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Evaluation of Functional Outcome of Rectal Cancer Management in Two Specialized Centers in the Last Three Years

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ABSTRACT

Background: Rectal cancer surgery had achieved remarkable evolution over the past years. Thanks to the adoption of total mesorectal excision and neoadjuvant chemoradiation, local recurrence rates dropped significantly down to 5%.
Objective: This study was aimed to evaluate the functional and oncological outcome of rectal cancer management in specialized two centers.
Patients and methods: This retrospective study included a total of 30 patients operated for rectal cancer, attending at Zagazig University Hospitals and Meet Ghamer Oncology Center. This study was conducted between 2017 to 2019.
Results: This study included 30 cases, 16 were males and 14 were females, operative time ranged from 120-140 minutes with mean 130 minutes. Blood loss ranged between 250-600 cc. Only one case was converted to open surgery. No intraoperative complications like ureteric or bowel injuries were recorded. Postoperative complications were noted in 7 patients, of them 4 patients developed perineal wound infection and they improved with conservative management, one case developed chest infection who was improved with medical treatment, 1 patient developed stoma and sunken refashioning was successfully done, and 1 patient complained of postoperative urinary incontinence and impotence.
Conclusion: It could be concluded that laparoscopic surgery improves oncologic and functional outcome better than open because of good visualization of pelvic anatomy.
Keywords: Rectal cancer rectum, Oncologic, Open surgery, Laparoscopic surgery.

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)].

With better surgical tools enabling a low anastomosis, a shift toward sphincter -saving approaches began, with the anterior resection replacing abdominoperineal resection as the standard curative resection, when possible. These approaches resulted in poor oncologic outcomes for recurrence and overall survival. Technical advancement came to light in 1982, when Heald *et al* published the total mesorectal excision (TME) technique. The local recurrence rate in rectal cancer exceeds 25% before implementation of TME technique, whereas the local recurrence rate was reduced to 4 % to 5 %with TME [(2)].

TME has replaced blunt dissection as the standard technique when performing radical rectal cancer surgery (sphincter-sparing or abdominoperineal resection). Conventional blunt dissection has the potential of violating the mesorectal envelop, leaving residual tumor in the pelvis, and causing major bleeding from the presacral plane [(3)].

TME employs a precise, sharp dissection between the visceral and parietal layers of the endopelvic fascia to ensure en bloc removal of the perirectal areolar tissue, including the lateral and circumferential margins of the mesorectal envelope, lymphatics, and vascular/perineural tumor deposits with the primary rectal cancer. TME also preserves the autonomic nerves and reduces the risk of presacral bleeding [(4)].

Neo-adjuvant and adjuvant chemotherapy and radiotherapy serve as adjuvants to improve the outcome after surgery; the dose and timing of these adjuncts are variable based on the disease stage and patient related factors. However, these adjuncts are not a substitute for a proper TME, with poor surgery yielding an inadequate surgical specimen invariably leading to local recurrence [(5)].

Randomized controlled trials comparing laparoscopic to open TME for rectal cancer have demonstrated numerous advantages to laparoscopy including less postoperative pain and shorter hospital stay and recovery time and quicker return of gastrointestinal function. Although several studies have proven that there were no significant differences with respect to involvement of the circumferential resection margin, macroscopic quality of the total mesorectal excision specimen, number of harvested lymph nodes , loco-regional recurrence and survival[(6)].

This study was aimed to assess the short term surgical, oncological, and functional outcomes of rectal surgery and comparing the outcomes of laparoscopic and open approaches.

PATIENTS AND METHODS

This retrospective study included a total of 30 patients operated for rectal cancer, attending at Zagazig University Hospitals and Meet Ghamer Oncology Center. This study was conducted between 2017 to 2019.

The included subjects were divided into two groups; **Group 1 (Meet Ghammer)** consisted of 16 patients, and **Group 2 (Zagazig)** consisted of 14 patients.

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Inclusion criteria: Known patients with rectal cancer and underwent surgery in both, Zagazig University Hospitals and Meet Ghamr Oncology Center.

Exclusion criteria: Advanced cancer stage IV. Emergency cases admitted to emergency unit i.e. obstructed or perforated tumors. Patients whose file was not completed or lost to give most of data needed in the study.

Ethical Consideration:

The study was approved by the Local Ethical Committee of Zagazig University. Written consent was obtained from every patient prior to the procedures. This study has been carried out in accordance with the code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Pre-operative assessment:

All patients were subjected to

- Demographic data taking.
- General clinical examination including PR and PV.
- Routine preoperative laboratory investigations including complete blood count (CBC), kidney function tests, liver function tests, coagulation profile, serum CEA.
- Colonoscopy and biopsy for all cases, abdominal ultrasound, MRI staging, and chest X-ray.

Operative strategy:

Modified lithotomy position, the right arm was tucked at the patient's side to facilitate the position of the surgeon and cameraman. The abdomen was prepared with antiseptic solution and draped routinely.

Surgical Procedure:

Supraumbilical incision 10 mm was done, insertion of Veress needle, insufflation of abdominal cavity by carbon dioxide (CO_2). After insufflation A 10-mm port was inserted through the supraumbilical port. The camera was inserted into the abdomen and an initial laparoscopy performed, carefully evaluating the liver, small bowel, and peritoneal. A 10-mm port was inserted through the right lower quadrant approximately 2 to 3 cm 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. Optional 5thSuprapubic trocar is placed in some cases.

Post-operative:

ICU admission, time of colostomy functioning, time until resumption of full oral intake, length of hospital stay, and morbidity were recorded.

Assessment of oncological outcome by:

Detailed pathological data including histopathology, grade of differentiation, tumor size, distance of tumor from anal verge, TNM stage, circumferential resection margins and the number of lymph nodes harvested. 6 months follow up for recurrence, port site and distant metastasis were documented. Functional outcome assessment by: (a) Urinary symptoms included (Urinary incontinence, Increase urinary frequency and Urinary retention). (b) Sexual symptoms included (Impotence and Retrograde ejaculation). (c) Bowel symptoms included (Incontinence, Frequency of defection and Diarrhea).

Statistical analysis

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test ($\chi 2$) to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean ± SD (Standard deviation). Independent samples t-test was used to compare between two independent groups of normally distributed variables (parametric data). P value < 0.05 was considered significant.

RESULTS

Table 1 shows that there was no statistically significant difference between Meet Ghammer group and Zagazig group as regard age and sex distribution (p>0.05).

Table (1): Some demographic data among the studied groups:

Variable	Group I (Meet Ghammer) N=16		Group II (Zagazig) N=14		total	t-test	P-value
Age (years):							
• ***Mean ± SD***	54.6 ± 12.2		56.6 ± 13.9		54.6 ± 12.2	0.42	0.677
• ***Range***	23-63		29-69		23-69		(NS)
Variable	**N**	**%**	**N**	**%**		**χ 2**	**P-value**
Sex:							
• ***Male***	10	62.5	8	57.1	18	0.089	1
• ***Female***	6	37.5	6	42.9	12		

Data is shown as number (percentage) or mean ± standard deviation.

Chi-square (χ 2) and t- tests were used. Bold values are statistically significant at p<0.05.

Table 2 shows that there was no statistically significant difference between Meet Ghammer group and Zagazig group as regard the complaint (p>0.05). The most common complaint among both groups were bleeding and constipation.

Table (2): Complain among the studied groups:

Variable	Group I (Meet Ghammer) N=16		Group II (Zagazig) N=14		Total	χ^2	P-value
	N	%	N	%			
Bleeding	16	100	14	100	30 (100%)	--	----
Weight loss	10	62.5	8	57.1	18 (60%)	0.089	1
Bloating	8	50	4	28.6	12 (40%)	1.4	0.284
Constipation	12	75	10	71.4	22 (73%)	0.74	1

Table 3 shows that there was statistically significant difference between Meet Ghammer group and Zagazig group as regard infiltrate pelvic wall and CEA ($p<0.05$).

Table (3): Investigations among the studied groups:

Variable	Group I (Meet Ghammer) N=16		Group II (Zagazig) N=14		total		χ^2	P-value
	N	%	N	%	N	%		
Colonoscope:								
Rectosigmoid	4	25	2	14.3	6	20		
Upper	0	0	2	14.3	2	6		
Middle	2	12.5	2	14.3	4	13	4.9	0.291
Lower	4	25	6	42.9	10	33		
Anorectal	6	37.5	2	14.3	8	27		
Infiltrate sphincter:								
Yes	2	12.5	2	14.3	4	13	Fisher	1
No	14	87.5	12	85.7	26	87		
Infiltrate pelvic wall:								
Yes	2	12.5	10	71.4	12	40	Fisher	**0.002* (HS)**
No	14	87.5	4	28.6	18	60		
CEA:								
CEA >5	10	62.5	14	100	24	80	Fisher	**0.019* (S)**
CEA *<5*	6	37.5	0	0	6	20		

Table 4 shows that there was no statistically significant difference between Meet Ghammer group and Zagazig group as regard intra-operative data ($p>0.05$).

Table (4): Intra-operative data among the studied groups:

Variable	Group I (Meet Ghammer) N=16		Group II (Zagazig) N=14		Total		χ^2	P-value
	N	%	N	%	N	%		
Type of operation:								
• *Anterior resection*	4	25	2	15	6	20		
• *LOW anterior resection*	4	25	6	42.9	10	33	7.4	0.147
• *Ultra-low anterior resection*	2	12.5	2	15	4	13		
• *Abdominoperineal*	6	37.5	4	28.6	10	33		
Open or lap:								
• *Open*	7	44	6	42.8	13	43	Fisher	0.209
• *Lab*	9	56	8	57.2	17	57		
ICU:								
• *Yes*	6	37.5	10	71.4	16	53	Fisher	0.056
• *No*	10	62.5	4	28.6	14	47		
• **Staplier**	8	50	8	57.1	16	53	Fisher	0.709
• **Manual suture**	8	50	6	42.9	14	47		
Conversion lap to open:								
• *Yes*	2	22.2	2	25	4	23	Fisher	0.209
• *No*	7	77.8	6	75	13	77		
• *Ileus*	2	12.5	0	0	2	6	Fisher	0.485
• *Not*	14	87.5	14	100	28	94		
Covering ileostomy:								
• *Yes*	10	62.5	10	71.4	20	67	Fisher	0.709
• *No*	6	37.5	4	28.6	10	33		

HS: Highly significant

Table 5 shows that there was statistically significant difference between Meet Ghammer group and Zagazig group as regard operative recovery and bowel function (p<0.05).

Table (5): Intra-operative data among the studied groups:

Variable	Group I (Meet Ghammer) N=16	Group II (Zagazig) N=14	Total	t-test	P-value
Time (min):					
• *Mean ± SD*	116.8 ± 12.9	110.7±21.9	110.7±21.9	0.94	0.353
• *Range*	100-140	110-150	100-150		
Blood loss (cc):					
• *Mean ± SD*	812.5 ± 214.1	800.3 ± 181.3	800.3±214.1	0.12	0.868
• *Range*	600-1200	700-1200	600-1200		
Operative recovery (days):					
• *Mean ± SD*	5.3 ± 1.9	4 ± 0.96	5.3 ± 1.9	-2.3	**0.028* (S)**
• *Range*	1-7	3-6	1-7		
Bowel function (days):					
• *Mean ± SD*	1.9 ± 0.66	1.4 ± 0.50	1.4 ± 0.50	-2.3	**0.031* (S)**
• *Range*	1-3	1-2	1-3	(MW)	

S: Significant

Table 6 shows that there was no statistically significant difference between Meet Ghammer group and Zagazig group as regard the complications (p>0.05).

Table (6): Complications among the studied groups:

Variable	Group I (Meet Ghammer) N=16		Group II (Zagazig) N=14		Total		χ 2	P-value
	N	%	N	%	N	%		
Bowel injury:								
• *Yes*	2	.512	0	0	2	7	Fisher	.4850
• *No*	14	87.5	14	100	28	93		
Ureteric injury:								
• *No*	16	100	14	100	30	100	---	---
Urethral injury:								
• *No*	16	100	14	100	30	100	---	---
Twisted mesentery:								
• *No*	16	100	14	100	30	100	---	---
Stoma:								
• *Normal*	14	87.5	14	100	28	93	Fisher	.4850
• *Sunken*	2	2.511	0	0	2	7		
Surgical site infection:								
• *Normal*	10	0.562	8	57.1	33			
• *Perineal infection*	2	0.512	2	14.3	7			
• *Abdominal infection*	2	0.512	2	14.3	7		0.81	.0870
• *Perineal & abdominal infection*	2	12.5	2	14.3	7			

Table 7 shows that there was no statistically significant difference between Meet Ghammer group and Zagazig group as regard chest infection (p>0.05).

Table (7): Chest infection among the studied groups:

Variable	Group I (Meet Ghammer) N=16		Group II (Zagazig) N=14		Total		χ 2	P-value
	N	%	N	%	N	%		
Chest infection:								
• *Yes*	2	12.5	1	7.1	3	10	Fisher	0.485
• *No*	14	87.5	13	92.9	27	90		

DISCUSSION

The age of the patients included ranged from 23 – 69 years with mean age of 47 years, 18 of patients were males and 12 were females.

In the current study, the mean operating time was 113 min. which is less than obtained with **Staudacher and his colleagues[7] and Khaikin and his colleague[8]** who reported their mean time to be 245min**. Liang *et al.* [9]** recorded operative time in rectal resection with average of 119 min**.**

Two randomized controlled trials (RCTs) were done for rectal surgery. **Law *et al.* [10] and Pugliese *et al.* [11]** reported operating time by anterior resection for upper and mid rectal cancer between 180 and 260 minutes. Operating time for rectal cancer is closely associated with factors of surgeon experience and pathology.

In the current study, the mean operative blood loss was 610 ml which was in the same range obtained in two randomized controlled studies which reported blood loss range between 450 and 620 ml[9] and it was more than that reported by **Yang and his colleague[12]** who reported operative blood loss of 28 ml**.**

In the current study, the main hospital stay was 4 ± 0.96 to 5.3 ± 1.9 days. The mean duration of hospital stay after laparoscopic resection for rectal cancer was commonly reported to be in the range of 8 to 11 days [13]**.**

Similar to findings reported by **Memon *et al.* [14],** laparoscopy for TME in this study has shown consistent advantages over open TME, including a reduced hospital stay, a shorter disability period, less postoperative pain, and a lower rate of chest infection. These findings were confirmed by our study.

Our study showed conversion rate of 23%, This rate of conversion is not in consistence with the results by **Khaikin and his colleagues[8]** who reported conversion rate of 12%**,** and **Leroy and his Colleagues[15]** who reported rate of conversion 3%**.**

An important benefit of laparoscopic colorectal surgery is earlier resumption of gastrointestinal tract function. After laparoscopic resection for rectal cancer, the patient usually has a bowel movement on day 1 to day 3 after operation and can tolerate a normal diet on day 3 to day 6 after operation. Although most studies reported earlier bowel movements and eating compared with open surgery [13]**.**

In the current study, bowel function was resumed as early as possible and the ability to resume oral diet is used as an indicator of resolution of postoperative ileus. It is found that the bowel function started at 2 days postoperatively which the same as that is reported by **Law and his colleagues[10] and Kim and his colleagues[16].**

In the current study, we recorded a case of intraoperative injury to the autonomic nerves and no other intraoperative organ injuries Injuries to the pelvic autonomic nervous system have been much more debated. **Yang and colleagues[12]** reported Injuries to the 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.

In our study, we had performed diverting ileostomy for all patients with rectosigmoid in upper and middle rectal cancer and coloanal anastomosis. In addition, terminal colostomy in lower rectum and anal canal cancer was also performed. Francesco et al performed diverting ileostomy in 75% of the patients who underwent TME[17]**.**

In the current study, the average number of lymph nodes harvested was 16 lymph nodes and TME was completed in 100% of the pathological specimen. **Yang *et al.* [12]** recorded average lymph node harvested about 14 and TME was completed in 95 % of the patients, nearly complete in 4 % of the specimens and incomplete in 1% of the specimens.

Low anterior resection syndrome is a constellation of symptoms, such as fecal incontinence or urgency, frequent or fragmented bowel movements, emptying difficulties, and increased intestinal gas, that occur after a sphincter-sparing resection (ie, anterior resection) of the rectum[18]**.**

It is estimated that between 25 and 80 percent of patients develop one or more symptoms of LARS following a sphincter-sparing rectal surgery. For individual patients, symptoms vary in type, severity, and duration as a reflection of different underlying etiologies[19]**.**

Urinary function was assessed with IPSS in pre-operative and post-operative periods. Regarding urinary function, 87.5% of our patients had normal International prostatic symptom score (IPSS) preoperatively, while 12% were suffering from mild Urinary symptoms.

These results are similar to those obtained by **Morino and his colleagues[20].**

In this study, we assessed male sexual functioning by an international validated questionnaire, the simplified International Index of Erectile Function (IIEF-5), which was applied to 18 males only of total 30 as 1 males were excluded due to advanced age and others were not sexually active.60% of the patients show no erectile dysfunction in the 6 months preoperatively that did not changed significantly in the 6 months postoperatively (50%).we concluded that there is no significant difference in male sexual function after nerve sparing TME for rectal cancers, the improvement in the sexual outcome in recent years is attributed to the more experience in the nerve preserving techniques , better magnified view and proficiency gain curve .This is agree with **Bonjer and his colleagues results[21].**

In this study a prolonged ileus has been reported in 1 case (3%) of our study which is similar to other rectal surgery study which reported a rate of 1.1% [22].

Wound infections were treated successfully by open wound care. Non-surgical complications occurred in the form of pneumonia and pulmonary edema in 1 case (3%) in our study which is less than the reported medical morbidity by **Chi and colleagues** [22] who reported 5.6% pneumonia in this study there is only one case of stoma complication it was sunken it treated by refashioning which is less than reported 7% stoma complication medical morbidity.

In the present study, neoadjuvant therapy was conducted in 24 cases (80%) of rectal cancer based on the stage and plan for resection. **Chi *et al.*** [22] **and Kuo *et al.*** [23] used neoadjuvant chemo-radiotherapy according to the stage of the rectal cancer, in a range which varied between 30% and 100% respectively. Twenty six (65%) showed evident down-staging, from which one patients showed complete pathological response (CR). The previously reported results for complete pathological response after neoadjuvant chemo-radiotherapy ranges between 14.5% and 22 %[23,24]**.** In 2008, Lee SH and colleagues reported that preoperative therapy,

Either short course radiotherapy or chemo-radiotherapy, is essentially used to increase resectability, local control and possibly, survival rates in locally advanced rectal cancer. According to Mandard tumor regression grade (TRG), 26 patients (48%) of our study groups showed good response while 28 (51%) showed poor response to neoadjuvant chemo-radiotherapy.

In our study we recorded free margins in 80% of cases which is less than obtained with **Staudacher and his colleagues[7]** 88% and **Khaikin and his colleague[8]** who reported 92%.

CONCLUSION

It could be concluded that laparoscopic surgery improves oncologic and functional outcome better than open because of good visualization of pelvic anatomy. Total mesorectal excision and neoadjuvant chemo radiotherapy improve oncologic outcome but if not performed well can affect functional outcome. We must pay attention for function outcome as quality of life for these patients of cancer rectum.

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