first bowel motion was 2.73 ± 1 days. Showed the mean time to pass flatus was 1.6 days [11]. Reported a mean time of passing flatus of 3.1 days [12]. Three important trials were recorded by Veldcamp *et al.*, Guillou *et al.*, [3,12] which showed that the mean time to first bowel motion was 3.6, 5.0, and 4.4 days, respectively [13].

An enhanced recovery program maximizes the benefit of laparoscopic surgery in early intestinal functional recovery. In our study, we used an enhanced recovery program with early postoperative enteral feeding and good analgesia. That is why functional intestinal recovery was earlier in our study than most of other studies. The mean duration of hospital stay in our study was 7 days. The mean operative stay in the four large randomized controlled trials carried by Veldcamp *et al.*, Nelson *et al.*, Guillou *et al.*, [3,12], was 8.2 ± 6.6 , 5 ± 1 , 9 ± 2.5 , and 5.2 ± 2 days, respectively [14]. The mean hospital stay in our study was even shorter than that of other studies. This can be attributed to the enhanced recovery program that was followed during the study. In our study, three (10%) patients required conversion to open surgery owing to suspected sacral infiltration, suspected uterine infiltration, and large bulky tumor. Conversion rate was 11% in Barcelona trial and 29% in Conventional versus Laparoscopic-Assisted Surgery in Colorectal Cancer (CLASSIC) trial [15]. The most common causes of conversion were bulky tumors, locally advanced tumor, dense adhesions, intestinal distension, presacral bleeding, and visceral injury. Gervaz *et al.* [3] detected that recently the rate of conversion in literature ranged from 1.45 to 48% with a mean conversion rate of 15%. In our study, oncological safety was assessed by examining postoperative results, such as the resection margin and the number of harvested lymph nodes. Mean number of lymph nodes harvested was 14. Mean number of positive lymph nodes was 2.2. Histological examination revealed that proximal and distal margins were free of tumor cells in all surgical specimens.

It appears from the comparison of our results with the other available studies that our results are nearly the same except slight increase in operative time and slight decrease in duration of hospital stay.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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