



LAPAROSCOPIC VERSUS OPEN SURGERY FOR NODE POSITIVE RECTAL CANCER: A RETROSPECTIVE ANALYSIS OF RECTAL CANCER PATIENTS IN A SINGLE INSTITUTION

Oncology

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ABSTRACT

INTRODUCTION: Colorectal cancer is the third most common cancer and ranks second in terms of mortality. Rectal cancers are biologically aggressive. Implementation of laparoscopy in the management of rectal cancers is challenging and oncological outcomes should be comparable with open surgery before widespread application of laparoscopy. This study is performed to assess laparoscopic versus open surgery in the management of rectal cancer.

MATERIALS AND METHODS: This is a retrospective analysis of 112 patients who under went open or laparoscopic surgery for rectal cancer. Both the groups were analysed in terms of operative time and post-operative complications and oncological outcomes.

RESULTS: Of 112 patients with rectal cancer surgery, 53.6% (n=60) underwent open surgery and 46.4% (n=52) underwent laparoscopic surgery. The median age of patients in our study is 52 years with range 21-80 years. 60.7% were males. Conversion rate in our study is 3.6%. The major reason for conversion is bleeding. Majority belong T3, N1b, and stage IIIB. No statistically significant differences were observed between the two groups in terms of blood loss, complications, recurrence, 5-year Disease free survival (DFS) and overall survival (OS). There was a significant difference observed between the two groups in regard to operative time. Laparoscopic surgery is 40 min longer than open surgery for rectal cancer.

CONCLUSION: Laparoscopic surgery has longer operative times than open surgery. However, laparoscopic and open have comparable equal efficacy in relation to post-operative complications, oncological outcomes.

KEYWORDS

INTRODUCTION:

Colorectal cancer is the third most common cancer and ranks second in terms of mortality. Colorectal cancer incidence rates vary widely, with 8-fold and 6-fold variations in colon and rectal cancer varied by geographic variations. (1) Nearly one third of all large bowel cancers are located in the rectum. (2) The standard management option for non-metastatic rectal cancer is multimodal therapy that includes surgery, supported by chemoradiotherapy in neoadjuvant or adjuvant settings. (3)

The development of minimally invasive techniques that includes laparoscopy, robotic and hybrid procedures led to their application in rectal cancer. Many clinical studies proved the usefulness of laparoscopic surgery for colon cancer compared with open surgery with regard to short-term outcomes, and long-term noninferiority has also been demonstrated.

Laparoscopic rectal cancer surgery is a technically demanding procedure and thus prohibit implementation of this technique in rectal cancers and especially in low lying ones. Laparoscopic surgery for rectal cancer was stated to be more difficult than that for colon cancer, so rectal cancer had been eliminated in some studies. (4-7) Some studies demonstrated the benefit of laparoscopic surgery for rectal cancer compared with open surgery, (8,9) whereas other clinical trials did not show the noninferiority of laparoscopic surgery. (10,11)

We conducted this retrospective single institution study to compare the long-term oncological outcomes of laparoscopic versus open surgery for rectal cancer surgery.

MATERIALS AND METHODS:

This study involved patients with clinical stage III rectal cancer who underwent open or laparoscopic surgery at our institute undergoing open or Laparoscopic surgery for rectal cancer from 2013 to 2014. This retrospective study identified 112 patients who underwent surgery for rectal cancer. All the patients were evaluated with Contrast enhanced CT scan of abdomen and pelvis and MRI pelvis, colonoscopy. All patients underwent biopsy of the lesion and subsequent metastatic work up with chest x ray.

Patients who were diagnosed with rectal cancer were subjected to surgery when there is no involvement of circumferential margin.

Circumferential margin is described as positive if the tumour extends to a point that is within 1 mm from the margin. Circumferential margin is described as threatened if the tumour extends to a point that is within 1-2 mm from the margin. Patients with positive circumferential margin underwent long course neoadjuvant capecitabine with oxaliplatin based chemoradiotherapy followed by surgery after 6 weeks. Patients with threatened circumferential margin underwent short course radiotherapy followed by surgery after 5 days but within 14 days.

Patients with diagnosis of rectal cancer between ages 18 to 80 years, histologically confirmed invasive adenocarcinoma were included in the study. Patients having distant metastases, presenting as acute obstruction and those who had medical complications precluding laparoscopic surgery were excluded from the study.

All surgeries were performed by the same surgical team that had extensive experience with open and laparoscopic colorectal surgery. All patients had mechanical bowel preparation with sodium phosphate. For laparoscopic resections, pneumoperitoneum with an intra-abdominal pressure between 12 and 14 mmHg was continued throughout the operation. The first step of the laparoscopic operation is dissection of the colon from medial to lateral and vessel ligation. In the left colon and rectum operations, distal resection is performed laparoscopically and proximal end is taken out from the suprapubic incision. After placing the anvil outside, anastomosis is performed intracorporeally. Care was taken to deliver the specimen under protection. A no-touch technique was also used in the open group. Anterior or low anterior resection is performed in rectum tumours according to the localization. Abdominoperineal resection was performed when there is sphincter involvement in low rectal cancer. Temporary ileostomy is mostly performed in low anterior resection cases. Patients in both groups underwent routine operation according to the complete mesocolic or mesorectal excision principles.

The demographic and clinicopathological data of consecutive patients were collected retrospectively, including the ECOG performance status, preoperative chemoradiotherapy, operative time, blood loss, conversion, tumour pathology, length of hospital stays, postoperative complications, recurrence-free survival (RFS), and overall survival (OS) periods. Statistical analysis was performed using SPSS software and p value <0.05 is considered statistically significant.

RESULTS:

Of 112 patients with rectal cancer surgery, 53.6% (n=60) underwent open surgery and 46.4% (n=52) underwent laparoscopic surgery. Demographic variables are depicted in table 1 and Staging characters are tabulated in table 2. The median age of patients in our study is 52 years with range 21-80 years. 60.7% were males. Conversion rate in our study is 3.6%. The major reason for conversion is bleeding.

Majority belong T3, N1b, and stage IIIB. The data regarding Operative time, blood loss, complications, recurrence, 5-year Disease free survival (DFS) and Over all survival (OS) were depicted in tables 3-6 respectively.

Our study showed significant difference in the operative time between the laparoscopy and open groups. (140 minutes versus 174 minutes; 31.5 pearson chi-square p value <0.001)

Our study showed that circumferential margin positivity is observed in 15% of open surgery group and 8.3% of the laparoscopy group. (p value 0.183; chi-square 1.45)

No statistically significant differences were observed between the two groups in terms of blood loss, complications, recurrence, 5-year Disease free survival (DFS) and overall survival (OS).

Variable	OPEN (n=60)	LAP (n=52)
Age (Median)	52 years	50 years
Sex – Male	31.25% (n=35)	29.4% (n=33)
Sex – Female	22.3% (n=25)	16.9% (n=19)
Histology – Adeno	41.9% (n=47)	35.7% (n=40)
Histology – signet ring	11.6% (n=13)	10.7% (n=12)
Location - Upper	3.5% (n=4)	4.4% (n=5)
Location – Middle	14.2% (n=16)	13.3% (n=15)
Location – Lower	35.7% (n=40)	28.5% (n=32)
Grade – Well	27.67% (n=31)	22.3% (n=25)
Grade – moderate	12.5% (n=14)	12.5% (n=14)
Grade - Poor	13.3% (n=15)	11.6% (n=13)
Pre op CT – YES	16.07% (n=18)	8.9% (n=10)
Pre op CT – NO	37.5% (n=42)	37.5% (n=42)
Pre op RT – YES	16.9% (n=19)	10.7% (n=12)
Pre op RT – NO	36.6% (n=41)	35.7% (n=40)

Variable	OPEN (n=60)	LAP (n=52)
T1	0.89% (n=1)	1.7% (n=2)
T2	15.17% (n=17)	10.7% (n=12)
T3	19.6% (n=22)	23.2% (n=26)
T4a	14.2% (n=16)	8.03% (n=9)
T4b	3.5% (n=4)	2.6% (n=3)
N1a	2.6% (n=3)	0.89% (n=1)
N1b	30.3% (n=34)	20.5% (n=23)
N2a	14.2% (n=16)	16.07% (n=18)
N2b	6.25% (n=7)	4.4% (n=5)
Stage III A	13.3% (n=15)	7.1% (n=8)
Stage III B	27.6% (n=31)	31.2% (n=35)
Stage III C	12.5% (n=14)	8.03% (n=9)

Variable	OPEN (n=60)	LAP (n=52)	P value
Operative time	140 minutes (mean) Range 121-243 minutes	174 minutes (mean) Range 136-302 minutes	0.0001
Blood loss	125 ml (median) Range 50-650 ml	200 ml (median) Range 50-1000ml	0.08
Complications-YES	18	8	0.06
Complications-NO	42	44	

Variable	OPEN (n=60)	LAP (n=52)	P value
Recurrence-YES	20	17	0.552
Recurrence-NO	40	35	

Variable	Estimate	95% CI (UL)	95% CI (LL)	P value
OPEN (n=60)	77.6	71.152	84.048	0.524
LAP (n=52)	81.6	75.348	88.037	

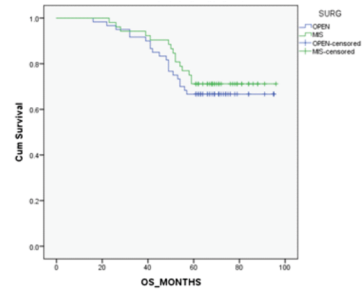


Figure 1 Showing OS

Variable	Estimate	95% CI (UL)	95% CI (LL)	P value
OPEN (n=60)	75.117	68.211	82.022	0.733
LAP (n=52)	78.019	71.012	85.026	

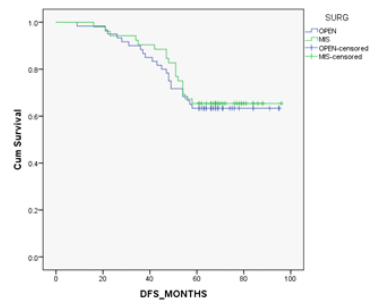


Figure 2 showing DFS

DISCUSSION:

Laparoscopic surgery for rectal cancer has been one of the emerging options in the management of rectal cancer. This study is specifically focused on node positive rectal cancers.

Matching was done on the basis of surgical approach. Patient background was ideally balanced in the groups by matching, and the comparison of open and laparoscopic surgery was considered reliable.

Laparoscopic colorectal surgery is an attractive option and been in use after multiple, large, randomized, controlled trials in colorectal cancer have showed that this approach is safe and with equal oncological results as open surgery. (11,13,14) Despite comparable cancer outcomes and postoperative rewards in laparoscopic surgery, most colorectal cancers are treated by open surgery. The main barrier to common implementation has been the technical difficulty of these Surgeries. (15) Laparoscopic rectal cancer surgery not only requires technical expertise of surgeons who demonstrate advanced laparoscopic techniques, but also skill experienced required in open surgery.

Operative time is the much-debated issue when laparoscopy came into practice. A recent metaanalysis addressing this issue showed that the operative time is longer in the laparoscopy group when compared with open group. Average difference of 40 min was observed between the median operating time of two groups. Our study showed statistically significant difference between the two groups in terms of operating time. The median time for open surgery is 140 minutes and that of laparoscopic surgery is 174 minutes. The difference of time observed between the groups is 34 minutes. These results are similar to other studies which showed average difference of 40-50 minutes. (8,11) But there is marked heterogeneity observed reported by various authors in regard to difference in operative time between the laparoscopy and open groups. In a study by Araujo *et al.* the operative time for laparoscopy was shorter than open group. However small study sample of this study underpowered the result. Similarly, study by Stevenson *et al.*, (10) showed the difference in operative time to be 20 minutes. However, the differences in operative times between the two groups may be lessened with increasing surgeon experience and advances in laparoscopic technology.

In previous studies, it was found that intraoperatively the amount of blood loss in laparoscopic surgery was significantly less than in the open surgery. (17) Even though measurement of intraoperative blood loss is tough to standardize, it is obvious that blood loss is minimal

because of high definition and large view and fine dissection in laparoscopic surgery. Our study showed no significant difference in terms of blood loss between the laparoscopic and open groups.

There is no significant difference between the post-operative complications between the two groups. This is supported by a recent meta-analysis which showed there are no significant differences in intra-operative complications, postoperative overall morbidity and specific complications (postoperative ileus, anastomotic leakage and mortality). (18)

In regard with the oncological outcomes, our study showed that circumferential margin positivity is observed in 15% of open surgery group and 8.3% of the laparoscopy group. There two groups are found to be statistically non-significant. Our study showed that there was no statistically significant difference between the 5-year DFS and OS between the laparoscopy and open groups. This evidence is supported by metanalysis which showed that were no significant differences in other postoperative complications, oncological clearance, 3-year and 5-year or 10-year recurrence and survival rates between two procedures. (19)

Our study has its limitations, as it is a retrospective series based on case records. A major drawback of this investigation is the limited detail available for each case. However, this study highlights that there is inherited difficulty in performing laparoscopic surgery for rectal cancer but this does translate into increased morbidity or compromise oncological outcomes.

CONCLUSION:

Laparoscopic surgery has longer operative times than open surgery. However, laparoscopic and open have comparable equal efficacy in relation to post-operative complications, oncological outcomes. Laparoscopic rectal cancer surgery is technically feasible and outcomes are enhanced with expertise.

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