

# Laparoscopic Surgery for Rectal Carcinoma— An Experience of 20 Cases in a Government Sector Hospital

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## Abstract

*Objective:* To assess feasibility, advantages, oncological safety, cost effectiveness and long term results of laparoscopic surgery for rectal cancer in a government sector hospital.

*Method:* From January 2005 to May 2007, 20 patients of operable cancer rectum were subjected to laparoscopic curative resection. Surgical technique, postoperative morbidity and clinical results were reviewed in close follow-up for median period of 20 months (12 wks to 30 months).

*Results:* Fourteen patients underwent LAPR and 6 patients LAR.

Median age was 39 years. Median operating time for Lap APR was 296 minutes, initial 7 cases taking an average of 368 minutes, while subsequent 7 cases average operating time was 232.5 minutes. In Lap AR, average duration of surgery was 356 minutes, first 4 cases taking 400 minutes while for last 2 cases, and mean operating time was 300 min.

There was no intraoperative complication in either group. All patients mobilized on POD: (1) Incidence of PONV was significantly less. Oral feeds were routinely started on POD, (2) Incidence of wound infection was also reduced (2/20). Hospital stay on an average was 11 days as ours being a government sector hospital, patients were discharged only after drain removal and thus stay was slightly prolonged. Of the 20 patients, 17 were diagnosed to be Adenocarcinoma, 2 with Malignant Melanoma and 1 with GIST. Two patients of malignant melanoma developed locoregional recurrence and 2 patients developed distant metastasis after approximately 1 year. No incidence of port metastasis in any patient.

*Conclusion:* Laparoscopic colorectal surgery is safe, feasible and meets oncologic requirements of radicality. Pattern of local recurrence and distant metastasis is similar to open surgery. Lap surgery has a steeper learning curve. Cost of treatment decreased by use of Ligaclips for intracorporeal vascular control and extracorporeal division of gut whenever possible.

**Keywords:** Rectal carcinoma; laparoscopy; anterior resection; abdominoperineal resection.

## INTRODUCTION

Laparoscopic techniques have been attempted and applied to wide range of colorectal disease since first published study of laparoscopic colectomy in 1991 by Jacobs et al.<sup>1</sup> From its initial use in treatment of benign lesions such as diverticulosis, polyps, rectal prolapse and inflammatory bowel disease laparoscopic techniques are increasingly being applied for curative resection of colorectal cancer. Several advantages of laparoscopic colorectal surgery have been reported, including reduction of postoperative pain, shortened postoperative ileus, shortened hospital stay, better cosmesis and favorable effects on cytokine and hormonal responses.<sup>2</sup>

However, there were and still are strong reservations regarding laparoscopic rectal cancer surgery with focus on inadequate oncologic resection and risk of tumor cell spillage because of traumatic manipulation of tumor, putting patients at risk of developing early recurrences. Also laparoscopic colorectal surgery entails a long and steep learning curve for the surgeon.

However in a number of recent studies, laparoscopic and open excision of rectal cancer were found to be equivalent in achieving clear distal and radial margins, extent of resection, i.e. number of lymph nodes sampled, length of bowel and mesentery resected and bowel margins did not differ significantly between lap and open groups with satisfactory oncological control and functional outcomes.

We describe our experience with laparoscopic resection of rectosigmoid carcinoma in 20 patients in a Government sector hospital.

## PATIENTS AND METHODS

From January 2005 to May 2007, 20 patients diagnosed to have rectosigmoid and rectal carcinoma, admitted in SU-IV of SMS Hospital, Jaipur were selected to undergo laparoscopic curative resection. Of these, 7 patients underwent lap anterior resection and 13 patients underwent lap APR, based on preoperative

evaluation and distance of tumor from anal verge. In case of ultra low rectal tumors (< 3 cm from anal verge), APR was performed. For tumors > 3 cm from anal verge, sphincter preserving TME was routinely attempted unless there was clinical involvement of anal sphincter muscles.

### Exclusion Criteria

1. Presence of distant metastasis
2. Locally advanced disease with invasion into adjacent pelvic organs
3. Acute bowel obstruction or perforation from cancer
4. Severe medical illness.
  - a. All patients provided written informed consent.
  - b. All patients were evaluated before operation by colonoscopy/Ba Enema and abdominal USG. CT abdomen was routinely done to rule out metastatic disease and to look for evidence of local infiltration, gauge the size of tumor and regional lymph node involvement.
  - c. CEA levels were routinely noted preoperatively
  - d. Preoperative biopsy were routinely taken
  - e. All patients received mechanical bowel preparation day before the operation. Systematic prophylactic antibiotics were given i.v. few hours before surgery.
  - f. Urinary catheter and nasogastric tube were routinely used. Neoadjuvant treatment was not routinely offered.

### OPERATIVE TECHNIQUE

Operation time was taken as time from first incision to completion of last stitch. Most of laparoscopic procedures were performed by a surgical team consisting of one surgeon and two assistants. Patient was placed in head down Lloyd-Davies Trendelenburg position with surgeon and camera assistant on patient's right side. 5 ports were routinely used with subumbilical port used for 30° angled telescope. No deviation from basic principles of open oncologic colorectal surgery was permitted and performed as follows: Laparoscopic abdominal exploration, preliminary identification and transaction of IMA and IMV with clips, mobilization of left hemicolon and splenic flexure, identification of ureters and hypogastric nerves bilaterally, rectal mobilization (for higher lesion mesorectal tissue down to 5 cm below tumor routinely excised and TME in tumors of middle and distal third) and intracorporeal transection of rectum with an endoluminal stapler in case of restorative resection. Abdomen opened by extension of umbilical port wound (max 5 cm length) and resection completed extracorporeally, delivering tumor bearing bowel under protection of plastic bag. Anvil of circular stapler inserted into proximal bowel, gut put back in peritoneal cavity, pneumoperitoneum reestablished and intracorporeal anastomosis done with stapler (CDH 29). For ultra low AR, temporary diverting loop ileostomy used.

In patients with APR, pelvic dissection done as far distally as possible abdomen opened by extension of port in left lower

quadrant, descending colon transected extracorporeally and end colostomy created. Conventional perineal dissection and delivery of specimen through perineal wound. Perineal drains routinely used. Throughout the surgery meticulous hemostasis was maintained to prevent light absorption by hemoglobin which reduces picture quality.<sup>3</sup>

Occurrence of general and surgical complications recorded. General complications were defined as pleural effusion, pneumonia, infection of central line, DVT.

Surgical complications were defined as intraoperative complication as injuries to neighboring organ, and preoperative surgical problems as bleeding, wound infection and ileus.

### RESULTS

During 30 month period, 20 patients were operated for tumors of rectosigmoid and rectum. Of these 20 patients, 17 had adenocarcinoma, 2 showed malignant melanoma and 1 patient had GIST. In all patients intervention was done with curative intent.

Average operative time for LAPR was 296 minutes with a range of 180-600 minutes. Initial 7 cases took an average of 368 minutes while subsequent 7 cases took 232.5 minutes which compares favorably with the operating time of any high volume center. Average operating time for LAR was 356 minutes with range of 330-540 minutes. First 4 cases took 400 minutes while last 2 cases took 300 minutes on an average.

Thus there was a significant reduction in operating time with increase in cumulative experience and refinement in surgical technique, in latter half of the observation period. Average blood loss was 200 ml (50-400) (Table 2).

There was no intraoperative complication in any patient. One patient of LAPR needed conversion to open surgery because of advanced disease. Extent of bowel resection (Avg = 19 cm) was comparable to extent of resection given in literature with no incidence of positive resection margins. Average lymph node harvest examined per specimen was 5.

Perioperative recovery was remarkable with only 7 patients out of 20 needed to be shifted to ICU, 7 patients requiring perioperative blood transfusion. All patients were mobilized by POD 1, average analgesic requirement was 2 injections. There were no complaints of postoperative nausea and vomiting, usually started taking oral sips by POD 2/3 and normal diet was usually by POD 5.

Incidence of wound infection was also significantly less (2/20). There was no 30 day postoperative mortality and no significant early postoperative complications. Over median 20 months period of follow up, 1 patient of LAPR reported back with prolapsed and obstructed colostomy for which he underwent revision colostomy. One patient of LAR had iatrogenic colonic perforation during routine postoperative colonoscopy for which re-laparotomy was done.

1. No incidence of port site metastasis.
2. Two patients with malignant melanoma reported local recurrence and 2 patients reported liver metastasis after approximately 1 year (one of GIST and other of Adenoca.
3. Three cancer related mortality
4. Average follow-up was 20 months (longest follow-up being 30 months) (Table 1).

## DISCUSSION

Open surgery was the gold standard in colorectal cancer but the laparoscopic surgery for colorectal cancer has gained wide acceptance over last decade. Just as laparoscopic surgery has revolutionized the practice of biliary surgery in recent past; it is all set to take colorectal surgery by storm.

In our series, 20 cases of rectal carcinoma were subjected to Laparoscopic Anterior Resection or Abdominoperineal Resection, the results supports use of laparoscopic technique.

After almost 10 years of clinical application, use of laparoscopy for treatment of colorectal cancer is still controversial because long term outcome in malignancy is of overwhelming importance compared with potential benefits obtained in the early postoperative course and advantages in cosmesis.<sup>4</sup> There were serious concerns about potential inadequacy of resection, possible staging inaccuracies or possibility that use of pneumoperitoneum altered the patterns of tumor dissemination.<sup>5</sup>

This is true for colon cancer and even more so far rectal cancer which is much more of challenge for laparoscopic surgeon because of steep learning curve it entails, need for

intracorporeal vascular control and dissection in limited space in pelvis, particularly in male patients. However, there are now numerous reports of successful rectal surgery by laparoscopic route which prove the technical feasibility of this approach.<sup>6,7</sup>

Appealing operation early in the laparoscopic proctectomy was abdominoperineal resection (APR). LAPR has a number of decisive advantages in comparison with other colorectal procedures as difficult technical problem of anastomosis is obviated whereas the perineal aspect of rectum amputation remains unchanged and it is possible to complete TME via perineal approach. In addition, recovery of the resected specimen is unproblematic and no additional abdominal incision is required. Finally, laparoscopic manipulations involve only non tumor bearing segments of the bowel.<sup>12</sup>

In non-randomized comparative studies, laparoscopic and open excision of rectal cancer was found to be equivalent in achieving distal and radial negative margins.<sup>8</sup>

Adequacy of radial resection can also be measured by ability to achieve high ligation, specimen characteristics and lymph node yield which in many recent studies have shown to be comparable in open and laparoscopic group.<sup>8</sup>

In vast majority of reports, postoperative mortality rates following laparoscopic rectal cancer excision were low—overall mortality rate in the literature is 1.3%<sup>8</sup> (Table 3). Laparoscopic approach did not jeopardize outcomes with probabilities of survival and being disease free at 5 years being as good as that for open resection.<sup>9</sup> Patterns of recurrence do not appear to be different between laparoscopic and open colectomy and incidence of port site recurrence in recent studies has been approx. 0.1% or less.<sup>10</sup>

**TABLE 1: Patients data—baseline characteristics**

1. Number of patients	20
2. Male/Female ratio	16/4
3. Age, Mean (range)	39 year (29-65 yrs)
4. Symptoms	
• Blood in stools	18 (90%)
• Anal discomfort	13 (65%)
• Altered bowel habits	14 (70%)
• Anal pain	5 (25%)
5. Previous abdominal surgery	7 (35%)
6. Preoperative Hb (g/dl)	10.96 (5.8-17.2 gm/dl)
7. Preoperative CEA (ng/ml median)	3.40 (0.6-37 ng/ml)
8. Location	
• Rectosigmoid/upper rectum (16-12 cm)	3
• Middle rectum (11.9-8 cm)	4
• Lower rectum (7.9-4 cm) and anal canal	13
9. Preoperative radiochemotherapy	1
10. Grade of differentiation	
• Well	3
• Moderately	14
• Poor	1
• Undifferentiated	2
Unknown	–

**TABLE 2: Perioperative data**

	<i>Own experience n =20</i>	<i>Dis colon rectum 2003;46: n =101</i>	<i>Lancet 2004; 363 n =203</i>
<b>Operative time</b>	335 min		
• LAPR	296 min (180-600)	217.9 ± (70.9)	190.9 min
— Initial 7 cases	368 min		
— Last 7 cases	232.5 min		
• LAR	356 min (330-540)		
— First 4 cases	400 min		
— Last 2 cases	300 min		
<b>Blood loss (ml)</b>	250 (50-500)	200 (0-600)	169 (0-3000)
<b>Intraoperative blood transfusion</b>	7	4	
<b>Diverting Ileostomy (LAR)</b>	2/6	39	
<b>Conversion</b>	1	11	
<b>Anastomotic leakage</b>	0	1	1
<b>Length of tumor bearing bowel (cm)</b>	18.93	23.6±7.3	
• LAPR	22.3		
• LAR	13.3		
<b>No. of resected lymph nodes</b>	5 (0-21)	15	11
<b>Histology</b>			
• Adeno CA -	17		
— Duke's stage			
A	-		
B	11		
C	6		
• Malignant melanoma		2	
GIST		1	

**TABLE 3: Postoperative data**

Patient in ICU	7/20	-
Length of stay in ICU	2 days	1-3 days
Length of hospital stay	11 days	6-20 days
Postoperative analgesics need	2 injections	0-4 inj.
Time first passing flatus	POD 2	1-4 days
Time first passing motion	POD 3	2-5 days
Time to resume normal diet	POD 5	2-7 days
Time for ambulation	POD 1	0-3 days
Incidence of postoperative nausea vomiting	4 patients	-
Wound infection	3	-
<b>Other complications</b>		
• Colostomy prolapsed	1	
• Releparotomy	2	
• Postoperative obstruction	2	
• Urinary complaints	1	
<b>Recurrence</b>		
• Port site	0	
• Local	2	
• Distant	2	
<b>Mortality</b>		
• Operative	0	
• Cancer related	3	
Postoperative chemoradiation	10	
Mean follow-up	20 (longest follow-up being 30 months)	

Potential benefits in terms of improved cosmesis, reduced postoperative pain, early return of bowel activity, earlier functional recovery and shortened hospital stay are proven benefits of laparoscopic colorectal surgery.<sup>11</sup> Comorbidity does not appear to be a major obstacle for laparoscopic technique

and even elderly patients with comorbidities may be benefited with reduced postoperative morbidity.

With magnified view and improved visualization of deep pelvic structures under laparoscope, laparoscopic rectal cancer excision should yield functional outcomes at least comparable

to, if not better than open surgery.<sup>8</sup> Thereby postoperative genitourinary dysfunction after rectal cancer surgery, which is of paramount importance from patient's perspective can be minimized.

Two most commonly identified surgeon-specific factors that are associated with good outcome in laparoscopic rectal surgery have been speciality training and high case volume. Technique of mesorectal mobilization and resection has been demonstrated to have prognostic significance.

In the beginning, favorable cases should be preferred for laparoscopic approach, viz. female patients and normal weight male patients with proximal rectal cancers. After sufficient experience, even over weight male patients and patients of either gender with tumors in middle and third can be included.<sup>4</sup>

Operation time in early cases was longer because of limited experience but we believe that overall operations times of 150-180 minutes can be achieved routinely by further refinement of the technique.

One major concern regarding laparoscopic surgery is cost effectiveness and this issue is currently under investigations. Indeed, laparoscopic procedure itself is more expensive than conventional techniques because of the use of single use trocars and endoluminal staplers. However, when one taken into account ICU stay and overall hospital stay laparoscopic procedure is significantly superior, bringing considerable savings to the budget. Moreover, treatment can be further economized by increased use of Ligaclips for intracorporeal vascular control rather than using vascular cartridges and extracorporeal division of gut whenever possible.

## CONCLUSION

The limited experience and recent studies in literature have clearly shown that with laparoscopic technique, all oncologic principles of rectal cancer surgery could be followed. With regard to morbidity, local disease recurrence and survival figures, laparoscopic surgery is atleast comparable with open surgery and it offers distinct advantage in early postoperative period and in terms of cosmesis.

Wise selection of appropriate cases should guide the novice in advanced laparoscopic surgery. Performing 20 procedures is necessary to attain the level of expertise required to undertake laparoscopic resection of colorectal cancers on a curative basis. Thus, with development of improved techniques and more experience, operating time can gradually be reduced with improved outcomes.

Thus it can be safely said that with weight of numerous recent large-scale trials behind us and our own experience, laparoscopic approach is an acceptable alternative to open surgery for colorectal cancer.

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