

A Comparative Study on Oncological Outcome between Laparoscopic and open Anterior Resection Cancer Rectum

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Abstract: Colorectal cancer is a major cause of morbidity and mortality throughout the world. It accounts for over 9% of all cancer incidences. It is the third most common cancer worldwide and the fourth most common cause of death. It affects men and women almost equally. Worldwide, colorectal cancer represents 9.4% of all incident cancer in men and 10.1% in women. The aim of the work is to compare laparoscopic and conventional open low anterior resection with total mesorectal excision for managing patients with rectal cancer from the oncological radicality point of view. The study will be a prospective randomized controlled clinical trial involving 40 patients with cancer rectum in whom anterior Resection with total mesorectal excision is indicated. There was no statistical significant difference in mean of distal margin in the studied groups. The mean distal margin in group A was 2.8 ± 0.59 cm, while in group B the mean length of the distal margin was 3.0 ± 0.62 cm, p value was 0.9. The mean number of harvested lymph nodes in group A was 11.55 ± 1.9 , while in group B it was 10.7 ± 2.23 , p value 0.2, with no statistical significant difference in mean of number of harvested lymph nodes in the studied groups. The number of affected lymph nodes in our study shows no significant difference between the two groups with the number of affected nodes in group A was 0.0 – 6.0 with mean number 2.1 ± 1.59 , while in group B the mean number was 2.6 ± 3.1 , with p value 0.5 with no significant differences between the two groups. All cases had negative circumferential margins. Laparoscopic anterior resection have provided optimism for the oncologic safety and have showed advantages of minimally invasive surgery. Thus, laparoscopic procedures may become the most effective treatments for colorectal cancer in the future.

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1. Introduction:

Colorectal cancer is a major cause of morbidity and mortality throughout the world. It accounts for over 9% of all cancer incidences. It is the third most common cancer worldwide and the fourth most common cause of death. It affects men and women almost equally. Worldwide, colorectal cancer represents 9.4% of all incident cancer in men and 10.1% in women. (1)

Laparoscopic colon resection was introduced in 1991. Concern for port site metastasis and inadequate oncologic clearance initially hampered its adoption in the treatment of colon and rectal malignancy. (2)

Since the first description by Jacobs laparoscopic colorectal surgery has gained popularity over the past years. The acceptance of this approach has not been as fast as it was for laparoscopic cholecystectomy and other laparoscopic operations, owing to several differences: a steep learning curve of procedures that requires working in multiple abdominal quadrants, control of vascular structures, creation of intestinal anastomoses and sometimes retrieving large specimens. Other concerns have focused on the

compliance of oncologic principles of radically and the presumed increased incidence of port-site metastases described in early series. Several advantages of laparoscopic colorectal surgery have been reported, including reduction of postoperative pain, shortened postoperative ileus and hospital stay, and recently a potential benefit in immune response and oncologic results (4).

Introduction of the concept of total mesorectal excision, which is currently considered the standard of care in rectal surgery, led to a significant improvement in the oncologic outcome by decreasing the local recurrence rate. Applying laparoscopic techniques to rectal resection for cancer is the most recent development, aiming to improve the postoperative recovery, while keeping the same surgical principles and aiming for a similar oncologic outcome as in open surgery. (5)

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However, recently large comparative studies and multiple prospective randomized control trials have reported equivalence in resection margin, lymph node collection, tumor recurrence, postoperative complications, and long-term outcomes between open and laparoscopic resection for colon cancer. In addition, these studies demonstrated earlier recovery of bowel function, less postoperative pain, and decreased hospital stay with the laparoscopic approach which has heralded widespread acceptance for laparoscopic resection of colon cancer. In contrast, laparoscopic total mesorectal excision for the treatment of rectal cancer has been welcomed with significantly less enthusiasm. While it is likely that patients with rectal cancer will experience the same benefits of early recovery and decreased postoperative pain from the laparoscopic approach, whether the same oncologic clearance, specifically an adequate TME can be obtained is of concern. Involvement of the circumferential resection margin after total mesorectal excision is a prognostic factor for local recurrence. (7)

Aim of the Work

The aim of the work is to compare laparoscopic and conventional open low anterior resection with total mesorectal excision for managing patients with rectal cancer from the oncological radicality point of view. The study will focus on the longitudinal resection margins, circumferential margins and the lymph node harvest in the excised specimen.

2. Patients and Methods

The study will be a prospective randomized controlled clinical trial involving 40 patients with cancer rectum in whom anterior Resection with total mesorectal excision is indicated.

Open anterior resection will be done in the other 20 patient. Laparoscopic anterior resection will be done in the other 20 patients.

In this comparative study the oncological radicality result in terms of longitudinal resection margin, circumferential margin and number of lymph nodes harvested will be assessed.

Inclusion criteria

The study will include all patients with pathologically proven rectal cancer other than those mentioned in the exclusion criteria.

Exclusion criteria:

The following patients will be excluded from our study:

1. Patients aged more than 70 years.
2. Patients with evidence of locally advanced rectal cancer.
3. Patients with lesions lying at a distance less than 6 cm from the anal verge.
4. Patients with metastatic rectal cancer.

5. Patients classified as American Society of Anaesthesiologists (ASA) (4).

For all these patients the proper preoperative preparation relative the patient's condition will be done including mechanical and chemical bowel preparation.

The patients will be randomly assigned to one of two groups; the first group will undergo surgery using the laparoscopic method, while the second group will undergo surgery using the open conventional method. Written consent to participate in this study will be also taken from all patients.

The localization of the tumor was categorized as upper (distal border of tumor 10–15 cm from the anal verge), middle (5–10 cm), and lower rectum (<5 cm).

Statistical analysis:

The data will be analysed using Microsoft Excel 2010 and statistical package for social science (SPSS version 22.0) for windows (SPSS IBM., Chicago, IL). Continuous normally distributed variables were represented as mean±SD. with 95% confidence interval; a p value < 0.05 will be considered statistically significant. To compare the means of normally distributed variables between groups, the Student's t test was performed. χ^2 test or Fisher's exact test was used to determine the distribution of categorical variables between groups.

Operative Technique:

All laparoscopic resections were performed after creation of the pneumoperitoneum by carbon dioxide. Alternatively, CO₂ was insufflated via a percutaneous Verresneedle or using the open Hasson technique. Four to five 5- to 12-mm laparoscopic trocars were located dependent on the site of the tumour lesion. For all laparoscopic resections, the distal third of the transverse colon, the splenic flexure, the descending colon, and the sigma were mobilized by medial and lateral access. For anterior rectum resection, the superior and mid extra peritonealrectum were mobilized. For deep anterior resection, the complete extra peritoneal rectum was mobilized, including the total mesorectal excision. The left ureter and the iliac vessels were identified. The inferior mesentery artery and vein were centrally divided by using absorbable endoclips. The rectum was divided intracorporally by using an endo-GIA-stapler. Dividing of the left colon was performed extracorporeally after suprapubicminilaparotomy (Pfannenstiel incision, length (4–6 cm), which was only used for extraction of the colon/ rectum. For wound protection, a plastic ring sleeve was inserted.

After extracorporeal placement of the stapler head and repositioning into the abdomen, the minilaparotomy was closed. The colorectal anastomosis was completed intracorporally using the circular stapler and checked by a hydropneumatic test.

One to two drains were placed next to the anastomosis and left in place for two to four days.

Ileostoma creation was not obligate and was performed in patients with individual high risk for anastomotic leakage.

All tumour specimens were dissected and analysed for lymph nodes following standard procedures. The pathologist was blinded to the operation procure technique.

The perioperative morbidity was assessed in every patient. Anastomotic leakage was defined as any leakage diagnosed by endoscopy, radiology or during surgery, independent of the need of surgical revision. Intra-abdominal abscess formation was defined by any abscess formation with the need for interventional or surgical therapy.

The following parameters were prospectively evaluated: conversion rate, length of hospitalization, estimated intraoperative blood loss, mortality rates, number of harvested lymph nodes, (circumferential, distal) margin, pathologic TNM staging.

3. Result:

A total of 40 patients was enrolled in the study between from April 2015 to April 2017. They were divided into the following groups:

Group A: Comprised 20 patients with open anterior resection.

Group B: Comprised 20 patients with lap anterior resection.

The data were collected, analyzed and compared between the groups, the following results were obtained:

There was no statistically significant difference in the mean age, sex distribution, site, size & distribution of lesions between the two groups.

There was highly significant difference in the operative time between patients undergoing laparoscopic anterior resection and open technique.

More operative time was needed for laparoscopic technique with a median of 240 min compared to 204 min for the median time of the open group.

In contrast to operative time, blood loss was significantly less in laparoscopic surgery in comparison with open cases, mean estimated blood loss in laparoscopic surgery was 430 ml with 580 ml estimated blood loss for open cases, in our study 6 patient in laparoscopic resection was received blood transfusion in comparison to open surgery 14 patient was received blood intraoperative transfusion.

Regarding intraoperative complications in our study, there was one case of laparoscopic anterior resection was converted to open due to uncontrolled bleeding by laparoscopy, and this patient was included in group B also tumour perforation was happened in one case of open anterior resection.

Table 1: comparison between open & laparoscopic resection.

		Group A open resection	Group B laparoscopic resection	P. value
Age		57.95 ± 7.08	57.0 ± 8.63	0.7
sex	female	4(20.0%)	5(25.0%)	0.7
	male	16(80.0%)	15(75.0%)	0.7
Tumour site	Upper rectum	14	15	0.9
		70.0%	75.0%	
	Lower rectum	6	5	
		30.0%	25.0%	
Tumour size		4.1 ± 1.3	4.6 ± 1.4	0.9
Distal Margin /cm		2.8 ± 0.59	3.0 ± 0.62	0.9
Number of Harvested Lymph Nodes		11.55 ± 1.9	10.7 ± 2.23	0.2
Number of Affected Lymph Nodes		2.1 ± 1.59	2.6 ± 3.1	0.5
Time of Operation/min		204.5 ± 11.46	240.0 ± 13.56	0.4
Estimated Blood Loss /ml		580.0 ± 69.58	437.5 ± 48.32	0.001
Hospital Stay /day		10.3 ± 3.4	7.55 ± 0.94	0.01*

Post-operative follow patient group A, one patient develop right side weakness due to cerebrovascular stroke, and another patient develop intestinal fistula, closed by conservative management.

There was no statistical significant difference in tumour site categories in the studied groups. As lower

rectal lesion was excluded from our study, 29 cases (72.5%) the lesion was in the upper rectum, and 11(27.5%) cases the lesion was in the lower rectum.

There was also no statistical significant difference in means of the tumor size in the studied groups.

In cases underwent to open anterior resection the tumour size ranges from 1.6 - 6.5cm with mean tumor size 4.1 ± 1.3 cm.

In cases underwent laparoscopic resection the tumour size ranges from 1.0 – 7.0cm with mean tumor size 4.6 ± 1.4 cm, p value 0.9.

There was no statistical significant difference in mean of distal margin in the studied groups. the mean distal margin in group A was 2.8 ± 0.59 cm, while in group B the mean length of the distal margin was 3.0 ± 0.62 cm, p value was 0.9.

The mean number of harvested lymph nodes in group A was 11.55 ± 1.9 , while in group B it was 10.7 ± 2.23 , p value 0.2, with no statistical significant difference in mean of number of harvested lymph nodes in the studied groups.

The number of affected lymph nodes in our study shows no significant difference between the two groups with the number of affected nodes in group A was 0.0 – 6.0 with mean number 2.1 ± 1.59 , while in group B the mean number was 2.6 ± 3.1 , with p value 0.5 with no significant differences between the two groups.

All cases had negative circumferential margins.

Stage:

Positive correlation between harvested and affected lymph nodes in studied groups, the number of affected lymph nodes increased in relation to increased number of harvested nodes.

There was also a significant positive correlation between affected lymph nodes and distal margin in studied groups, as the number of affected nodes increased as the length of the distal margin increased.

The same significant positive correlation between affected lymph nodes and stage in studied groups, as the number of affected nodes increased as the stage of the disease increased in both groups.

There are limitations to this study that must be acknowledged. First, and main limitation, of our study was the small number of patients enrolled in this study. the second limitation is absence of long term oncological follow up to assess local recurrence and survival is necessary to ascertain oncological safety of laparoscopic resection in patients with rectal cancer.

Table (2) comparison of staging between open and laparoscopic cases

Stage		Groups		Total	P. value
		Open	Lap.		
I	Count	1	1	2	0.7
	% within Groups	5.0%	5.0%	5.0%	
II	Count	3	5	8	
	% within Groups	15.0%	25.0%	20.0%	
III	Count	16	14	30	
	% within Groups	80.0%	70.0%	75.0%	
Total	Count	20	20	40	
	% within Groups	100.0%	100.0%	100.0%	

There was no statistical significant difference in stage categories in the studied groups.

Conclusion and Recommendation

Current evidence suggests that laparoscopic rectal cancer resection benefits patients, with earlier return of bowel function, reduced blood loss, improved cosmetics, and shorter hospital stay. The oncologic outcomes are comparable to open surgery.

Laparoscopic anterior resection have provided optimism for the oncologic safety and have showed advantages of minimally invasive surgery. Thus, laparoscopic procedures may become the most effective treatments for colorectal cancer in the future.

Major disadvantages of laparoscopic colectomy include increased operative time; most studies report a 30to 75 minute increase in surgical time using the

minimally invasive approach, significant learning curve; 20-50 cases needed for laparoscopic colectomy to achieve the learning curve. Operative time decreases significantly as the number of procedures performed by the operating surgeon increases.

Further randomized studies are necessary to evaluate long-term clinical outcome, quality of life, and recurrence rate, Therefore, we strongly recommend performing a laparoscopic approach whenever it is feasible in colorectal surgery instead of the conventional open approach.

References

1. Hagggar FA and Boushey RP. Colorectal cancer epidemiology: incidence, mortality, survival, and risk factors. *Clinics in colon and rectal surgery*, 2009; 22(04): 191-197.
2. Mukta KK and Fichera A. Laparoscopic rectal cancer surgery: where do we stand. *World J Gastroenterol*. 2012; 18(46):6747-55.
3. Lacy A. Colon cancer: laparoscopic resection *Annals of Oncology*, 2005; 16 (Supplement 2): 88–92.
4. Wexner SD and Latulippe JF. Laparoscopic colorectal surgery and cancer. *Dig Surg*. 1998; 15:117–123.
5. Milsom JW, de Oliveira OJ, Trencheva KI, Pandey S, Lee SW, Sonoda T. Longterm outcomes of patients undergoing curative laparoscopic surgery for mid and low rectal cancer. *Dis Colon Rectum* 2009; 52: 1215-22.
6. Mukta KK and Fichera A. Laparoscopic rectal cancer surgery: where do we stand. *World J Gastroenterol*. 2012; 18(46):6747-55.
7. Rullier A, Gourgou-Bourgade S, Jarlier M, Bibeau F, Chassagne-Clément C, Hennequin C, Tisseau L, Leroux A, Ettore F, Peoc'h M, Diebold MA. Predictive factors of positive circumferential resection margin after radiochemotherapy for rectal cancer: the French randomised trial ACCORD12/0405 PRODIGE 2. *European Journal of Cancer*. 2013; 49(1):82-9.

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