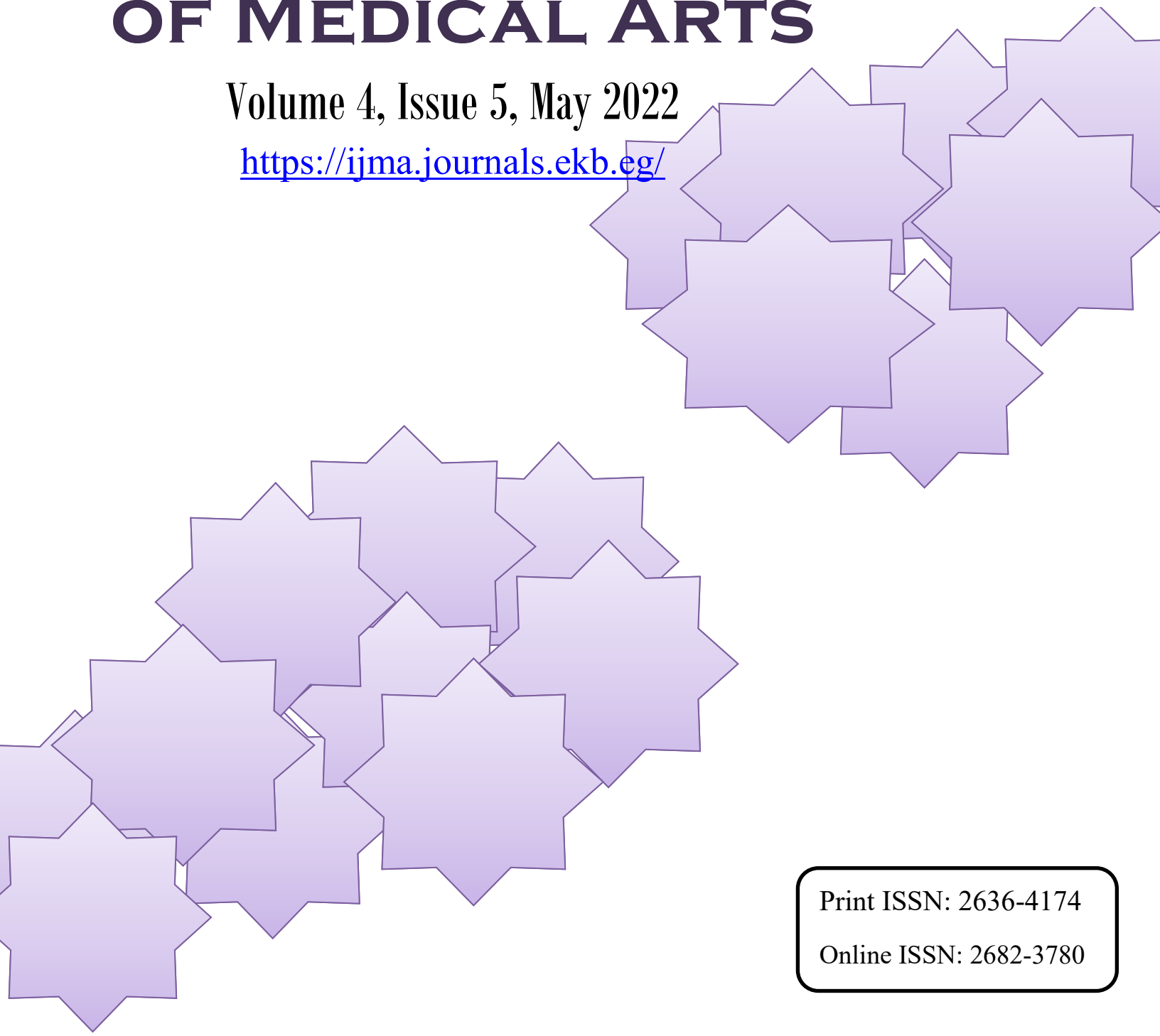
International Journal of Medical Arts

Volume 4, Issue 5, May 2022

https://ijma.journals.ekb.eg/



Print ISSN: 2636-4174

Online ISSN: 2682-3780

Available online at Journal Website
https://ijma.journals.ekb.eg/
Main Subject [Surgery]

Original Article

Laparoscopic versus Open Rectosigmoid Cancer Resection: A comparative Study

Mohamed Mohamed Mostafa Balbola[1]*, Ayman Fahmy Elramah[1], Almetwaly Ragab Ragab Ibrahim[2], Mai Eltantawy khafaga[3]

[1] Department of General Surgery, Damietta Faculty of Medicine, Al-Azhar University, Damietta, Egypt.

[2] Department of Vascular Surgery, Damietta Faculty of Medicine, Al-Azhar University, Damietta, Egypt

[3] Department of Public Health, Faculty of Medicine, Cairo University, Cairo, Egypt.

Article information

Received: 05-03-2022

Accepted: 11-06-2022

DOI: 10.21608/IJMA.2022.125469.1438

*Corresponding author

Email:

mmmbalbola@domazhermedicine.edu.eg

Citation: Balbola MM, Elramah AF, Ibrahim AR, khafaga ME. Laparoscopic versus Open Rectosigmoid Cancer Resection: A comparative Study. IJMA 2022 May; 4 [5]: 2351-2363. doi: 10.21608/IJMA.2022.125469.1438

ABSTRACT

Background: Although widely performed the usefulness of Laparoscopic surgery for rectosigmoid and upper rectal cancer resection compared with open surgery has not been established sufficiently.

The aim of this study was to compare the short-term, oncologic, outcomes of laparoscopic and open resection for recto-sigmoid and / or upper rectal cancer in the same time period.

Patients and Methods: This prospective study included 50 patients with recto-sigmoid and upper rectal cancer diseases, admitted to Al Azhar New Damietta University hospital and Damietta cancer Institute surgery departments between December 2016 and December 2018. Patients were randomly divided into two groups: [Group 1: "25 patients"] subjected to laparoscopic interventions, and [Group 2: "25 patients]" subjected to open surgery. Data were collected and Short-term outcomes and long-term prognosis were analyzed.

Results: The mean operative time was significantly increased in the LR group than OR group [LR 198.88± 18.7, OR 183.4± 20.5 minutes, p =0.01] as well as the hospital stay [LR 8.8± 2, OR 7.4± 2.9 days, p =0.013]. However, LR group was quicker to recover in term of mobilizing early, recovery of bowel function, and early toleration of diet and fluid and this difference was only statistically significant for oral fluid but not for diet [p= 0.078; 0.17 respectively]. There was no significant difference between both groups in tumor characteristics as locations, gross tumor morphology, staging, and distance to the distal margin. Also, both groups had comparable intraoperative and post-operative adverse events.

Conclusion: Laparoscopic surgery for rectosigmoid cancer and rectal cancer offers numerous advantages beyond aesthetics aspects and is possible and safe with comparable oncological clearance to open surgery and might be considered an option of care when both approaches are suitable.

Keywords: Rectosigmoid; Cancer; Resection; Laparoscopy.

This is an open-access article registered under the Creative Commons, ShareAlike 4.0 International license [CC BY-SA 4.0] [https://creativecommons.org/licenses/by-sa/4.0/legalcode.

INTRODUCTION

Colorectal cancer [CRC] is the third most common type of cancer and the second leading cause of cancer mortality diagnosed worldwide [1]. In Egypt, it was diagnosed in 29-31% of cancer patients aged ≤ 40 years, and was detected in 11-15% of colonoscopies [2]. The ideal treatment for rectal cancer remains surgical resection. A number of studies have demonstrated the impact of a committed team on oncologic outcomes, complication rates, and long-term clinical outcomes in patients with rectal cancer [3]

Surgical resection has remained the cornerstone of cure, despite advances in chemo-radiotherapy. About 90–92% and 84% of patients with carcinoma of colon and of rectum, respectively, are treated surgically. However, conventional laparotomy is associated with significant morbidity and long convalescence. Surgery has been also employed as a palliative treatment to relieve detrimental symptoms in patients with advanced disease [4-6].

In recent times, minimally invasive surgery was increasingly used in oncologic surgery, due to its benefits on postoperative outcomes [earlier recovery and return to bowel function, shorter length of hospital stay] as confirmed in previous meta-analyses [7]. Additionally, laparoscopic surgery for rectal cancer has gained popularity thanks to the development of technical skills, associated with increasing surgeons' expertise [8].

Although laparoscopic colectomy has been proven in prospective, randomized trials to be at least equivalent oncologically to open colectomy for colon cancer with respect to local recurrence and overall survival [OS], Laparoscopic proct-ectomy, whether for cancer or benign disease, is generally regarded as more challenging than laparoscopic colectomy, and few prospective randomized trials have yet been completed as reported in 2012 [9]. However, Baigrie and Stupart in 2010 reported that Laparoscopic colorectal cancer surgery [LCRCS] has been established in the developed world, with considerable interest growing in developing nations. It has reached the point in the UK where patients are soon to be given the right to insist on LCRCS even if their surgeon prefers open resection [OCRCS] [10].

In Egypt, because of limited resources and the expenses of MIS, laparoscopic colorectal surgery is restricted in use for a few tertiary centers with only few cases being treated every year. However, studies from Egypt have showed that various types of laparoscopic colo-rectal surgery for cancer with the adoption of the standardized operative steps respecting the oncologic fundamentals could be performed successfully without jeopardizing oncologic safety [11].

THE AIM OF THE WORK

The aim of this study was to compare the short-term, including oncologic, outcomes of laparo-scopic resection to open resection for recto-sigmoid and/or upper rectal cancer investigating the suggestion that laparoscopic primary tumor resection is safe and effective when compared with the open method in a cohort of patients undergoing surgery in the same time period from December 2016 and December 2018.

PATIENTS AND METHODS

This study included 50 patients with sigmoid, recto- sigmoid and upper rectal cancer diseases who presented during the period between December 2016 and December 2018 to the outpatient's clinic or the emergency department of Al Azhar University hospital and Damietta cancer Institute. Patients were eligible to be included in the study if their age ranges between 35 and 85 years; with a final diagnosis of operable of rectosigmoid and / or upper rectal cancer diseases. Patients with multicenteric carcinoma, surgically unfit patients or who had Inoperable, patients with doubtful accessibility throughout the study or who were lost in the follow up or were unable to provide informed consent were excluded from the study.

All patients were subjected to history taking and physical examination, general complete clinical examination to evaluate disease severity and stability of the patient to withstand anesthesia and surgery. Routine and Special Laboratory investigations [as indicated e.g. Serum CEA.] were done accordingly. All patients had their clinical staging after CT, MRI or both. After histological confirmation of the diagnosis and application of the inclusion and exclusion criteria, 50 patients were included in the study. Using closed envelope method, patients were randomly divided into two groups according to the intended kind of the surgical intervention [open and laparoscopic]. [Group 1]: involved "25 patients" comprised those who had recto-sigmoid and / or rectal carcinomas and were subjected to operation by laparoscopic interventions and [Group 2]: included "25 patients" those who had recto-sigmoid and / or rectal cancer diseases and were subjected to open surgical interventions.

Bowel preparation: polyethylene glycol [PEG]

powder was used in 2 divided doses.

Prophylactic intravenous antibiotic: in the form of third generation cephalosporins [ceftriaxone 1 g] and metronidazole intravenous infusion within one hour before the skin incision was followed as a routine. A prophylactic dose of Low molecular weight Heparin according to weight [Enoxaparin] 0.5 mg/kg within 12 hours before the operation, was given to all patients who were also subjected to graduated compression [elastic] stockings. All patients received general anesthesia with endotracheal intubation.

Surgical technique: All patients were operated on the principles of surgical oncology with curative intention, such as high inferior mesenteric artery ligation, PME, adequate margins, and wound protection. For lesions of the sigmoid colon or rectosigmoid junction, the sigmoid colectomy with or without upper rectum resection and lymphadenectomy extended to the inferior mesenteric vessel origin were performed. At least 5 cm safety surgical clearance margin was mandatory for all patients. For upper third rectal lesions, a 5cm mesorectal resection with end-to-end colorectal anastomosis was done.

Steps of laparoscopic surgery [Figures 1 and 2]: After the induction of anesthesia, the patient is properly positioned and a bladder catheter and a gastric tube are placed for bladder and gastric decompression. The patient is placed in lithotomy stirrups and the Trendelenburg position, with the right side tilted downward. The surgeon stands on the right side of the patient. The monitor is placed next to patient's left Shoulder. pneumoperitoneum creation via 10mm supra-umbilical safety trocar. Further trocars were placed at the preference of the surgeon. A medial-to-lateral dissection starts by elevating the rectosigmoid colon anteriorly, allowing for identification of the IMA and the sacral promontory. The visceral peritoneum of the mesocolon was incised medially at the level of the sacral promontory, allowing entrance into the presacral space. The IMA is elevated anteriorly, and blunt dissection is used to separate the artery from the underlying retroperitoneum sweeping the left ureter away to avoid injury. A high ligation of the IMA is performed using LIGACLIP. Additional mescolic ligation, including the inferior mesenteric vein at the level of the ligament of Treitz, is necessary to obtain adequate colonic mobility. A medial-to-lateral dissection is continued over Gerota fascia to the abdominal wall. The lateral attachments are divided to connect the lateral and medial dissection planes. The site of distal transection is chosen based on pathology, the mesentery is divided; where for sigmoid resections, linear staplers were used to divide the colon while for rectosigmoid/ upper rectal resection, the best approach was a linear cutting articulating stapler from a suprapubic port. Anastomosis is then performed as convenient. For anterior recto-sigmoid resections, anastomoses were performed intra-corporeally, with a circular stapler, while for higher sigmoid resection, anastomoses were performed extra-corporeally, either hand sewn or side to side, with a linear stapler. Five-centimeter bowel margins were accepted and splenic flexure mobilization was optional. A diversionary loop ileostomy was performed when selected for individual patients. Extraction of specimen was done via mini-laparotomy or Phannenstiel incision.

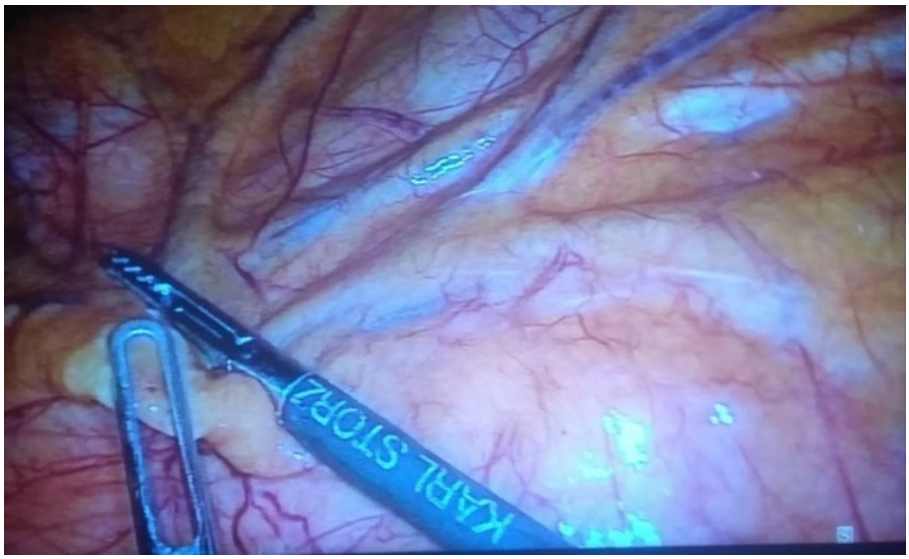


Figure [1]: Identification of vessels during laparoscopic approach

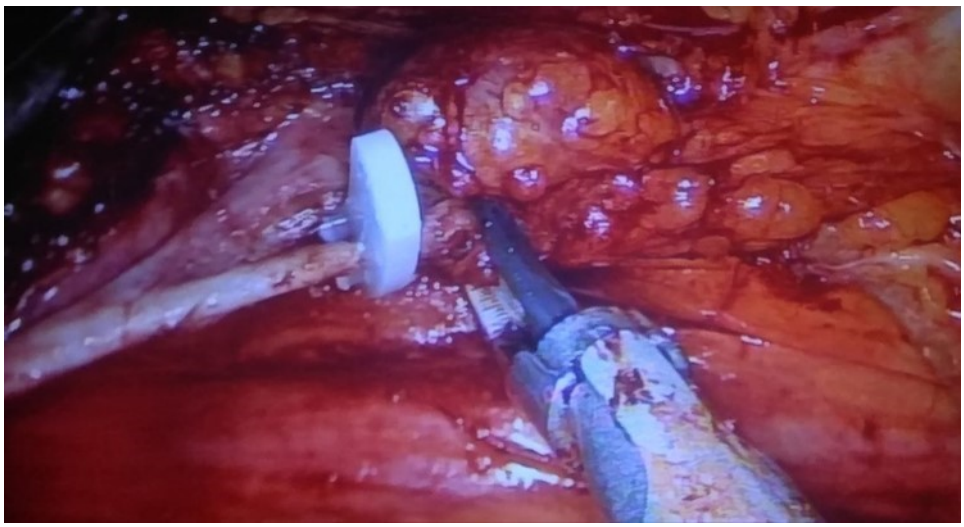


Figure [2]: Control of the vascular pedicle during laparoscopic approach

Steps of open surgery: The procedures were performed through a midline laparotomy with lateral-to-medial dissection which includes medial tension on the colon and incision of the lateral attachments staying slightly medial to the line of Toldt to avoid dissection in the retroperitoneum. The left ureter is identified and preserved, and similar vessel ligation is performed.

Follow up after surgery and discharge from the hospital: All patients were discharged from the operative theatre to the ICU at least for the 1st 24 hours.

Pain evaluation and comparing between groups: The average daily dose was calculated using the Opiate Equianalgesic Dosing Chart and online Morphine Milligram Equivalents [MME] calculator [https://www.mdcalc.com/morphine-milligram-equivalents-mme-calculator]. Enhanced recovery after surgery [ERAS] protocols was introduced to all study groups and time of first mobilization, time until resumption of full oral intake, length of hospital stay, early morbidity and mortality were compared between both groups.

Assessment of oncological outcome by detailed pathological data included histopathology, grade of differentiation, tumor size, and distance of tumor from anal verge, TNM stage, circumferential resection margins and the number of lymph nodes harvested.

Before discharging, all the patients were evaluated clinically; routine laboratory investigations were ordered, and took follow up was arranged. Patients were followed up after one month, 6 months and 2 years post operatively.

Statistical analysis: The collected data was entered to and analyzed by computer using Statistical Package of Social Services, version 21 [SPSS]. Categorical variables were analyzed using the $\chi 2$ test. Continuous variables were analyzed using Mann–Whitney U test. DFS was analyzed using the Kaplan–Meier method, and comparison of DFS between two groups was performed using the log-rank test. P values less than 0.05 were considered to be significant.

RESULTS

This was a prospective study and included 50 patients with a diagnosis of adenocarcinoma of rectosigmoid/upper rectum, presented to the New Damietta Al Azhar University and Damietta Cancer center outpatient's clinics and the emergency departments and admitted to the surgery departments during the period between December 2016 and December 2018. It was planned that patients to be divided into 2 groups each of 25 patients: [Group 1]: those who were allocated to laparoscopic intervention and [Group 2]: those who were subjected to open surgical intervention.

Epidemiologic analysis: Generally, 29 males and 21 females were included, with their age ranged between 37 and 82 years. 14 males and 11 females were allocated to the Laparoscopic group. It was observed that patients from open surgery group were a slightly older than those in laparoscopic group [mean. 60.99+_11.8 years, p= 0.8 vs 60.2+_12.1], however, there was no significant difference in both gender [p= 0.3] and age distribution between the two groups.

Preoperative clinical information

Presenting symptoms: 27 patients presented with change in the bowel habit [10 of them underwent laparoscopic resection. 18 patients presented with bleeding per rectum [6 of them underwent laparoscopic resection, 12 had open surgery]. 4 patients presented to Emergency department with acute rectal bleeding that require admission and a diagnosis of recto-sigmoid cancer was made with index operation during the same admission [2 of them underwent laparoscopic resection, and 2 had open surgery]. One patient presented to Emergency department with subacute obstructive symptoms and radiologically diagnosed on a CT and had laparoscopic converted to open surgery after endoscopic confirmation of the diagnosis with a biopsy.

Patients Characteristics: There was no significant difference in term of BMI, patient comorbidities, and previous abdominal surgery between patients who underwent laparoscopic or open surgery.

Body mass index [BMI]: The mean BMI for patients who were allocated to the open group was 27.2, SD ± 5.6, and was 25.2, SD ± 4.7 for those who were allocated to the laparoscopic group. No statistical significance was found between the 2 groups [p= 0.59].

Medical comorbidities and ASA: As presented in the following 2 charts, both groups were matched in terms of background medical co-morbidities which was evident by no statistical significance in ASA grade [p=0.61].

Regarding the Environmental and Modifiable risk factors as smoking, obesity, alcohol intake, and red and processed meat, lack of physical activity and deficiency in intake of dietary fiber, whole grains, dairy products, calcium supplements, vitamin D, and marine omega-3 fatty acid as obtained from patient history: all had no significant impact on surgical or pathological outcome.

Previous abdominal operation: 10 patients [40%] from the group who underwent open surgery and 9 patients [36%] from the group who had laparoscopic surgery had a history of previous abdominal surgery. The 2 patients who had conversion from laparoscopic to open surgery did not undergo previous abdominal surgeries. There was no significant difference between the 2 groups related to previous abdominal surgery [p=0.77]

Tumor characteristic [figure 3]: From all patients enrolled to our study, 78% [39 patients] had a mass seen during endoscopy, 12% [6 patients] had an ulcerated mass, 8% [4 patients] had a malignant ulcer, and 2% [one patient] had a polyp with invasive component. The following chart is showing the distribution of tumor gross morphology in each of the open and laparoscopic group. Both groups were matched in term of the endoscopic gross tumor morphology with no statistically significant difference [p=0.28].

Tumor location [distance from the anal verge]: Regarding the distance of the lower margin of the tumor from the anal verge, of patients who had open surgery; 12 patients had their tumor distance between 20-30 cm, 7 patients between 10-20 cm, and 6 patients had their tumor distance > 30 cm. For those in the laparoscopic surgery group; 12 patients [2 of them were converted to open] had their tumor distance between 20-30 cm, 9 patients had their tumor distance > 30 cm, and 4 patients between 10-20 cm. No significant difference in the tumor distance was found between our two groups [P=0.49].

Tumor clinical staging: All patients had their clinical staging after CT, MRI or both. As shown in [figure 4], both groups were matched in terms of cT and cN stages as we found no statistically significant difference in the cT stage or the cN stage between open and laparoscopic groups [p=0.538 and p=1.0 respectively.

Surgical Management: From the 25 patients who had an open surgery, 52% [13 patients] underwent low anterior resection without having a de-functioning ileostomy, 16% [4 patients] did have a de-functioning ileostomy with the low anterior resection, 24% [6 patients] had sigmoid colectomy, and 8% [2 patients] underwent Hartman's resection. From patients who were allocated to the laparoscopic group, 48% [12 patients] underwent low anterior resection without having a de-functioning ileostomy, 8% [2 patients] did have a de-functioning ileostomy with the low anterior resection, 36% [9 patients] had sigmoid colectomy, and 8% [2 patients] underwent Hartman's resection. Two [2] patients had their operation converted to open low anterior resection [one patient developed arrhythmia after insufflation and in the other patient due to stapler failure].

Technique of anastomosis: After exclusion of 4 patients who underwent a Hartman's resection, a double stapling technique was used for anastomosis in 33 patients [71.7%] of cases, whereas hand sewn

anastomosis was performed in 12 patients of cases who had sigmoid resection and in one case of rectosigmoid resection after conversion to open surgery due to failure of stapling procedure with accounting collectively 13 cases [28.3%]. Five patients from those who were allocated to the open group [20%] had a hand sewn anastomosis, while the rest of this group [20 patients, 80%] had stapled anastomosis. For the laparoscopic group, 48% of this group [12 patients] had a hand sewn anastomosis, and a staple was used in 52% [13 patients, one of them had a conversion to open surgery] of this group. Both groups were matched and there was no significant difference in term of the technique used for anastomosis [p=0.72].

Intraoperative surgical complications: In the open surgery group, there were three cases with intraoperative bleeding that were controlled easily by suturing ligation. Also there was only one case of left ureteric injury while doing the open Sigmoidectomy and was managed with repair of the left ureter by stent and suturing. In the laparoscopic group, bleeding was encountered in two cases and was controlled easily intraoperatively by Ligasure and megaclips. Bowel injury due to thermal injury was encountered in the proximal portion in one patient and was managed by resection till healthy margin. Stapler failure had occurred in one case and was converted to the open technique. There was no statistically significant difference between study groups regarding intraoperative complications [p=0.28].

Operative and post-operative results: It is to be noted that two patients from the laparoscopic group who had conversion to open surgery; were either excluded or added to the open group during operative and postoperative analysis.

Operative time: The results showed that: in the laparoscopic group the mean operative time from skin incision till closure was increased more than in open group and this showed statistical significance. The mean operative time for the open surgery group was found to be 183.4± 20.5 which was found considerably shorter than the laparoscopic group 198.88± 18.7 [p =0.01].

Estimated blood loss [EBL]: As presented in figure 5, fewer patients in the laparoscopic group EBL <250 cc and between 250-500 cc compared to the open and converted group. On the other hand, fewer patients in the open surgery group had EBL between 500-750cc, 750-100 cc. So, these data showed that there was no statistical significant difference between the study groups regarding amount of blood loss [p =0.77].

Mobilization after surgery: Our results showed that patients who underwent laparoscopic resection were able to mobilize earlier than their counterparts in open resection and this difference was statistically significant [p=0.03].

Toleration of oral fluid and diet: Patients who had laparoscopic resection tolerated one liter of fluid and diet quicker than those who had open surgery, and this difference was only statistically significant for oral fluid but not for diet [p= 0.078; 0.17 respectively].

First bowel movement: Our results showed slightly earlier recovery of bowel function after laparoscopic surgeries. The mean time to passing first flatus was 2.8 days after laparoscopy compared 3.7 days after open surgery [p= 0.027]. The average duration that patient in the laparoscopic group needed to open their bowel after the operation was 5.32±1.31 days while in the laparoscopic group, it was 4.87±0.67 days, however this did not reach a statistical significance [p= 0.15].

The length of hospital stay: The length of hospitalization was significantly longer in laparoscopic completed surgery group [mean± SD, 8.8±2 day] than in open surgery group [mean± SD, 7.4±2.9 day] [p= 0.013].

Post-operative pain management: Regarding the pain management in our patients, 2 patients who had laparoscopic to open conversion were added to the open group. The daily MME for patients in the open group has a mean of 47.57± 21.46 compared to a mean of 37.87± 8.16 for those in the laparo-scopic group [p=0.03]. The average duration of pain killer requirement in the open group is 8.57 days while this was 5.96 days [P=0.08]. We concluded that lower doses of morphine equivalent and fewer injections of analgesics were used by patients in the laparoscopy group than those of open surgery group. The mean duration of analgesic treatment was also shorter.

Early post-operative complication [Table 4]: Totally anastomotic leak was observed in three [6%] patients and wound infection occurred in 5 cases [10 %]. In the laparoscopic group, anastomotic leak in one case [4.3%] and was treated by percutaneous drainage while surgical wound infection had occurred in one case [4.3%] and was controlled with antibiotics and daily dressings. The need for re-operation occurred once and a dead bowel was found so subtotal colectomy and end ileostomy performed. In the open group, anastomotic leak occurred in two

patients [7.4%], both were treated by re-laparotomy, washout and stoma formation while Wound infection occurred in occurred in 4 cases [14.8%]. They were managed with antibiotic and daily dressing. Postoperative ileus had occurred in 7 cases [14%]; 2 in the laparoscopic [8.7%] and 5 [18.5%] in the open surgery group and all were managed conservatively. A single case of early postoperative death was documented in the group of laparoscopic surgery on the 7th day postoperatively as a result of massive pulmonary embolism. There was no statistically significant difference between the two groups in relation to early post-operative complication [p= 0.45].

Pathological outcome: The histopathology in the surgical specimen showed adenocarcinoma in all cases except in one case from the group of open resections where the final specimen showed adenosquamous carcinoma.

Pathological staging: Pathological staging is presented in the [Table 5]: The adequacy of lymph node clearance was assessed by the number of retrieved lymph nodes in the surgical specimen weather it is ≥ or <12 lymph nodes, and it was found to be significantly more adequate in the laparoscopic group compared to the open and converted groups [p=0.028].

Margin of excised tumor: All patients had a negative longitudinal margin in the resection biopsy. 3 patients from the open group [12%] and 1 patient from the laparoscopic group [4 %] had a positive circumferential margin. This difference was not statistically significant [p= 0.67].

Follow up and Survival: For post-operative follow up, 47 patients [25 from the original open group plus the converted 2cases from the laparoscopic group and the remaining 20 laparoscopic group] were included in this analysis after excluding 3 patients: 2 due to loss of follow up and the 3rd who died 7 days after operation. 2 year postoperative follow up revealed that 6 patients had adhesive SBO [2 of them were in the laparoscopic group and 4 in the open group], 3 cases developed incisional hernias only from the open rectosigmoid resection group, 7 patients developed recurrent/ metastatic disease [4 were in the laparoscopic group and 3 from the open group]. There was no statistically significant difference between study groups in complications 2 year postoperatively [p=0.52].

Regarding patient status 2 years after the operation, 12 % [3 patients out of 25] from the open group developed recurrent or metastatic disease and the rest were alive free from the disease. In the laparoscopic group, 19% [4 patients out of 21] developed recurrent or metastatic disease, 4% [1 patient] died and the rest of patients were alive free from the disease. Therefore, the mean for overall survival time for our patients from the open group was 24.4 months, 95% Confidence Interval [95% CI 20.9 – 24.1], while for the laparoscopic group, the mean for overall survival time was 23.2 months, 95% Confidence Interval [95% CI 22 – 24.3].

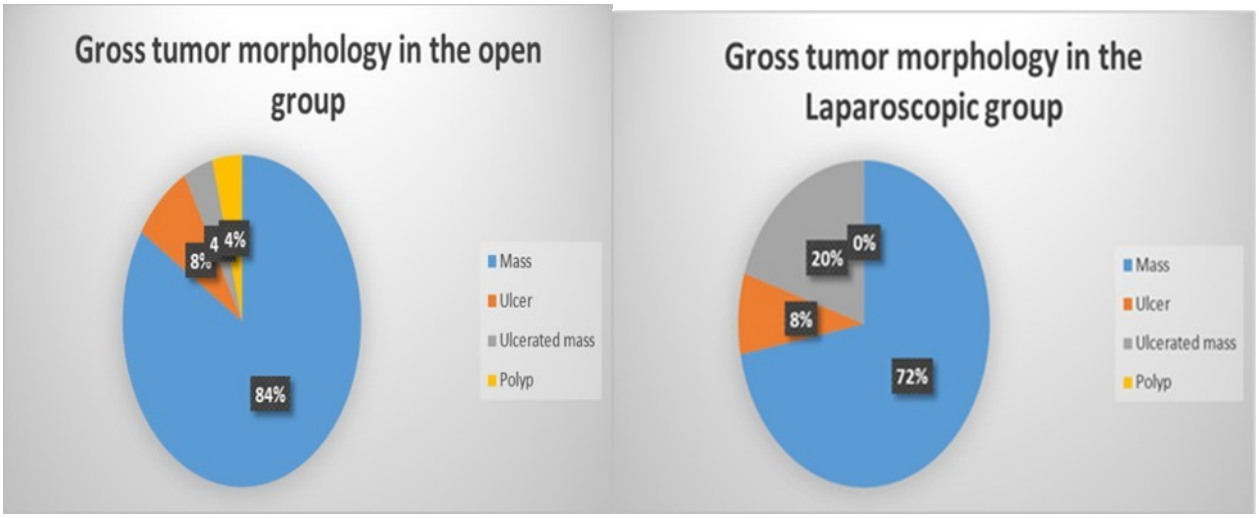


Figure [3]: Gross tumor morphology

Table [1]: Technique of anastomosis in our patients

	Procedure				Total
	LAR	SIGMOIDECTO-MY	Hartman's resection	LAR+ ileostomy	
Hand-sewn anastomosis	0	12	4 [N/A, excluded]	1	13
Stapled anastomosis	25	3	0	5	33
Total	25	15	4 [N/A, excluded]	6	46

Table [2]: Intra-operative adverse events

Complications	Total [n=50]	Laparoscopic [n=25]	Open [n=25]
Bowel injury	1	1	0
Vascular injury, bleeding	5	2	3
Left Ureteric injury	1	0	1
Stapler failure	1	1	0

Table [3]: Operative and postoperative outcome

Parameter	Laparoscopic[n=23]	Open [n=25]	P value
Operative time [minute]: Range	155-234	145-230	
Mean ± SD	198.88± 18.7	183.4± 20.5	0.01
Day of return of bowel function			
1st day flatus [mean ± SD]	2.8 ± 0.7	3.7± 0.6	0.027
1st day stool [mean ± SD]	4.87± 0.67	5.32± 1.31	0.15
Day of ambulation	1.39±0.58	1.92±0.99	0.03
Day till tolerating			
One Liter fluid	2.09±1.24	2.92± 1.87	0.078
Diet	4.39± 0.66	4.72± 0.94	0.17
Hospital stay [day]			
Mean ± SD	8.9±2.8	7.4±2.9	0.013

Table [4]: Early post-operative complications

Complications	Total = 50	Laparoscopic = 23	Open = 27
Anastomotic leak	3 [6%]	1 [4.3%]	2 [7.4%]
Wound sepsis/ dehiscence	5 [10%]	1 [4.3%]	4 [14.8%]
Postoperative ileus	7 [14%]	2 [8.7%]	5 [18.5%]
Early death [within 30 days]	1 [2%]	1 [4.3%]	0

Table [5]: Pathological T and N classification

	Whole cohort N=50	Open group N=25	Lap group N=23	Lap conversion N=2	P value
T staging:					
T1	2	2	0	0	0.54
T2	30	12	16	2	
T3	18	11	7	0	
N staging:					
N1	3	2	0	1	**0.02**
N2	45	21	23	1	
N3	2	2	0	0	

Table [6]: Postoperative follow up and survival in the studied patients

Postoperative complications	Total [n = 50]	Laparoscopic group[n=20] 25-[1 died +2 lost + 2 converted] =21		Open group [n=25 + 2 converted] = 27	
		No.	%	No.	%
Adhesion	6 [12%]	2	10	4	15
Incisional hernia	3 [6%]	0	0	3	11%
Recurrence/ metastasis	7 [14%]	4	20	3	11%

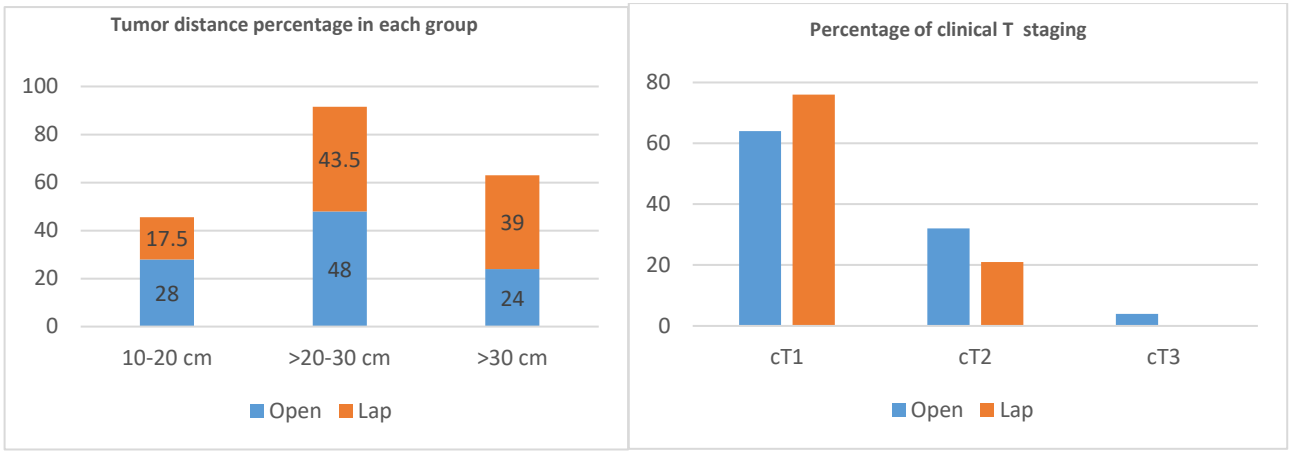


Figure [4]: Tumor distance and Percentage of clinical T stag in the study groups

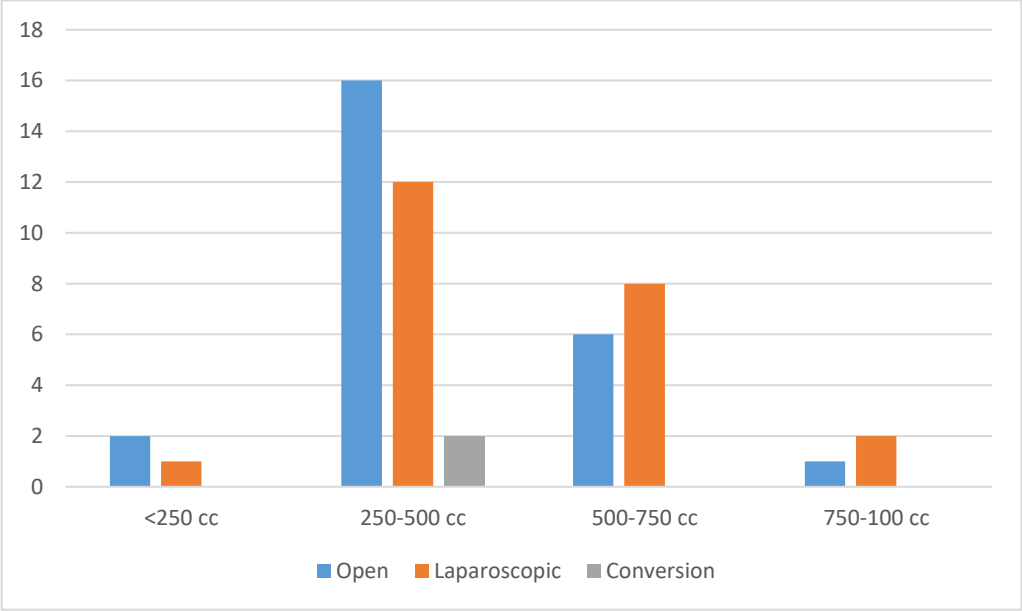


Figure [5]: Estimated blood loss in the study groups

DISCUSSION

Colorectal cancer is one of the common malignant tumors and poses a serious threat to people's health. Surgical resection of the primary tumor is still the only curative method. Colorectal Surgery has changed with the advent of laparoscopic techniques and there is significant literature supporting its use over open surgery [13, 14].

Despite the evidence of significant short- and long-term benefits compared with the open approach, the incorporation of laparoscopic techniques in developing countries has been challenging, due in particular to the high costs of equipment and lack of expertise [15].

Moreover, there is some recent controversial data concluding that laparoscopic resection should not be routinely recommended especially when treating rectal cancer in view of ergonomic considerations and oncological merits [16, 17].

Our patients were recruited from two centers in Damietta Governorate; one of them is a laparoscopic naive center which has not introduced MIS surgery until recently and the other has the main laparoscopic experience reserved primarily for benign Upper GI and Bariatric work. In our study, we aimed at assessing feasibility and evolving institutional experience with the application of MIS approaches to rectosigmoid cancer via comparing laparoscopic versus the conventional approach. Patients were randomly distributed to two groups' twenty-five patients each' the laparoscopic group and the open group. The baseline characteristics of the patients and tumors were well matched. The conversion rate in the current study was 8% as only two patients had their operation converted to open low anterior resection which was comparable to a recent prospective randomized trial which has revealed a conversion rate as high as 9.7% [18] while another study reported a significant reduction of the

conversion rate to 5.5% with increasing experience in laparoscopy and number of laparoscopic resections [19].

Oncological outcome has been reported to be worse in converted laparoscopic colorectal cancer patients compared to open resections in a recent meta-analysis [20]

A pooled result from a meta-analysis showed that the laparoscopic surgery group dramatically increased operative time and decreased blood loss compared with the open surgery group [21], while our results showed the same for operative time as it was significantly longer in the open group, but the blood loss did not show a statistical difference between the two groups.

According to our study, Length of hospital stay was significantly longer in laparoscopic-successful group [8.9±2.8 day] than open surgery group [7.4±2.9 day] [P=0.013]. Moreover, Pain control was significantly improved in the laparoscopic group evident by decreased opiate daily requirement as well as the duration of Analgesia requirement. The daily MME for patients in the laparoscopic group has a mean of 37.87± 8.16 compared to a mean of 47.57± 21.46 for those in the open group [P=0.03]. The average duration of analgesic requirement was 5.96 days in the laparoscopic group while this was 8.57 days in the open group [P=0.08]. We concluded that lower doses of morphine equivalent and fewer injections of analgesics were used by patients in the laparoscopy group than those of open surgery group. The mean duration of analgesic treatment was also shorter. Post-operative recovery in term of mobilization, our patients who underwent laparoscopic resection were able to mobilize earlier than those in open resection and this difference was statistically significant [P =0.03].

In term of diet and fluid tolerability, our patients who had laparoscopic resection tolerated one liter of fluid and diet quicker than those who had open surgery, and this difference was only statistically significant for oral fluid but not for diet. When compared with open surgery in literatures, MIS technique maintain similar advantages, including shorter hospital length of stay, shorter duration of narcotic use, decreased pain scores and quicker return of bowel function [22-24].

With regards to length of hospital stay, this was significantly shorter in the laparoscopic total colectomy cohort in in two of recent studies when compared to the open total colectomy cohort [25, 26].

In addition, both postoperative solid diet intake start and hospital stay were shorter in the laparoscopic group in a multicenter study of 1830 patients with descending and transverse colon cancer in Japan [27].

Our results revealed slightly earlier recovery of bowel function after laparoscopic surgeries however were not statistically significance for time to first passing flatus but not for opening bowel. A meta-analysis on short term outcome of laparoscopic surgery on colorectal carcinoma showed that bowel activity recovery was significantly earlier in the laparoscopic group than in the open group [28].

The current popular enhanced recovery after surgery [ERAS] pathways could also promote bowel function recovery after laparoscopic surgery. It was a hot topic in CRC surgery [29].

Current study showed that early postoperative complications as anastomotic leakage, wound infection and post-operative ileus rates were lower in laparoscopic group [4.3% vs7.4%] - [4.3% vs14.8%] and [8.7% vs18.5%] respectively but this was not statistically significant in our cohorts. Laparoscopic surgery was found to significantly reduce the incidence of SSI when compared to open surgery in a meta-analysis of 5797 patients [30].

In a study which utilized the American College of Surgeons National Surgical Quality Improvement Program [ACS-NSQIP] database to examine the 30-day rates of postoperative complications, it was concluded that MIS was associated with significantly lower 30-day PO complications, unplanned re-admission including 152114 patients who underwent colon resection [31].

Anastomotic leak is a potentially devastating consequence of colorectal surgery and it continues to be variably reported, with an incidence ranging widely from 5% to 19%, depending on the site and type of anastomosis and the cohort under investigation [32].

Laparoscopic surgery has consistently been shown to have comparable or improved short-term and oncological long-term outcomes when compared to conventional open colectomy. However, literature evaluating the effect of laparoscopic surgery on anastomotic leak rate is inconsistent and inconclusive; there has been some concern that laparoscopy is associated with increased rates of anastomotic failure as concluded from the Conventional versus Laparoscopic-Assisted Surgery in patients with Colorectal Cancer

[CLASICC] trial which demonstrated leak rates of 3% and 4 % respectively for open and laparoscopic colonic resections; for rectal resections the respective rates were 7 and 8 per cent [33].

Most studies, however, including meta-analysis show no significant difference in anastomotic leak rates although the majority of the included papers were of poor quality [34, 35].

All patients had a negative longitudinal margin in the resection biopsy. 3 patients from the open group [12%] and 1 patient from the laparoscopic group [4 %] had a positive circumferential margin. This difference was not statistically significant [P= 0.67]. In our study, on comparing the pathologic outcomes, the number of retrieved lymph nodes was significantly more adequate in the laparoscopic than in the open group but regarding the distal margin All patients had a negative longitudinal margin in the resection biopsy but concerning the circumferential excised margins [12%] from the open group and [4 %] from the laparoscopic group had a positive circumferential margin with no significant difference. Similar results were also reported in a recent case series study which showed that the laparoscopic group had more harvested mesenteric lymph nodes [5.0 nodes, 95% confidence interval [CI]: 1.8e8.1; p-value: <0.01] with comparable margin status [p-value: 0.66] [36]. However, in a Danish nationwide propensity score matched database study, laparoscopic resection was associated with a higher probability of good resection quality [defined as resection performed either in the mesocolic plane accompanied by R0 resection, or by a resection performed in the intramesocolic plane accompanied by R0 resection. compared with open resection for colonic cancer though there was no statistical difference in regard to obtaining a minimum of 12 lymph nodes between laparoscopic and open surgery [37].

On the other hand, few studies comparing open and laparoscopic resection showed comparable lymph node harvesting in both techniques [38, 39].

Our results did not show a difference regarding the post-operative follow up and survival analysis where the mean for overall survival time for our patients from the open group was 24.4 months, 95% Confidence Interval [95% CI 20.9 – 24.1], while for the laparoscopic group, it was 23.2 months, 95% Confidence Interval [95% CI 22 – 24.3].

In the literature, the laparoscopic and the open approach seem to be equivalent in terms of long-term survival and disease-free survival [40, 41].

However, a one-year mortality reduction over the time periods of a recent population-based study in 4 major European countries were thought likely to be due to improvements in surgical procedures and utilizing laparoscopy, as well as improved perioperative and postoperative care [41].

Conclusion:

Though Judgments are difficult to make, our results on practicality and short term outcome largely correspond to the results in the literature. Laparoscopic surgery for rectosigmoid cancer and rectal cancer is possible and can be done safely with comparable oncological clearance. Laparoscopic surgery offered numerous advantages beyond aesthetics compared to open surgery, and should nowadays be considered as standard of care when both approaches are suitable.

Conflict of interest and financial disclosure

None to be disclosed

REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018 Nov; 68[6]: 394-424. doi: 10.3322/caac.21492.

2. Ramzy I, Hasaballah M, Marzaban R, Shaker O, Soliman ZA. Evaluation of microRNAs-29a, 92a and 145 in colorectal carcinoma as candidate diagnostic markers: An Egyptian pilot study. Clin Res Hepatol Gastroenterol. 2015 Sep;39[4]:508-15. doi: 10.1016/j.clinre.2014.12. 008.

3. Hall GM, Shanmugan S, Bleier JI, Jeganathan AN, Epstein AJ, Paulson EC. Colorectal specialization and survival in colorectal cancer. Colorectal Dis. 2016 Feb;18[2]:O51-60. doi: 10.1111/codi.13246.

4. Nussbaum DP, Speicher PJ, Ganapathi AM, Englum BR, Keenan JE, Mantyh CR, Migaly J. Laparoscopic versus open low anterior resection for rectal cancer: results from the national cancer data base. J Gastrointest Surg. 2015 Jan;19 [1]: 124-31; discussion 131-2. doi: 10. 1007/s11605-014-2614-1.

5. Stormark K, Søreide K, Søreide JA, Kvaløy JT, Pfeffer F, Eriksen MT, Nedrebø BS, Kørner H. Nationwide implementation of laparoscopic surgery for colon cancer: short-term outcomes and long-term survival in a population-based cohort. Surg Endosc. 2016 Nov;30[11]:4853-4864. doi: 10.1007/s00464-016-4819-8.

6. Tjandra JJ, Chan MK. Systematic review on the short-term outcome of laparoscopic resection for colon and rectosigmoid cancer. Colorectal Dis. 2006 Jun; 8 [5]: 375-88. doi: 10.1111/j.1463-1318. 2006. 00974.x.

7. Zhao JK, Chen NZ, Zheng JB, He S, Sun XJ. Laparoscopic versus open surgery for rectal cancer: Results of a systematic review and meta-analysis on clinical efficacy. Mol Clin Oncol. 2014; 2[6]:1097-1102. doi: 10.3892/mco. 2014.345.

8. Conticchio M, Papagni V, Notarnicola M, Delvecchio A, Riccelli U, Ammendola M, *et al*. Laparoscopic vs. open mesorectal excision for rectal cancer: Are these approaches still comparable? A systematic review and meta-analysis. PLoS One. 2020 Jul 28;15[7]: e0235887. doi: 10.1371/ journal.pone. 0235887.

9. Kosinski L, Habr-Gama A, Ludwig K, Perez R. Shifting concepts in rectal cancer management: a review of contemporary primary rectal cancer treatment strategies. CA Cancer J Clin. 2012;62 [3]:173-202. doi: 10.3322/caac.21138.

10. Baigrie RJ, Stupart D. Introduction of laparoscopic colorectal cancer surgery in developing nations. Br J Surg. 2010 May; 97[5]:625-7. doi: 10.1002/ bjs.7090.

11. Amin AT, Ahmed BM, Khallaf SM. Safety and feasibility of laparoscopic colo-rectal surgery for cancer at a tertiary center in a developing country: Egypt as an example. J Egypt Natl Canc Inst. 2015; 27[2]:91-5. doi: 10.1016/j. jnci.2015.03. 005.

12. Mahmoud AMA, Moneer MM. Toward standard-ization of laparoscopic resection for colorectal cancer in developing countries: A step by step module. J Egypt Natl Canc Inst. 2017 Sep; 29 [3]:135-140. doi: 10.1016/j.jnci.2017.04. 003.

13. Wu ZJ, Huang XW, Yu JH, Lin HZ, Zheng FW. Short-term clinical and oncological outcomes after single-incision plus one-port laparoscopic surgery for rectosigmoid cancer: a retrospective clinical analysis of 30 cases. J Int Med Res. 2021 Jul; 49 [7]: 3000605211019674. doi: 10.1177/ 0300060521101-9674.

14. Donlon NE, Nugent TS, Free R, Hafeez A, Kalbassi R, Neary PC, O'Riordain DS. Robotic versus laparoscopic anterior resections for rectal and rectosigmoid cancer: an institutional experience. Ir J Med Sci. 2022 Apr;191[2]:845-851. doi: 10.1007/ s11845-021-02625-z.

15. Choy I, Kitto S, Adu-Aryee N, Okrainec A. Barriers to the uptake of laparoscopic surgery in a lower-middle-income country. Surg Endosc. 2013; 27 [11]: 4009-15. doi: 10.1007/s00464-013-3019-z.

16. Abbas SK, Yelika SB, You K, Mathai J, Essani R, Krivokapić Z, Bergamaschi R. Rectal cancer should not be resected laparoscopically: the rationale and the data. Tech Coloproctol. 2017 Mar; 21[3]:237-240. doi: 10.1007/s10151-017-1596-x.

17. Chiu CC, Lin WL, Shi HY, Huang CC, Chen JJ, Su SB, *et al*. Comparison of Oncologic Outcomes in Laparoscopic versus Open Surgery for Non-Metastatic Colorectal Cancer: Personal Experience in a Single Institution. J Clin Med. 2019 Jun 19;8[6]:875. doi: 10.3390/ jcm8060875.

18. Allaix ME, Furnée EJ, Mistrangelo M, Arezzo A, Morino M. Conversion of laparoscopic colorectal resection for cancer: What is the impact on short-term outcomes and survival? World J Gastroenterol. 2016 Oct 7;22[37]:8304-8313. doi: 10.3748/wjg. v22.i37.8304.

19. Tekkis PP, Senagore AJ, Delaney CP. Conversion rates in laparoscopic colorectal surgery: a predictive model with, 1253 patients. Surg Endosc. 2005 Jan; 19[1]:47-54. doi: 10. 1007/ s00464-004-8904-z.

20. Wu B, Wang W, Hao G, Song G. Effect of cancer characteristics and oncological outcomes associated with laparoscopic colorectal resection converted to open surgery: A meta-analysis. Medicine [Baltimore]. 2018 Dec;97[50]:e13317. doi: 10.1097/ MD.0000000000013317.

21. Song XJ, Liu ZL, Zeng R, Ye W. A meta-analysis of laparoscopic surgery versus conventional open surgery in the treatment of colorectal cancer. Medicine [Baltimore]. 2019; 98[17]: e15347. doi: 10.1097/MD. 0000000000015347.

22. Weeks JC, Nelson H, Gelber S, Sargent D, Schroeder G; Clinical Outcomes of Surgical Therapy [COST] Study Group. Short-term quality-of-life outcomes following laparoscopic-assisted colectomy vs open colectomy for colon cancer: a randomized trial. JAMA. 2002 Jan 16;287[3]:321-8. doi: 10.1001/ jama.287.3.321.

23. Schwenk W, Haase O, Neudecker J, Müller JM. Short term benefits for laparoscopic colorectal resection. Cochrane Database Syst Rev. 2005; 2005 [3]: CD003145. doi: 10.1002/14651858. CD003145. pub2.

24. Basse L, Jakobsen DH, Bardram L, Billesbølle P, Lund C, Mogensen T, Rosenberg J, Kehlet H. Functional recovery after open versus laparoscopic colonic resection: a randomized, blinded study. Ann Surg. 2005 Mar;241[3]:416-23. doi: 10.1097/01.sla.0000154149.85506.36.

25. Kothari P, Congiusta DV, Merchant AM. Laparoscopic versus open colectomy: the impact

of frailty on outcomes. Updates Surg. 2019 Mar; 71[1]:89-96. doi: 10.1007/s13304-018-0531-7.

26. Gavriilidis P, Katsanos K. Laparoscopic Versus Open Transverse Colectomy: A Systematic Review and Meta-Analysis. World J Surg. 2018 Sep; 42 [9]:3008-3014. doi: 10.1007/s00268-018-4570-5.

27. Yamaguchi S, Tashiro J, Araki R, Okuda J, Hanai T, Otsuka K, *et al*. Laparoscopic versus open resection for transverse and descending colon cancer: Short-term and long-term outcomes of a multicenter retrospective study of 1830 patients. Asian J Endosc Surg. 2017 Aug;10[3]:268-275. doi: 10.1111/ases.12373.

28. Tong G, Zhang G, Liu J, Zheng Z, Chen Y, Cui E. A meta-analysis of short-term outcome of laparoscopic surgery versus conventional open surgery on colorectal carcinoma. Medicine [Baltimore]. 2017; 96[48]:e8957. doi: 10.1097/ MD.0000000000008957.

29. Spanjersberg WR, van Sambeeck JD, Bremers A, Rosman C, van Laarhoven CJ. Systematic review and meta-analysis for laparoscopic versus open colon surgery with or without an ERAS programme. Surg Endosc. 2015 Dec;29 [12]: 3443-53. doi: 10.1007/s00464-015-4148-3.

30. Kulkarni N, Arulampalam T. Laparoscopic surgery reduces the incidence of surgical site infections compared to the open approach for colorectal procedures: a meta-analysis. Tech Coloproctol. 2020 Oct;24[10]:1017-1024. doi: 10.1007/s10151-020-02293-8.

31. Sood A, Meyer CP, Abdollah F, Sammon JD, Sun M, Lipsitz SR, *et al*. Minimally invasive surgery and its impact on 30-day postoperative complications, unplanned readmissions and mortality. Br J Surg. 2017 Sep;104[10]:1372-1381. doi: 10.1002/bjs. 10561.

32. Vallance A, Wexner S, Berho M, Cahill R, Coleman M, Haboubi N, *et al*. A collaborative review of the current concepts and challenges of anastomotic leaks in colorectal surgery. Colorectal Dis. 2017 Jan;19[1]:O1-O12. doi: 10.1111/codi.13534..

33. Jayne DG, Thorpe HC, Copeland J, Quirke P, Brown JM, Guillou PJ. Five-year follow-up of the Medical Research Council CLASICC trial of laparoscopically assisted versus open surgery for colorectal cancer. Br J Surg. 2010 Nov; 97 [11]: 1638-45. doi: 10.1002/bjs. 7160.

34. Hua L, Wang C, Yao K, Zhang J, Chen J, Ma W. Is the incidence of postoperative anastomotic leakage different between laparoscopic and open total mesorectal excision in patients with rectal cancer? A meta-analysis based on randomized controlled trials and controlled clinical trials. J Cancer Res Ther. 2014 Dec;10 Suppl:272-5. doi: 10.4103/ 0973-1482. 151491.

35. McDermott FD, Heeney A, Kelly ME, Steele RJ, Carlson GL. Systematic review of preoperative, intraoperative and postoperative risk factors for colorectal anastomotic leaks. Br J Surg. 2015; 102[5]:462-79. doi: 10.1002/ bjs.9697.

36. Tunruttanakul S, Chareonsil B, Charernsuk M. Operative outcome of laparoscopic colorectal cancer surgery in a regional hospital in a developing country: A propensity score-matched comparative analysis. Asian J Surg. 2021 Jan;44 [1]:329-333. doi: 10.1016/j.asjsur.2020.08.007.

37. Vogelsang RP, Klein MF, Gögenur I. Risk Factors for Compromised Surgical Resection: A Nationwide Propensity Score-Matched Study on Laparoscopic and Open Resection for Colonic Cancer. Dis Colon Rectum. 2019;62[4]: 438-446. doi: 10.1097/ DCR. 0000000000001304.

38. Stracci F, Bianconi F, Leite S, Liso A, La Rosa F, Lancellotta V, van de Velde CJ, Aristei C. Linking surgical specimen length and examined lymph nodes in colorectal cancer patients. Eur J Surg Oncol. 2016 Feb;42[2]:260-5. doi: 10. 1016/j.ejso.2015.11.017.

39. Bizzoca C, Zupo R, Aquilino F, Castellana F, Fiore F, Sardone R, Vincenti L. Video-Laparoscopic versus Open Surgery in Obese Patients with Colorectal Cancer: A Propensity Score Matching Study. Cancers [Basel]. 2021 Apr;13[8]:1844. doi: 10.3390/cancers13081844.

40. Völkel V, Draeger T, Gerken M, Klinkhammer-Schalke M, Benz S, Fürst A. Laparoscopic surgery for colon cancer. A systematic review with special focus on real-world data. Coloproctology 2020; 42 [5]: 413-420. doi: 10. 1007/s00053-020-00481-6.

41. Bahadoer RR, Bastiaannet E, Claassen YHM, van der Mark M, van Eycken E, Verbeeck J, *et al*. One-year excess mortality and treatment in surgically treated patients with colorectal cancer: A EURECCA European comparison. Eur J Surg Oncol. 2021Jul;47[7]:1651-1660. doi: 10.1016/ j.ejso.2021. 01.011.

5/2022

International Journal of Medical Arts

https://ijma.journals.ekb.eg/
Print ISSN: 2636-4174
Online ISSN: 2682-3780