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Toward standardization of laparoscopic resection for colorectal cancer in developing countries: A step by step module

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ABSTRACT

Background: Despite the proven benefits, laparoscopic colorectal surgery is still underutilized among surgeons especially in developing countries. Also a steep learning is one of the causes of its limited adoption.
Objective: To explore the learning curve of single surgeon experience in laparoscopic colectomy and feasibility of implementing a well standardized step by step operative technique to overcome the beginning technical obstacles.
Patients and methods: This prospective study included 50 patients with carcinoma of the left colon and rectum recruited from the department of surgical oncology at National Cancer Institute, Cairo University in the period 2012–2016. All the procedures were performed through laparoscopic approach. Intra and post-operative data were recorded and analyzed.
Results: The mean age was 49.7 ± 10.6 years (range: 33–74 years). They were 29 males and 21 females. The mean operation time was 180 min (range 100–370 min), and the mean blood loss was 350 ml (60–600 ml). Six patients (12%) were converted to a laparotomy. The median lymph nodes harvest was 12 (range 7–25). The mean time of passing flatus after surgery was 2 days (1–4 days) and the mean time of passing stools was 3.3 days (2–5) days. The median hospitalization period after surgery was 4 days (3–12). 5 patients (10%) had postoperative morbidity, major morbidity occurred in one patient.
Conclusion: Laparoscopic colorectal surgery for colorectal cancer is safe and oncologically sound, standardized well-structured laparoscopic technique masters the procedure even in early learning curve setting.

Introduction

Laparoscopic colectomy was first reported in 1991 [1]. Since then huge scientific evidence confirmed the feasibility and the oncological safety of laparoscopic colorectal surgery [2,3]. Compared to open surgery for colorectal cancer, laparoscopic surgery has significantly less blood loss, shorter time to pass flatus, shorter time start diet, shorter hospital stay, easier recovery and rapid return to work. On the other hand, there is no significant difference as regard postoperative morbidity, lymph node yield, and sphincter preservation, also Long term results show similar disease-free survival, overall survival, and 10 years recurrences rate [4–7]. Moreover, recently compared to open colectomy, laparoscopic colectomy is associated with greater rates of compliance with guidelines for adjuvant chemotherapy and slightly lesser time to start of chemotherapy [8].

Nevertheless Laparoscopic surgery has many constrains; it is performed on the basis of two-dimensional vision, laparoscopic surgery is technically demanding and requires a substantial sum of experience and skills adding to the limitations of manipulation, retraction and instrumentation [9].

In addition, the steep learning curve is an obstacle among general and colorectal surgeons in many countries [10]. Lack of training and mentoring are other main reasons for not performing laparoscopic procedures [11,12]. Moreover, in developing countries the cost of the instruments is considered an important issue [13].

Segmentation of the procedure into well organized; adequately detailed and properly structured training model will fasten the learning curve and master the procedure, without compromising the oncologic principles [14].

Patients and methods

This prospective study included 50 patients with carcinoma of the left colon and rectum. It was carried out in department of sur-

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gical oncology at National Cancer Institute, Cairo University by single surgeon in the period 2012–2016. All laparoscopic procedures for left colon, sigmoid and rectal cancer were performed according to the principles of total mesocolic excision with central vascular ligation and medial to lateral approach for colon cancer, and total mesorectal excision (TME) for all mid and low rectal tumors, while partial mesorectal excision was done for high rectal tumors [15,11,16,17].

Intra- and postoperative complications, conversion rate, operating time, blood loss, length of hospital stay, tumor stage, number of lymph nodes harvested, post-operative complications and a 30-day readmission rate were recorded prospectively into our departmental database and analyzed. All patients provided informed consent and the study was approved by local ethical committee.

Surgical procedure

This 12 steps proposed module was applied for all patients in this study, sticking firmly to the sequence of steps and details of operative work.

1. The patient is properly fixed to the operative table from both legs and chest wall, and then put in lithotomy position, anti-Trendelenburg (20 degree) and right lateral position (10 degree). This patient fixation allows using gravity as retraction for small bowel. Working trocars are placed as shown in (Fig. 1).
2. Preparation of the field is done by, retraction of the greater omentum at the upper abdomen, the jejunum retracted to the right hypochodrium below right side of the transverse colon, and the distal portion of the ilium is retracted in the right iliac fossa, to avoid small bowel overriding the operative field (Fig. 2a).
3. The sigmoid summit is retracted toward the anterior abdominal wall to put tension on inferior mesenteric artery (IMA) (Fig. 2b), this is followed by incising the peritoneum at the base of sigmoid mesocolon in a line extending from the sacral promontory to the 3rd part of the duodenum.
4. Teasing and sweeping the extra peritoneal fat is done to expose the origin of IMA, then the IMA is dissected with the surrounding lymph nodes and controlled by ligasure after application of double proximal clips and double distal once (Fig. 2c and d).
5. Separation of the sigmoid mesentery from the retroperitoneal structures is done through entering into a space below the IMA, dissection is directed upward just below the vessels and dropping down the gonadal vessels, left ureter, the Gerota fascia and tail of pancreas (Fig. 2e).
6. Mobilization of the splenic flexure is done through medial approach first by going in a plane below the inferior mesenteric vein (IMV) dissecting laterally toward the lateral wall of the colon, this is completed by lateral dissection of the lateral embryonic attachment and dissecting the lateral part of left transverse colon from the greater omental attachment (Fig 2f and g).
7. The next step is freeing the lateral embryonic attachment between the peritoneum of anterior abdominal wall and the descending and sigmoid colon till reaching the previously created retroperitoneal space and re-identification of the left ureter at the level of sacral promontory (Fig. 2h).
8. Control of IMV is done using ligasure just below the duodenum (Fig. 2i).
9. In the pelvis, dissection of the mesorectom starts posteriorly at the sacral promontory with ligasure in the avascular retrorectal plane till the pelvic floor (Fig. 2j), then following the mesorectom toward the right lateral and left lateral sides, and dissecting the anterior mesorectum from the base of the bladder and prostate in males and from the vagina in females.
10. Once the distal transection cut is defatened according to tumor location, the distal rectum is divided using articulating linear stapler (Fig. 2k).
11. Delivery of the specimen through Pfannenstiel incision, dividing the proximal sigmoid, then introduction of the anvil of EEA (end to end anastomosis circular stapler), then purse string suture is done at the cut end (Fig. 2l), then dropping the anvil into the abdomen.
12. Creating pneumoperitoneum again after closing the Pfannenstiel incision, restoration of the bowel continuity is accomplished by end to end anastomosis using EEA introduced from the anal canal, with medial orientation of the colonic mesentery (Fig 2m).

Fig. 1. Shows port placement. C: optical trocar, R: right hand trocar, L: left hand trocar, A1: 1st assistant trocar, A2: 2nd assistant trocar at the site of Pfannenstiel incision.

Air leak test is done by injecting air in the anal canal and watching bubbling in the pelvis floated with irrigated saline (Fig 2n). Protective ileostomy is also done in lower anastomosis (Fig. 2o).

The quality of surgery was assessed according to two main parameters; the first is safety of patient as regard blood loss, intraoperative incidents and postoperative morbidity, secondly is respecting the sound surgical oncology principles regarding high pedicle ligation, adequate lymph node yield and negative circumferential and distal margins.

The enhanced recovery after surgery program (ERAS) was adopted for postoperative care. Enemas for bowel preparation is performed one day before surgery, last meal was received 8hrs before operation and short-acting sedative (lorazepam 1 mg) was given the night before operation, clear liquid juice is allowed till 2 h before surgery.

On the day of surgery, thoracic epidural catheter was inserted for postoperative analgesia, and then pre-anesthetic medication including IV midazolam and prophylactic ondansetron and dexamethasone for prevention of post-operative nausea and vomiting.

After the operation, epidural analgesia is used in the 1st postoperative 48-h. At the evening of surgery oral fluids is allowed and mobilization is started out of bed. On day one; the first semisolid food intake, and on day two, semisolid diet and normal diet are allowed according to patient tolerance. The patient was

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