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Laparoscopic Total Mesorectal Excision in Patients with Anorectal Carcinoma: Our Early Experience

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ABSTRACT

Background: Total mesorectal excision allows en bloc removal of the mesorectum with the rectal fascia and decreases the recurrence rate to 5%. The aim of the study was to evaluate the feasibility of the laparoscopic total mesorectal excision in anorectal cancer.

Patient and Methods: Twenty-four patients were included in the study. Laparoscopic total mesorectal excision was done in all patients. Patients were followed up during their hospital stay and after discharge for recurrence and other relevant data.

Results: The mean age of studied group was 52.2 ± 12.4 years and the majority of them were females (66.7%).The mean operative time was 150.4 ± 32.6 minutes, and the mean hospital stay was 2.6±0.69 days and, the mean blood loss was 181.7±48.97cc. The majority of the studied group (95.84%) had no recurrence. As regard complications, the majority of the patients (66.7%) had no complications. However, 8.3% of them had wound infection, stoma complication, chest infection and leakage.

Conclusion: Laparoscopic TME in sphincter preserving rectal resection can be performed with good technical efficiency, quick functional recovery, and mild disability less operative blood loss and operative trauma.

Keywords: Mesorectal, Cancer, Laparoscopic, Anorectal.

INTRODUCTION

Colorectal cancer (CRC) is the third most common cancer in males and the second most common in females, with 1.2 million annual new cases worldwide. Over 143000 new cases of CRC are diagnosed annually in the United States, and approximately 52000 Americans die of the disease every year. These deaths account for approximately 9% of all cancer mortality [1].

The total mesorectal excision (TME) technique described by Heald, which consists of resection of the rectum within the mesorectal envelope, allows for the removal of the mesorectum en bloc along with the fascia recti propria [2]. The local recurrence rate in rectal cancer patients exceeded 25% before implementation of the TME technique, whereas the local recurrence rate was reduced to 4% to 5% with the implementation of TME [2].

The complete TME has components including: (1) high ligation of the inferior mesenteric artery (IMA), (2) complete mobilization of the splenic flexure, (3) division of the colon at the descending sigmoid junction, (4) sharp dissection in the avascular plane into the pelvis anterior the presacral fascia and outside the fascia propria or enveloping visceral fascia, (5) division of lymphatic and middle hemorrhoidal vessels anterolaterally, and (6) inclusion of all pelvic fat and lymphatic material at least 2 cm below the level of the distal margin.

All of these criteria have been validated by multiple studies and are the framework for current

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practice guidelines [3].So, the aim of this work is to evaluate the outcome of Laparoscopic total mesorectal excision of anorectal and rectosigmoid cancers as our early experience and assessing the feasibility of its routine use in our daily practice.

PATIENTS AND METHODS

After approval of the University Ethical Committee, this study was conducted on patients presenting with mid and low rectal cancer to the outpatient clinic of both Zagazig University Hospitals & El-Salam Oncology Center during the period from July 2017 to 2020.All the procedures were done on elective basis.

Inclusion criteria included ages between 15-70 years and fitness for laparoscopic surgery. While patients with tumors above rectosigmoid junction, patients with locally advanced rectal cancer, patients with metastatic rectal cancer (except liver metastasis) and all emergency cases (e.g. perforation, obstruction) were excluded.

All patients were subjected to full history taking, complete physical examination including rectal and vaginal examination. Routine blood investigations included complete blood count, liver and kidney function, INR and blood glucose levels. Other investigations included serum CEA and CA19-9. Radiological investigations included chest X-ray, pelviabdominal ultrasound and CT with IV and oral contrast. Colonoscopic examination and biopsy was done as well for all patients.
Patients with advanced rectal cancer received chemoradiotherapy in the form of long course radiotherapy for 4 weeks followed by surgery after 4-6 weeks. An informed consent was obtained from all patients.

Preparation:

We did not use routine preoperative bowel preparation but single preoperative enema at the morning of the operation to avoid the column of faeces at the stable line.

Routine perioperatie intravenous antibiotic in the form of third generation cephalosporins and metronidazole within 30 minutes of the skin incision was given to all patients. Prophylactic measures against venous thrombosis were taken and all patients received prophylactic measures according to risk stratification by Rogero and Caprini scores.

Operative Technique:

All patients received general anesthesia. An orogastric tube and Foley’s catheter were inserted together with elastic stockings.
A 10-mm disposable Visi-port was inserted through the supraumbilical port and the abdominal cavity was entered under vision.

The camera was inserted into the abdomen and an initial laparoscopy performed, carefully evaluating the liver, small bowel, and peritoneal surfaces. A 12-mm port was inserted through the right lower quadrant approximately 2 to 3cm medial and superior to the anterior superior iliac spine. A 5-mm port was then inserted in the right upper quadrant at least a hand's breadth superior to the lower quadrant port. A left lower quadrant 5-mm port was also inserted.

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The patient was rotated with the left side up and right side down, to approximately 15 to 20○ tilt, and often as far as the table can go. This helped to move the small bowel to the right side of the abdomen. The patient was then placed in the Trendelenburg position. This again helped gravitational migration of the small bowel away from the operative field.

Two atraumatic bowel clamps were inserted through the two right- sided abdominal ports. The greater omentum was reflected over the transverse colon so that it went to lie on the stomach. The small bowel was moved to the patient's right side allowing visualization of the medial aspect of the rectosigmoid mesentery pedicle. This necessitated the use of the assistant's 5-mm atraumatic bowel clamp through the left lower quadrant to tent the sigmoid mesentery cephalad.

An atraumatic bowel clamp was placed on the rectosigmoid mesentery at the level of the sacral promontory, approximately half way between the bowel wall and the promontory itself. This area was then stretched up toward the left lower quadrant port, stretching the inferior mesenteric vessels away from the retroperitoneum.

Cautery was used to open the peritoneum along this line, opening the plane cranially up to the origin of the inferior mesenteric artery, and caudally past the sacral promontory. Blunt dissection was then used to lift the vessels away from the retroperitoneum and presacral autonomic nerves.
The ureter was then looked for under the inferior mesenteric artery. If the ureter cannot be seen and the dissection was in the correct plane, the ureter should be just deep to the parietal peritoneum, and just medial to the gonadal vessels. Care was taken not to dissect too deep and injure the iliac vessels. If the ureter cannot be found, it has usually been elevated on the back of the inferior mesenteric pedicle, and one needed to stay very close to the vessel not only to find the ureter but also to protect the autonomic nerves. We routinely perform the medial to lateral dissection in which the plane between the retroperitoneam and the mesentery was developed which is avascular plane between toldts fascia and the mesentry and by working in this plane all the retroperitoneal structures are protected under the fascia.

Cautery was then used to open a window in the peritoneum, lateral to the inferior mesenteric vessels. The vessel was divided near its origin. Laparoscopic clips are used to divide the vessel. Other energy sources were also used. The inferior mesenteric vein was identified and divided proximally at the lower border of the pancreas.
Having divided the vessel, the plane between the descending colon mesentery and the retroperitoneum was developed laterally, out toward the lateral attachment of the colon, and superiorly, dissecting the bowel off the anterior surface of the Gerota's fascia up toward the splenic flexure.

In all cases of our study we had performed splenic flexure mobilization as the anastomosis was always low down in the pelvis and few centimeters above the anal verge. We used the same technique in mobilization of the splenic flexure by working up after ligation of the inferior mesenteric vein and continue from below in the plane between the splenic flexure and the retroperitoneam until the spleen and the lesser sac is visible from below. We then divided the peritoneal attachments between the pancreas and the colon to enter the lesser sac. The last attachment between the spleen and tail of pancreas to the splenic flexure were divided during lateral

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mobilization of the colon.
The rectosigmoid junction was grasped with the left-hand instrument and was drawed to the patient's right side. This allowed the lateral attachments of the sigmoid and descending colon to be seen and divided using cautery.

Atraumatic bowel clamps that were inserted through the left-sided ports were used to elevate the rectosigmoid colon out of the pelvis and away from the retroperitoneum and sacral promontory, to enable entry into the presacral space.

The posterior aspect of the mesorectum was identified and the mesorectal plane dissected with diathermy, preserving the hypogastric nerves passing down into the pelvis anterior to the sacrum. Dissection continued down the presacral space in this avascular plane toward the pelvic floor. Attention was switched to the peritoneum on the right side of the rectum. This was divided to the level of the seminal vesicles or rectovaginal septum. This was repeated on the peritoneum on the left side of the rectum. This facilitated further posterior dissection along the back of the mesorectum to the pelvic floor, to a level inferior to the lower edge of the mesorectum. Usually, when the approach is low on the posterior surface of the mesorectum, it became necessary to perform a lateral and anterior dissection.

A bowel grasper inserted through the left iliac fossa port was used to retract the peritoneum anterior to the rectum forward. The peritoneal dissection was continued from the free edge of the lateral peritoneal dissection, anteriorly. Lateral dissection was continued on both sides of the rectum and was extended anterior to the rectum in front of Denonvillier's fascia, separating the posterior vaginal wall from the anterior wall of the rectum or down past the level of the prostate in men. It was necessary to perform a total mesorectal excision and hence the rectum must be dissected down close to the muscle tube of the rectum below the level of the mesorectum. If sphincter preservation deemed possible when adequate distal and circumferential margin can be obtained without evidence of sphincter infiltration, the rectum is divided as low as possible as guided by DRE with stapler (ECHELON FLEX™ GST System, Ethicon).

The specimen is extracted through pfennestiel incision and the anvil of the circular stapler is applied to the proximal cut margin of the colon. The anvil is returned back to the abdomen and the wound is closed. The abdomen is reinsuflated and the circular stapler is introduced through the anus and is fitted to the anvil now the intestinal continuity is restored, we usually protect our anastomosis by covering ileostomy.

We performed intersphincteric resection when the tumour is low lying with no infiltration of the sphincters, it is our technique to complete the intersphincteric resection from above after complete rectal mobilization and TME to the level of the pelvic floor, we divide the hiatal ligament which is a tense fascial layer between the levator and the rectum posteriorly and then completion of the dissection both laterally and anteriorly until we palpate the tip of dissecting instrument at the anal margin at the proposed site of the intersphincteric space. At this point we shift to the perineal approach where we divide the rectum above the dentate line when possible and perform coloanal anastomosis. Covering ileostomy was done for all patients underwent intersphincteric resection.
In APR Perineal part: After completeness of abdominal part patient position is modified to

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lithotomy position then after prepping and drabbing of the perineum was done. We used the classic approach to perform the perineal part of the operation as the following: After closure of the anus with purse string suture using silk suture. An elliptical incision is created that extends from the midpoint of the perineal body in the men, or the posterior vaginal introitus in the women back to a point midway between the coccyx and the anus.

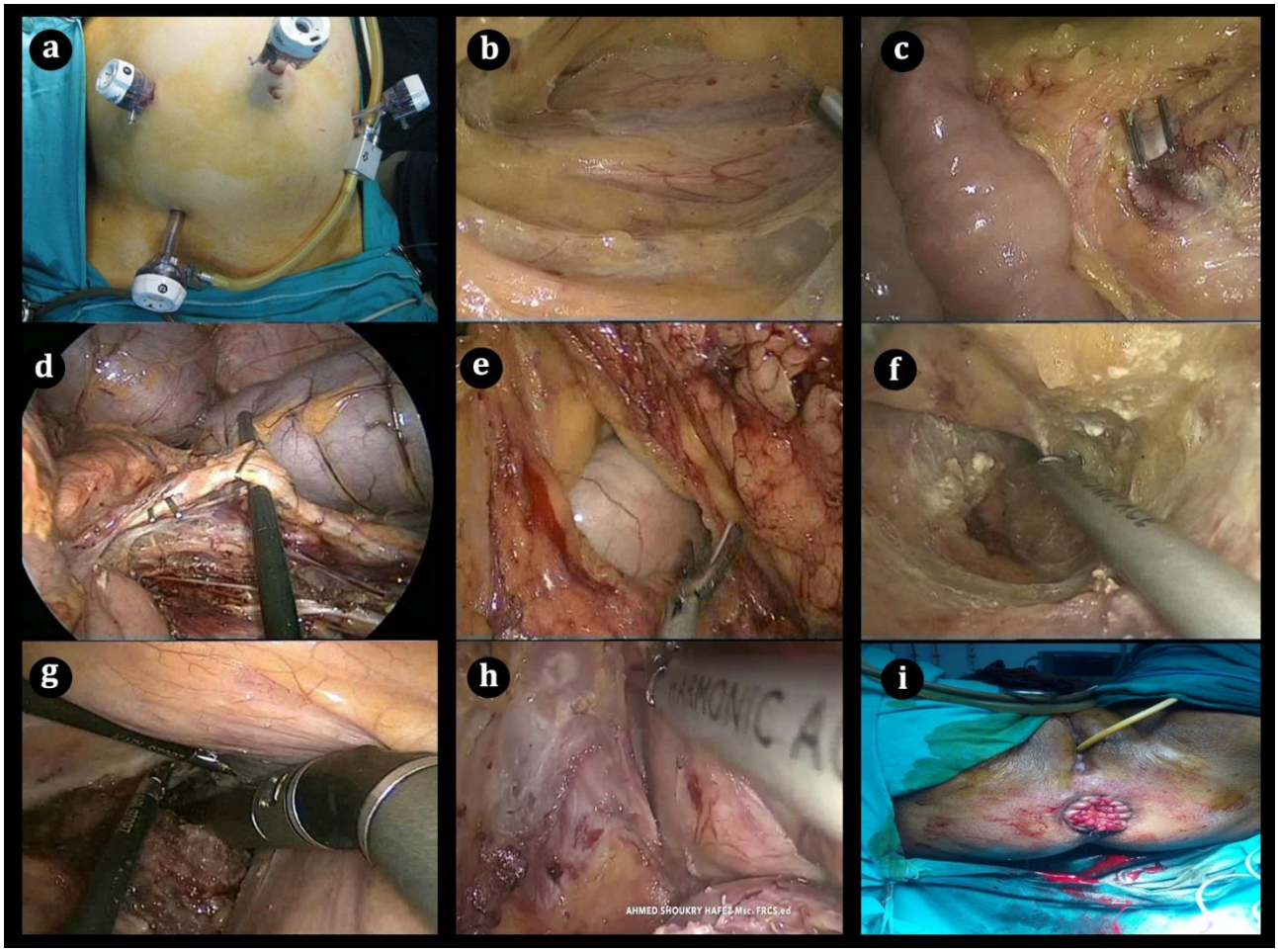

Fig. (1): Operative steps. a) Port insertion; b) Media to lateral dissection; c) High ligation of inferior mesenteric artery; d) Ligation of inferior mesenteric vein; e) Splenic flexure mobilization; f) Mobilization of the rectum posteriorly; g) Dividing the rectum with endoGIA; h) Inter-sphincteric plain of dissection; i) Coloanal anastomosis by handsewn technique after intersphincteric resection.

The incision was continued down through the subcutaneous tissue into the ischiorectal fat using electrocautery, dissection was continued posteriorly and laterally where the inferior hemorrhoidal artery is encountered and ligated. The index finger was used as a guide to resect the levator muscle, then dissection begun anteriorly where transverse perinei and rectourethralis muscles are divided. The specimen was delivered through the perineum and the perineum was closed after approximation of the muscles to prevent perineal hernia after irrigation with saline and putting a drain which removed after 7 days. Insufflation of abdomen again with CO_2 was done to construct the end colostomy, the proximal end of the sigmoid colon was pulled up through the left lower quadrant trocar and fixed to anterior abdominal wall. An intra-abdominal drain was usually left for 3 days and then removed. Closure of the port sites with interrupted sutures.

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Indocyanine-green ICG was intravenously injected after a satisfactory primary visual assessment before resection. ICG was supplied as a sterile water-soluble lyophilized powder. It was injected intravenously, at a dosage of 0.3 mg/kg, two times: before the resection of the colon and after the completion of the anastomosis to assess colonic stumps and margins perfusion.

Fluorescence is excited by exposition to a near-infrared (NIR) light source, therefore a special scope and camera equipped with a xenon light source providing both NIR wavelength and standard light was employed (KARL STORZ GmbH & Co. KG, Tuttlingen, Germany). Switching from standard to NIR light was activated by the surgeon. The vascularization of the colon was analyzed with NIR light following 1 min of the injection of ICG, and waiting until a good perfusion signal was evident, to confirm the level of colonic resection that was chosen by standard visual inspection. The perfusion of the previously identified site of resection was judged as "good" (meaning uniform distribution of fluorescence to the chosen level of proximal colon resection), "poor" (meaning non-uniform distribution of fluorescence to the chosen level of proximal colon resection), or "absent" (if no fluorescence was observed in the 10 cm proximal to the chosen level of colon resection).

Fig. (2): Using ICG after dissection and before resection.

If poor or absent perfusion were demonstrated, a further inspection of the bowel was done following 180 s, prior to re-resect the bowel. The entire procedural time ranged between 2 and 4 min.

All patients included in the study were personally interviewed and asked to apply for 3 questionnaires after giving an informed consent; International Prostate Symptom Score (IPSS) for all patients, International Index of Erectile Function (IIEF-5) questionnaire for 16 males and Female Sexual Function Index (FSFI) for 8 females. LARS (low anterior resection syndrome) scores for all patients.

Urinary functions for all patients were assessed by the International Prostatic Symptom Score (IPSS). The questionnaire involves seven questions frequency, nocturia, weak urinary stream, hesitancy, intermittence, incomplete emptying, and urgency.

Female sexual function was assessed by the female sexual function index. The Female Sexual Function Index (FSFI) questionnaire is a validated questionnaire that was used to evaluate sexual

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function in females. This questionnaire is composed of 19 items and evaluates six areas, sexual activity, desire, excitement, lubrication, satisfaction, and dyspareunia. For individual domain scores, the scores of the individual items that comprise the domain are added and multiply the sum by a fixed numerical factor according to their importance. The six domain scores are added to obtain the total score, a domain score of zero indicates that the subject reported having no sexual activity during the past month. The total possible scores for this questionnaire range from 2 to 36, a score of <26.55 indicate the presence of female sexual dysfunction.

Male sexual function was assessed by International Index of Erectile Function (IIEF-5) questionnaire which is a validated questionnaire that was used to assess the sexual function in males by means of 5 items ranging from 1-5 for each and the IIEF-5 score is the sum of the ordinal responses to the 5 items.

For assessment of anorectal function after rectal resection we used the low anterior resection syndrome score (LARS) which is validated score using questionnaire formed of 5 items Incontinence for flatus, Incontinence for liquid stools, Frequency bowel, Clustering of stools and Urgency. Because ileostomy was done for all cases in this study, the questionnaire was sent 1 and 6 months after stoma closure. The LARS score was categorized into no LARS (0–20 points), minor LARS (21–29 points), and major LARS (30–42 points).

Statistical Analysis:

The collected data were coded, tabulated, and statistically analyzed using SPSS program (Statistical Package for Social Sciences) software version 20. Descriptive statistics were done for numerical data by mean, standard deviation and minimum & maximum of the range, while they were done for categorical data by number and percentage.

RESULTS

The mean age of studied group was 52.2 ± 12.4 years and the majority of them were females (66.7%). More than half (58.3%) of the studied group had no comorbidities, and 16.7% of them had hypertension. The majority of the patients (83.3%) had long course neoadjuvant. As regard symptoms, 66.7% of the patients had bleeding while 16.7% had bleeding and change bowel habits.
The majority of the studied group (33.3%) underwent APR while 20.8% of patients underwent Ultra LAR and Ileostomy (Table 2).

Table (1): Comorbidities, neoadjuvant and symptoms data among the studied group.

Variable	N=24	%=100
Comorbidities:		
– No	14	58.3%
– DM	2	8.3%
– Hypertension	4	16.7%
– Smoking	2	8.3%
– SLE	2	8.3%
Neoadjuvant:		
– Short course	4	16.7%
– Long course	16	66.7%
– No	4	16.7%

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Symptoms:		
– Bleeding	16	66.7%
– Bleeding and change bowel habits	4	16.7%
– Bleeding and perianal pain	2	8.3%
– Bleeding, change bowel habits and perianal pain	2	8.3%

Table (2): Operations among the studied group.

Variable	N=24	%=100
Operations:		
– Ultra LAR and Ileostomy	5	20.8%
– Inter-sphinctericand Ileostomy	4	16.7%
– APR	8	33.3%
– AR	4	16.7%
– LAR, TAHBSOand Ileostomy	3	12.5%

The mean distance of the mass site from anal verge by colonoscopy of studied group was 5.75±4.96 cm and the mean period of follow-up was 19.3±4.8 months.
The mean operative time was 150.4 ± 32.6 minutes, and the mean hospital stay was 2.6±0.69 days and, the mean blood loss was 181.7±48.97cc. The majority of the studied group (95.84%) had no recurrence. As regard complications, the majority of the patients (66.7%) had no complications. However, 8.3% of them had wound infection, stoma complication, chest infection and leakage.

Table (3): Recurrence and complication data among the studied group.

Variable	N=24	%=100
Recurrence:		
– No	23	95.84%
– Yes	1	4.16%
Complications:		
– No	20	83.3%
– Wound infection	1	4.16%
– Stoma complication	1	4.16%
– Chest infection	1	4.16%
– Leakage	1	4.16%

The mean number of positive LN was 2.4 ± 2.4 (ranged from 0-8) and the mean total LN was 10.7±4. 5 (ranged from 6-24). The majority of the studied group (91.7%) had adenocarcinoma (95.84% of them were grade II).

Only one patient had a positive circumferential resection margin (< 2mm) and had free proximal and distal resected margins. Two patients (8.3%) of the studied group had urogenital affection pre-operative and they still had it post-operative.

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Table (4):LN, pathology andgradeamong thestudiedgroup.

Variable	N=24	%=100
Pathology:		
– Adenocarcinoma	23	95.84%
– GIST	1	4.16%
Grade:		
– I	2	8.3%
– II	20	83.3%
– III	2	8.3%

DISCUSSION

Low anterior resection (LAR) and abdominoperineal resection (APR) with total mesorectal excision (TME) remain the mainstays of treatment for locally advanced rectal cancer. Operative techniques have evolved over time to encompass several approaches, including open (hand-assisted), laparoscopic and transanal procedures [4].

Our study was concerned about feasibility, surgical and functional outcome of laparoscopic TME.
The ASCRS (American society of colon and rectal surgeons) guidelines strongly recommends neoadjuvant CRT for cancer rectum patients to decrease local recurrence [5], so 20 patients (83.3%) receive neoadjuvant therapy preoperative. Duranet al. [6]concluded that inferior rectal tumor, advanced patient age and neoadjuvant CRT increase risk of urinary and sexual function. Two patients (4.8%) in our study had urogenital dysfunction preoperative, postoperative no more patients were affected.

The majority of the studied group (33.3%) underwent APR and (20.8%) of them underwent ultra LAR and Ileostomy, Inter-sphincteric resection and Ileostomy and AR each was done in 16.7%, while the least operation was done is LAR, TAHBSO and Ileostomy in 12.5% of the patients.
As most of operated patients with mid-and low rectal cancers and the coloanal anastomosis were few centimeters from the anal verge we had performed a diverting stoma for 20 patients (83.3%). In only 4 patients (16.7%) with upper rectal and rectosigmoid tumors stoma not done. Francesco et al performed diverting ileostomy in 75% of the patients who underwent laparoscopic TME [7].

Tei et al. [8] meta-analysis compared single port with multiport technique and concluded that single port rectal surgery is safe and feasible, with slighter postoperative pain, lower conversion rate to open surgery, lower postoperative complication rate and satisfactory oncological clearance.
All cases were operated by medial to lateral approach with central vascular ligation which is the standard approach in laparoscopic rectal surgery as mentioned in most of studies [9-13].

Our study showed conversion rate of 0%, This rate of conversion is not in consistence with the results by Khaikin and his colleagues who reported conversion rate of 12% [14]. Leroy and his Colleagues [15] and Milsom and his colleagues [16], reported rate of conversion 3%.
One of the advantages of laparoscopic surgery over open surgery is less blood loss and less need for blood transfusion [17]. In our study, the mean operative blood loss was 150.4 ± 32.6 ml which was in the same range obtained in two randomized controlled studies which reported blood loss range

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between 90 and 320ml [11,12]. And it was more than that reported by Qingqiang and his colleagues who reported operative blood loss of 28 ml [13]. Less blood loss in laparoscopic surgery may be caused by usual using of modern energy devices during laparoscopic surgery like Harmonic® scalpel or Ligasure TM V as minor oozing compromise the laparoscopic view, Therefore, dissection must be performed with this tools that optimize precise tissue cutting and coagulation [18].

For assessment of the vascularity in risky cases ICG was used in the four cases of Inter-sphincteric resection. In two meta-analyses by Blanco-Colino et al. [19]and Shen et al. [20], the conclusion was ICG showed significant benefit in reducing the incidence of anastomotic leak, thereby improving patient outcomes.

Although Operative time is a poor surrogate for learning curve in laparoscopic colorectal surgery [21], but experience of the surgeons who operated the cases may explain the short operative time compared with other studies, as our operative time mean was 150.4±32.6 minutes while Pugliese et al. [10]reported a mean operative time of 244 minutes, also Ng et al. [12]mean operative time was 213.5 minutes in LAPR. Two randomized controlled trials (RCTs) on laparoscopic resection for rectal. Law et al. [9] and Pugliese et al. [10] reported operating time by laparoscopic anterior resection for upper and mid rectal cancer between 180 and 260 minutes.

A resection is judged radical when the circumferential, distal, and proximal edges of the specimen are devoid of tumor cells [17]. proximal and distal margins are free in all our cases with one case of positive CRM (2.4%). COLOR II trial reported 10 % of laparoscopic group with positive CRM and the same percentage in the open group [17], Positive CRM within 2mm increase risk of recurrence by about 16% within 2 years [22], this occurred in one case of our study with positive CRM and recurrence occurred after 6 months of the initial operation.
Stomal gangrene was observed in one patient (2.4%), Ke et al. [23]reported one case (3%), also Morshed et al. [24] reported one case (5%). the stoma gangrene in our study was caused by twist of the stoma, which leads to necrotizing fasciitis, which needed debridement, stoma relocation and later on grafting.

Anastomotic leakage after colorectal surgery is a serious complication leading to increased morbidity and mortality [25]. We had one case of leakage in our study which preoperative had colonscopic tattooing with leakage of the dye detected intraoperative causing localized mild peritonitis in the pelvis. Park et al. [26] reported Localized leakages of ink in six patients (9.5%) during surgery. This leakage was mostly the cause of anastomotic leak postoperative.
A meta-analysis of 10 studies compared between open and laparoscopic colorectal surgery [27] showed local recurrence rates 6.0 and 7.0% in the laparoscopic group and open group respectively with no significant difference between them. In our study we had one case of local recurrence (4.16%) presented by pelvic mass compressing the left ureter and causing hydroureter and subjected for chemoradiotherapy.

In our study we used to identify the autonomic nerves, thanks to the magnified view of the new generations of high definition cameras, we recorded 0 numbers of intraoperative injuries to the autonomic nerves and no other intraoperative organ injuries. Injuries to the pelvic autonomic nervous system have been much more debated. Qingqiang and colleagues reported Injuries to the

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pelvic autonomic nervous system were recorded in only 4 cases in the laparoscopic group compared with 12 cases in the Open group. Laparoscopy, provided with the characteristics of amplifying the local view, may help in eliminating the blind zone of naked eyes in an open procedure. Thus, the identification of the operating plane and the protection of the autonomic nerves could also be beneficial [13].

CONCLUSION

Laparoscopic TME in sphincter preserving rectal resection can be performed with good technical efficiency, quick functional recovery, and mild disability less operative blood loss and operative trauma. The short-term oncologic results of laparoscopic TME seem to be acceptable, urinary and sexual outcome seem to be better than those obtained in other studies with conventional resection.

REFERENCES

[1] Mizrahi I and Mazeh H (2014): Role of laparoscopy in rectal cancer: A review. World J Gastroenterol., 17: 4900-4907.
[2] Heald R, Husband E and Ryall R (1982): The mesorectum in rectal cancer surgery—the clue to pelvic recurrence?. Br J Surg., 69:613-616.
[3] Nogueras J, Wexner S, Fleshman J and Fischer J (2012): Master Techniques in General Surgery: Colon and Rectal Surgery: Abdominal Operations. Philadelphia, PA: Lippincott Williams & Wilkins, PP: 127-131.
[4] Crippa J, Grass F, Achilli P, Mathis KL, Kelley SR, Merchea A, & Larson, DW (2020): Risk factors for conversion in laparoscopic and robotic rectal cancer surgery. British Journal of Surgery; 107(5): 560-566.
[5] Monson JR, Weiser MR, Buie WD, Chang GJ, Rafferty JF, Buie WD, et al. (2013): Practice parameters for the management of rectal cancer (revised). Dis Colon Rectum; 56 (5):535-50.
[6] Duran E, Tanriseven M, Ersoz N, Oztas M (2015): Urinary and Sexual Dysfunction Rates and Risk Factors Following Rectal Cancer Surgery. Int J Colorectal Dis; 30(11):1547-55.
[7] Francesco F, Andrea V, Paolo P, Stefano C, Alessia G, Giampaolo F and Marco S (2016): Total mesorectal excision for mid and low rectal cancer: Laparoscopic vs robotic surgery. World J Gastroenterol; 22(13): 3602–3610.
[8] Tei M, Otsuka M, Suzuki Y, Kishi K, Tanemura M, Akamatsu H. (2018): Safety and feasibility of single-port laparoscopic low anterior resection for upper rectal cancer. Am J Surg.; 216:1101–1106.
[9] Law WL, Lee YM, Choi HK et al. (2006): Laparoscopic and open anterior resection for upper and mid rectal cancer: an evaluation of outcomes. Dis Colon Rectum; 49:1108 –1115.
[10] Pugliese R, Di Lernia S, Sansonna F, Ferrari G. et al. (2007): Outcomes of laparoscopic Miles' operation in very low rectal adenocarcinoma. Analysis of 32 cases. EJSO; (33): 49-54.
[11] Liang JT, Lai HS, Lee PH (2007): Laparoscopic pelvic autonomic nerve-preserving surgery for patients with lower rectal cancer after chemoradiation therapy. Ann SurgOncol.; 14:1285–1287.
[12] Ng S, Leung K, Lee J, Yui R. et al. (2008): Laparoscopic-assisted versus open abdominoperineal resection for low rectal cancer: a prospective randomized trial. Ann Surg Oncol.;(15): 2418-2425.
[13] Qingqiang Yang, Peng Xiu, Xiaolong Qi, Guoping Yi and Liang Xu (2013): Surgical Margins

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 4, 2021, Pages. 6198 - 6209
Received 05 March 2021; Accepted 01 April 2021.

and Short-Term Results Of Laparascopic Total Mesorectal Excision for Low Rectal Cancer. JSLS; 17:212-218.

[14] Khaikin M, Bashankaev B, Person B, et al. (2009): Laparoscopic versus open proctectomy for rectal cancer: patients' outcome and oncologic adequacy. Surg Laparosc Endosc Percutan Tech; 19: 118-122.

[15] Leroy J, Jamali F, Forbes L et al., (2004): Laparoscopic total mesorectal excision (TME) for rectal cancer surgery: long-term outcomes. SurgEndosc; 18: 281-289.

[16] Milsom JW, de Oliveira Jr O, Trencheva KI, Pandey S, Lee SW & Sonoda T (2009): Long-term outcomes of patients undergoing curative laparoscopic surgery for mid and low rectal cancer. Diseases of the colon & rectum, 52(7): 1215-1222.

[17] Van der Pas MH, Haglind E, Cuesta MA et al. (2013): Laparoscopic versus open surgery for rectal cancer (COLOR II): short-term outcomes of a randomized, phase 3 trial. Lancet Oncol.; (14):210-218.

[18] Allaix M, Arezzo A, Giraudo G, Arolfo S et al (2017): The Thunderbeat and Other Energy Devices in Laparoscopic Colorectal Resections: Analysis of Outcomes and Costs. Journal Of Laparoendoscopic & Advanced Surgical Techniques; 27(12): 1225-1229.

[19] Blanco-Colino R and Espin-Basany E (2018): Intraoperative use of ICG fluorescence imaging to reduce the risk of anastomotic leakage in colorectal surgery: a systematic review and meta-analysis. Tech Coloproctol; 22: 15–23.

[20] Shen R, Zhang Y, Wang T (2018): Indocyanine green fluorescence angiography and the incidence of anastomotic leak after colorectal resection for colorectal cancer: a meta-analysis. Diseases of the Colon & Rectum, 61(10), 1228-1234.

[21] Barrie J, Jayne D, Wright J, Murray C et al. (2014): Attaining Surgical Competency and Its Implications in Surgical Clinical Trial Design: A Systematic Review of the Learning Curve in Laparoscopic and Robot-Assisted Laparoscopic Colorectal Cancer Surgery. Ann Surg Oncol.; (21): 829–840.

[22] Nagtegaal ID, Marijnen CA, Kranenbarg EK, van de Velde CJ, van Krieken JH (2002): Pathology Review Committee; Cooperative Clinical Investigators. Circumferential margin involvement is still an important predictor of local recurrence in rectal carcinoma: not one millimeter but two millimeters is the limit. Am J Surg Pathol.;26(3):350-7.

[23] Ke T, Chen W, Chen H, Huang T, You J and Lin T (2008): Laparoscopic Abdominoperineal Resection for Low Rectal Adenocarcinoma. J Soc Colon Rectal Surgeon (Taiwan); (19):63-70.

[24] Morshed M, EL-Awady S, Farid M, Bassuni M, El-Gendy H and Abdallah E (2013): Laparoscopic assisted abdominoperineal resection of low seated rectal cancer: evaluation of the technique and functional outcome. Egyptian Journal of Surgery; (32):79-85.

[25] Vasiliu EC, Zarnescu NO, Costea R, Neagu S. (2015): Review of Risk Factors for Anastomotic Leakage in Colorectal Surgery. Chirurgia (Bucur); 110(4):319-26.

[26] Park JW, Sohn DK, Hong CW, Han KS, Choi DH, Chang HJ, Lim SB, Choi HS, Jeong SY (2008): The usefulness of preoperative colonoscopic tattooing using a saline test injection method with prepackaged sterile India ink for localization in laparoscopic colorectal surgery. Surg Endosc.; 22(2): 501–505.

[27] Ma Y, Yang Z, Qin H, & Wang Y (2011): A meta-analysis of laparoscopy compared with open colorectal resection for colorectal cancer. Medical oncology; 28(4): 925-933.