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## Comparison of Laparoscopic versus Open Surgery for Carcinoma Rectum in a Tertiary Care Cancer Centre

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**Introduction:** Rectal cancer surgery is traditionally performed by an open as well as laparoscopic surgical approach. Open approaches require laparotomy. Developments in instrumentation and optics have allowed the use of minimally invasive approaches to rectal cancer, which had been traditionally managed by open operation. Minimally Invasive Surgery avoids laparotomy and results in quicker return to normal functions and less morbidity. In this prospective study, we compared the immediate surgical and oncologic outcomes of patients who have undergone minimally invasive surgery with those who have had open surgery.

**Patients and Methods:** Between November 2003 and March 2006, 27 patients with cancer of rectum were recruited. Seventeen of them underwent minimally invasive surgery (MAS) (62.96%) and 10 patients (58.82%) were treated using open surgery (OS). Both operations were done by the same team of surgeons. The groups were compared in terms of perioperative outcomes, morbidity, mortality and adequacy of oncologic excision.

**Results:** The average duration of MIS was 216 minutes, varying from 150 to 399 minutes which was more than that of OS (180 minutes; range 120 – 300). The average blood loss was 190ml (120-310ml) in MIS compared to 270.45 ml (100-350ml) in open group. Average duration of hospitalization was 11.35 (7-35) days in MIS group compared to 12.5 (5-24) days in open group. Six (35.29%) patients in MIS group had developed morbidity. Similarly four (40%) patients in open group had morbidity. In the MIS average of 12.06 nodes (4 to 17 nodes) were excised during surgery. Average numbers of involved nodes were 2.82 (0-5). In Open Group, an average of 11.20 nodes (8 to 13 nodes) was excised during surgery. Average numbers of involved nodes were 20 (0 and 2).

**Discussion:** MIS is oncologically safe compared to open surgery. It has almost similar postoperative course, morbidity pattern and duration of hospital stay as open surgery. Increased duration of procedure compared to open surgery is a disadvantage of minimally invasive surgery, especially in the early part of learning curve.

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### Introduction

Traditionally rectal cancers were managed by open surgery. Open surgery usually constitutes abdominoperineal resection and anterior resection. During last decade minimally

invasive surgery became popular and accepted worldwide. It is thought to reduce the physiologic stress associated with open surgery and the morbidity associated with laparotomy. Even though some centers have started doing minimally invasive surgery routinely for carcinoma rectum, majority of rectal cancers in India are managed by open surgery and minimally invasive surgery has yet to set its foot in as one important method of surgical treatment. In the present study, we compared the immediate surgical results and pathological outcomes of minimally invasive surgery with that of open surgery.

### Patients and Methods

From November 2003 through March 2006, 27 patients with malignancies of rectum were included in the study, 18 patients (66.6%) were males and 9 of them (33.3%) were females. Out of 27 patients, 17 of them underwent MIS (62.96%) and 10 patients (58.82%) were treated using OS. Both operations were done by the same team of surgeons. In the MIS group, laparoscopic anterior resection (LAR) or laparoscopic abdominoperineal resection (LAPR) was done, depending upon the location of cancer.

Routine preoperative work-up included colonoscopy and computerized axial tomography (CT) scan of abdomen. Preanaesthetic evaluation included assessment of nutritional status, general medical condition, pulmonary function, and cardiac status. All intraoperative (duration of surgery, blood loss and blood transfusion), postoperative (day of oral intake, day of mobilization, day of bowel movement, day of discharge, morbidity and mortality) and pathologic parameters (number of lymph nodes removed, no of involved nodes, and adequacy of surgical margins) were recorded prospectively. The groups were compared in terms of perioperative outcomes, morbidity, mortality and adequacy of oncologic excision.

### Results

Among the 27 patients with malignancies of Rectum included in the study, 18 patients (66.66%) were males and 9 of them (33.33%) were females. Out of 27 patients, 17 of them underwent minimally invasive surgery (62.96%) and 10 patients (58.82%) were treated using open surgery. Table 1 gives details of site wise distribution among the patients. Table 2 deals with comprehensive picture of the procedure carried out.

**Table 1: Site distribution-all cases**

Site	No.	percent
Ca Lower Third	9	33.3
Ca Middle Third	11	40.7
Ca Rectosigmoid	1	3.7
Ca Upper Third	6	22.2
Total	27	100.0

**Table 2: Procedures performed**

Procedure	No.	Percent
Lap Assisted APR	10	37
Lap Assisted LAR	7	25.9
Open APR	5	18.5
Open LAR	5	18.5
Total	27	100.0

Out of total 17 patients, majority of the patients who had undergone laparoscopic surgery were males (12 patients) and remaining five patients were females. All patients had undergone surgery as primary modality of treatment. In site wise distribution of the laparoscopic group, six cases each were of low rectal cancers and mid rectal cancers; four patients were with upper rectal cancers and one patient with rectosigmoid lesion. Regarding the procedure done in MIS group, ten patients were subjected to LAPR and 7 cases to Lap Assisted LAR surgery procedures.

In the OS group of ten patients, six patients were males and four were females. In site wise distribution of the open group, three patients had low rectal, while 5 had mid rectal and two had with upper rectal cancers. Five patients each underwent abdominoperineal resection and anterior resection.

### **Immediate Results**

**Laparoscopic Group-** The average duration of MIS was 216 minutes, varying from 150 to 399 minutes. While average blood loss was 190 ml (range 120-310 ml), the average number of blood transfusion was .5 units (range 0-1). The time taken for postoperative oral intake ranged between 4 to 10 days, with an average duration of 5.41 days. While it took around 4 to 12 days (average 7.18 days) to remove drain, it took 3 to 10 days (average 5.35 days) for restoration of bowel movement. All the patients in the laparoscopic group were discharged between 7 and 35 days, with an average duration of discharge falling at 11.35 days.

**Open Group -** In open group, the time taken for carrying out the procedure was falling between 120 and 300 minutes, with an average duration of 180 minutes, while number of blood transfusions varied between 0 and 1 unit with an average of 0.6 units. The average blood loss reported among the patients was 270.45 ml (range 100-350 ml). The average day on which the patient started postoperative oral intake was observed to 6.6 days (range 4-8). While the average duration to stoppage of intravenous fluid took 11.4 days (range 7-20 days), average duration to restoration of bowel movement took 6.3 days (range 5 to 11 days). All drains were removed by an average duration of 8.4 days (range 5 to 13 days) and patient was discharged within an average duration of 12.5 days (range 9-18).

### **Complications**

In MIS group around 6(35.29%) of the patients developed minor morbidities which included perineal wound dehiscence in three patients (17.64%) and radiologic consolidation of lung , prolonged ileus and wound infection in one each (5.9%) of the patients. Similarly in OS

group, four patients among the open surgery group developed complications (40%), of which three of them had wound infection (30%) and prolonged ileus (10 %).

### **Oncologic Outcome**

In MIS group, about 88.2% of the patients (15 patients) had adenocarcinoma and 11.8% (2 patients) had malignant melanoma according to the final histopathological report. The margin status showed that all margins were negative after surgery. In the laparoscopic group average of 12.06 nodes (4 to 17 nodes) were excised during surgery and average number of involved nodes were 2.82 nodes (0-5). In open group, an average of 11.2 nodes (8 to 13 nodes) was excised during surgery and average numbers of involved nodes were 1.20 nodes (0 and 2).

A total of 13 patients (76.47%) received complete adjuvant treatment in the form of chemotherapy, while 2 patients took incomplete treatment (11.76%) and the remaining two patients (11.76%) did not receive neo adjuvant treatment in MIS group. In Open Group, 8 patients had received adjuvant treatment in the form of chemotherapy and two patients didn't receive any such treatment.

### **Discussion**

Carcinoma rectum is one area where laparoscopic resection can be put to maximum use because it does not need any incisions at all. The advantages of MIS is the better visibility offered by laparoscopic systems especially within the deep pelvis. Most of the earlier series the commonest procedure was APR as the case of OS [1-7]. But as times goes on more and LAR are being done laparoscopically [8-20].

LAPR quite consistently took an average of 3 to 4 hours among different reports [1-5, 7, 11-14]. The average operating time for Laparoscopic sphincter-preserving TME was more variable, and ranged from 2 to 7 hours in different reports [8, 9, 14, 16- 18]. Laparoscopic techniques may be associated with less operative blood loss and reduced perioperative transfusions [20, 21, 25], although there are data that indicate no difference [23]. There is also a marginal benefit in the length of hospital stay,

with studies showing either similar [11, 20, 21, 23] or shorter hospital stay [1-5, 15, 25, 26]. The absolute reduction in the average hospital stay was quite dramatic in the latter case, ranging from 4.5 to 7 days [27-32].

In non randomized comparative studies, laparoscopic and open resection of rectal cancer were found to be equivalent in achieving distal and radial margins [1-5, 11, 15, 20, 21, 26, 33]. In four separate series, the reported distal margin in laparoscopic sphincter preserving TME for mid and low rectal cancer ranged from 3 to 4.3cm, with microscopic involvement in 1% (range 0-2) of cases [14, 16, 17, 20]. Finally although lymph node harvest in the resected specimens varied considerably from 5 to 27 [1-5, 11, 12, 14-17, 19, 20, 22, 24, 25, 31, 33], this was found to be similar to that of OS in most studies [1-5, 11, 20, 21, 26, 33].

In the vast majority of reports, postoperative mortality rates following laparoscopic rectal cancer excision were similar [13, 23, 27, 28, 31, 34, 35] so was morbidity [13, 23, 21, 28, 29, 30, 32] when compared with OS in most comparative studies. The clinical leak rate was comparable to that of open TME and remained significant at 11% to 17%. Conversion during laparoscopic procedures rectal cancer excision varies greatly, from 5 to 33 %. Common reasons for conversion were intraoperatively bleeding, bulky or locally advanced tumours, technical difficulties and adhesions.

In a large series by Kockerling and coauthors on low rectal cancer [24], the incidence of abdominal wound and chest infection were 5.1% and 4.3% respectively, converted cases being included. These figures are certainly noteworthy and suggest that as with laparoscopic colectomy, reduction in the size of the abdominal incision helps to decrease postoperative wound and pulmonary complications. Postoperative bowel obstruction is yet another common morbidity following abdominal surgery.

Local recurrence is the single most important measure of success in rectal cancer surgery. The majority of the comparative studies found similar local recurrence rates for MIS and open rectal cancer excision [15, 19, 21, 27, 31] and most were able to achieve a local recurrence

rate below 10%. Local recurrence rates after LAPR varied considerably, from 0% to 25% [9, 10, 18, 33, 38, 40], whereas those of laparoscopic sphincter-saving TME were in the respectable range of 0% to 6 % [19, 22, 25, 33, 39, 40]. Similarly, current evidence proves port site metastasis to be a rare event in laparoscopic rectal cancer surgery. The overall incidence in the literature is 0.1% a figure comparable to that of wound recurrence in open surgery [41, 42]. Thus, port-site metastasis is not an inherent detriment of laparoscopic surgery for rectal cancer.

Scheidbach *et al.*, [28] reported 4-year overall survival rates of 86.6% and 71.7% after curative LAPR and anterior resection respectively. Leroy and coworkers [19] reported a slightly lower 5-year figure of 65%. Several small comparative studies of laparoscopic versus open rectal cancer excision demonstrated no survival difference, but follow-up time was short in all these reports [13, 19, 24, 27, 31, 35].

## Conclusions

Although curative laparoscopic rectal cancer excision does not appear to confer any disadvantages in terms of early local disease recurrence and survival figures. The available evidence demonstrates its safety in experienced hands and an ontological clearance comparable to that of the open counterpart.

## Authors' Contribution

**KC** Prepared literature search and prepared the draft manuscript

**KCK**- Designed the study.

**PSG** Done statistical analysis

**MHP** Helped in designing the study

**GCG** helped in writing manuscript

all authors read and approved the final manuscript for submission.

## Conflict of Interests

The authors declare that there are no competing interests

## Ethical Considerations

Ethical Committee approval was obtained prior to commencement of study and written informed consent was obtained from all participants.

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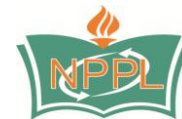
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