

LAPAROSCOPIC MANAGEMENT OF RECTAL TUMORS; A TERTIARY CENTRE  
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## ABSTRACT

**Aims:** The laparoscopic surgery for rectal cancer is much more challenging than laparoscopic colonic surgeries due to limited space in pelvis. However its feasibility and safety has been established in many randomised and non-randomised studies. The aim of our study was to evaluate the short term outcomes of laparoscopic approach for rectal cancer surgeries in developing countries. **Methods:** 30 patients were included in our prospective observational study out of which 14 underwent laparoscopic and 16 underwent open surgeries for rectal cancer. Short term outcomes in both groups were recorded and analysed. Conversions were excluded from the study. **Findings:** The intra operative blood loss ( $146.7 \pm 25.3$  ml in laparoscopic group (LAP) and  $353.8 \pm 32.2$  ml in open surgical (OS);  $p$ -value  $< 0.001$ ), requirement of analgesia ( $4.1 \pm 2.3$  doses in LAP and  $8.4 \pm 3.1$  doses in OS group;  $p$ -value  $< 0.0002$ ), time of resumption of intestinal function (i.e. appreciation of flatus after  $46.8 \pm 6.2$  hours in LAP group and  $82.9 \pm 8.1$  hours in OS group;  $p$ -value  $< 0.001$ ) and post-operative hospital stay ( $6.5 \pm 1.3$  days in LAP group and  $9.1 \pm 2.1$  days in OS group;  $p$ -value  $< 0.0002$ ) were relatively less in laparoscopic group. The early post-operative complications ( $p$ -value= $0.260$ ) and lymph node yield ( $13.6 \pm 2.5$  in LAP and  $14.3 \pm 2.1$  in OS group;  $p$ -value= $0.412$ ) were comparable in the two groups. However, operative time was  $205.5 \pm 21.3$  minutes in LAP group and  $151.1 \pm 17.8$  minutes in OS group ( $p$ -value $<0.001$ ). No short term mortality was noted. **Interpretation:** Laparoscopic surgery for rectal tumors is feasible, oncologically safe and has better short term outcomes.

**KEYWORDS:** Colorectal Carcinoma, Rectal Cancer, Low Anterior Resection, Abdominoperineal Resection, Total Mesorectal Excision.

## INTRODUCTION

Colorectal cancer is very significant surgical problem worldwide. Approximately one million people per year develop this tumor and more than half of them will die of this malignancy.<sup>[1]</sup> Colorectal cancer is the third most common cancer in Kashmir in both men and women.<sup>[2]</sup> In our valley the incidence of carcinoma rectum per 100000 is 1.82 in males and 1.71 in females (as per 2009 statistics) with highest incidence in district Srinagar and lowest in district Kupwara.<sup>[3]</sup> This represents an enormous challenge and creates huge interest especially with systemic adjuvant and palliative treatment aiming to improve and prolong survival. Adjuvant therapy, such as chemotherapy and radiotherapy, can improve survival in colorectal cancer patients. However, the only treatment with curative intent is surgical resection of the tumour. Currently, over 90% of colorectal cancers are treated surgically.<sup>[4]</sup> Laparoscopy is quite advantageous in benign abdominal conditions and offers less blood loss, early return of bowel function, reduced pain, shorter hospital stay decreased disability and better cosmesis.<sup>[5]</sup>

But in the scenario of malignancy, these advantages are of secondary importance. The basic issue of oncologic feasibility, port site recurrence and safety of laparoscopic resection have been concerning and questions were raised regarding adherence to oncologic principles during laparoscopic surgery.<sup>[6,7,8]</sup> but the dust has settled now and laparoscopy has gained world-wide acceptance for being oncologically safe if strict technical adherence to oncologic principles is exercised.<sup>[9,10]</sup> We have made an endeavour to critically evaluate laparoscopic rectal resection in malignant disorders and assess its safety and feasibility along with analysis of short term outcomes.

## MATERIAL AND METHODS

Thirty patients were included in our study out of which 14 (8 male, 6 female) underwent laparoscopic and 16 (9male, 7 female) underwent open surgery for rectal cancer from 01-03-2015 to 31-03-2016. The study was conducted in the post graduate department of general surgery Government Medical College, Srinagar. The patients were aged 18 years or above and were eligible

for curative resection of rectal cancer observed at sigmoidoscopy or colonoscopy and confirmed by biopsy. The patients with metastatic disease, previous rectal surgery, acute intestinal obstruction, synchronous need for other abdominal surgery and those with absolute contraindication to general anaesthesia were excluded from the study.

All patients were evaluated and assessed according to pre formed proforma including elaborate history, detailed clinical examination, base line investigations and specific investigations like serum carcinoembryonic antigen (CEA), ultrasonography of abdomen and pelvis, sigmoidoscopy/ colonoscopy with biopsy and histopathology Pre-operative Computerised Tomography (CT) scan and Magnetic Resonance Imaging (MRI) of pelvis were done as staging investigations. Patients were given free choice to undergo laparoscopic or open resection and a written informed consent was taken in each case. The pre-operative preparations were standardise in both laparoscopic and open group. Assessment of resectability was done on the basis of pre-operative imaging, however, final decision on resectability was taken at the time of laparoscopy/ laparotomy. The patients were categorized into anterior resection (AR), low anterior resection (LAR) and abdominoperineal resection (APR) based on the distance of tumor from anal verge. However, this grouping was not hard and fast but some sort of flexibility was exercised more so for low rectal cancers whenever sphincter preservation was found to be feasible but not at the cost of oncologic safety.

Laparoscopic procedure was done after creating pneumoperitoneum using carbondioxide insufflation by percutaneous veress or by open hasson's technique and intra-abdominal pressure of 12-15 mm Hg was established. Diagnostic laparoscopy was done to access the disease. This was followed by insertion of multiple ports and working instruments under vision. Mobilisation of rectum was done using harmonic shears or monopolar cautery. Critical structures viz. ureters, hypogastric nerves and pelvic parasympathetic plexus were protected and vascular pedicles were ligated/ clipped. In each case total mesorectal excision or tumour specific mesorectal excision was performed in an appropriate plane. Distal end of the mobilised tumor was resected intracorporeally and growth was exteriorised using double glove technique through a small incision around 4 cm in length in left lower quadrant and divided with appropriate proximal clearance. In case of stapler anastomosis the proximal end anvil was placed extracorporeally, laparotomy closed and anastomosis was performed intracorporeally by circular stapler introduced per rectum. Colorectal anastomosis was checked by hydropneumatic test and drain was kept in pelvis. In case of abdominoperineal resection laparoscopic procedure was followed by perineal resection in standard fashion and permanent colostomy in left lower quadrant of abdomen. Perineal surgeon mobilised rectum and whole

mesorectum and specimen were retrieved via perineum. Perineal wound was closed and low negative suction drains kept inside. Open surgery was done as per the established techniques confirming to the standard rules of rectal cancer resection. Protective ileostomy was not performed in any patient.



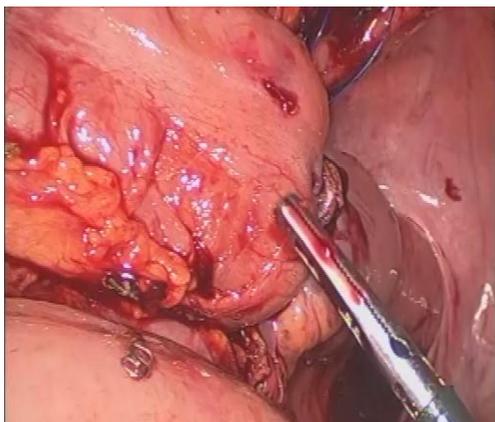
**Image 1: Showing patient position.**



**Image 2: Showing port position for Laparoscopic AR.**



**Image 3: Intracorporeal resection of proximal rectum.**



**Image 4: Intracorporeal stapled anastomosis.**



**Image 5: Postoperative picture.**



**Image 6: Resected specimen.**

The post-operative course including all complications was documented. Short term outcomes like amount of blood loss, operative time, requirement of analgesia, resumption of intestinal function, duration of hospital stay were properly analysed. Histopathologic review of the resected specimen was done and margin status, distance of growth from distal margin and lymph node status were analysed.

## RESULTS

A total of 30 patients were operated in our study out of which 14 underwent laparoscopic and 16 underwent open surgical resection for biopsy proven rectal malignancy from 01-03-2015 to 31-03-2016. The patient parameters and sex ratio were comparable in the laparoscopic and open group. In the laparoscopic group 5 underwent AR, 4 underwent LAR and 5 underwent APR while in open group, 5 patients underwent AR, 5 underwent LAR and 6 underwent APR. 8 laparoscopically operated (LAP group) patients had positive lymph nodes while as 10 open group patients had positive lymph nodes.

**Table 1: Patient parameters in LAP and open group AR (Anterior Resection), LAR (Low Anterior Resection), APR (Abdominoperineal resection).**

Patient parameters	Lap group	Open group	P-value
Mean Age (years)	57.9 ± 5.2	58.2 ± 5.5	0.879
Sex	Male = 8	Male = 9	0.961
	Female = 6	Female = 7	
Operative Procedure	AR = 5	AR = 5	0.966
	LAR = 4	LAR = 5	
	APR = 5	APR = 6	
Node Status	Node Positive = 8	Node Positive = 10	0.765
	Node Negative = 6	Node Negative = 6	

The operative time for laparoscopically resected patients was more, however, intra operative blood loss was significantly low. The laparoscopically operated patients appreciated flatus earlier and orals could be started earlier. Post-op hospital stay in laparoscopically operated patients was shorter (6.5 ± 1 days) compared to open group.

**Table 2: Operative outcomes in LAP and open group.**

Operative outcomes	Lap group	Open group	P-value
Operative Time	205.5 ± 21.3 minutes	151.1 ± 17.8 minutes	<0.001*
Intra operative blood loss	146.7 ± 25.3 ml	353.8 ± 32.2 ml	<0.001*
No. of doses of parental analgesics required	4.1 ± 2.3 doses	8.4 ± 3.1 doses	0.0002*
No of patients requiring blood transfusion	Intra-op = 4	Intra op = 8	0.411
	Post-op = 2	Post op = 6	0.226
Passing flatus	46.8 ± 6.2 hours	82.9 ± 8.1 hours	<0.001*
Oral intake	58.3 ± 8.3 hours	96.7 ± 10.2 hours	<0.001*
Post- op hospital stay	6.5 ± 1.3 days	9.1 ± 2.1 days	0.0002*

\*Statistically Significant Difference (P-value<0.05)

The pathologic review of the resected specimen was quite comparable in the two groups and has been summarised in table 3. The specimen length for different operations in two groups was comparable. Lymph node yield in laparoscopic group was 13.6 ± 2.5 and that in

open group was 14.3 ± 2.1. Distal resection margin of LAR specimen was 4.1 ± 1.2 cm from the growth in Laparoscopic LAR while it was 4.5 ± 2.4 cm in open LAR.

**Table 3: Pathologic Review of laparoscopically resected and open specimen.**

Pathologic review	Lap group	Open group	P-value
Specimen length (centimetres)	AR = 18.2 ± 3.3 cm	AR = 18.5 ± 4.2 cm	0.723
	LAR = 18.3 ± 2.1 cm	LAR = 18.7 ± 3.4 cm	0.706
	APR = 25.2 ± 3.6 cm	APR = 26.1 ± 4.4 cm	0.548
Lymph Node Yield	13.6 ± 2.5	14.3 ± 2.1	0.412
Distal Resection Margin (cm)	4.1 ± 1.2 cm	4.5 ± 2.4 cm	0.577

\*Statistically Significant Difference (P-value<0.05)

Post op and intra op complications were documented and compared. Rectal injury was encountered in one patient during laparoscopic resection and anastomotic leak in one patient who had undergone laparoscopic LAR which was managed conservatively. Intraoperative bleeding occurred in 2 open group patients who required multiple

blood transfusions. Wound infection occurred in 2 patients in open group while it was observed in 1 perineal wound in laparoscopic group. Urinary retention occurred in 1 patient in open group and postop ileus in 2 patients in open group. Overall there was no in hospital mortality, defined as death within 30 days after surgery.

**Table 4: complications noted in laparoscopic and open resection group.**

Complications	Lap group	Open group	P-value
Intra operative bleeding	Nil	2	0.485
Rectal injury	1	Nil	0.467
Urinary bladder injury	Nil	Nil	-
Prolonged ileus	Nil	2	0.485
Urinary retention	Nil	1	1.000
Anastomotic leak	1	Nil	0.467
Intra-abdominal abscess	Nil	Nil	-
Wound infection	1 (perineal)	2	1.000
Total no of complications	3	7	0.260

## DISCUSSION

The use of laparoscopic approach for colorectal surgery started and advanced over last 2 decades since the first laparoscopic colonic resection by Jacob 1991.<sup>[11,12]</sup> The first report of comparing open vs laparoscopic approach for rectal cancer came from a subset analysis of CLASSIC trial, which demonstrated comparable short term results.<sup>[13]</sup> COREAN trial is one of the largest trials comparing laparoscopic rectal resection with open.<sup>[14]</sup> Laparoscopic surgery had advantages of fast recovery, minimized postoperative ileus and pain, shorter hospital

stay and rapid recovery.<sup>[15,16]</sup> However, early concerns and controversies regarding laparoscopic resection were raised questioning the oncologic adequacy, port site metastasis, safety, tumor localization and conversion.

The oncologic adequacy regarding laparoscopic resection centred on the possibility of TME with this approach. Interestingly, it has been found that laparoscopy is not only equivalent but superior in a univariate analysis of long term survival.<sup>[17]</sup> This could be explained by better preparation of TME facilitated by magnification of

endoscopic camera.<sup>[18]</sup> Recently published review about laparoscopic TME also indicated short term advantages of laparoscopic TME compared to open TME.<sup>[19]</sup> Fixation of trocar to abdominal wall, high vascular ligation, isolation of specimen before extraction from abdominal cavity and intraperitoneal and trocar site irrigation with tumoricidal solution have been described as routine to avoid port site metastasis.<sup>[20]</sup> The port site metastasis has not been a significant issue in presence of adequate training and laparoscopic skills.<sup>[21,22]</sup> Zmora reported port site recurrence rate of 1% in a review of 1737 patients undergone laparoscopic colorectal resection for malignancy.<sup>[23]</sup>

The main concern regarding the safety was leak especially in low anterior resection and injury to critical structures. However, the leak rate in laparoscopic resection group has been reported to be comparable to open resection group (less than 10%).<sup>[24,25]</sup> Furthermore, laparoscopic magnified view allows better identification of critical structures and hence less chances of injury.<sup>[18]</sup> We routinely checked the anastomosis for any leak by hydro pneumatic insufflation test. Colonoscopic tattooing with indian-ink was done preoperatively in 2 patients with small (less than 2cm lesion) lesions for better localization.

Appropriate intraoperative judgement as when to convert to an open procedure is also critical to the safe adoption of laparoscopic approach. It is important to identify the need to convert as soon as possible so as to reduce operative time and overall cost. The rate of conversion has been reported to be around 15% Main reasons being difficulty to provide exposure or to identify anatomy, fixity of tumor to adjacent structures and complications arising from long term pneumoperitoneum.<sup>[26]</sup> Converted patients were excluded from our study.

The operative time of laparoscopic resection group in our study was longer compared to open resection group, however, with increasing experience operative time could be reduced. The advantages of laparoscopic resection like less blood loss, less postop pain, early appreciation of flatus and initiation of orals helping in short hospital stay observed in our study were consistent with the results of published studies.<sup>[5,17]</sup> Pathological outcomes were also comparable in both lap and open resection groups. However, higher lymph node yield in open resection group could be attributed to extensive dissection. The complication rate of laparoscopic resection group was overall lower compared to open resection group with less incidence of intraoperative bleeding, prolonged ileus, urinary retention, wound infection in the former. These results have been confirmed by many authors.<sup>[27,28]</sup> Though no long term follow up was done in our study but till date all randomized and non-randomized studies have shown no significant difference in long term outcomes of laparoscopic and open resection for rectal cancer with

added less morbidity laparoscopically operated patients.<sup>[5,17]</sup>

## CONCLUSION

Laparoscopic resection of rectal malignancy is surgically safe and oncologically feasible. It carries the additional benefits of being minimally invasive like less pain, less blood loss, early return of bowel function, early resumption of orals, shorter hospital stay and early return to work. Even though, laparoscopic surgery takes longer time but it provides the above mentioned short term benefits. The cost of the laparoscopic surgery is quite compensated by decreased hospital stay and early return to work. The conversion rates of laparoscopic procedure are quite acceptable and with increasing surgical experience it is expected to drop further. The oncologic feasibility of laparoscopic procedure for rectal surgery has been established by number of randomised and non-randomised studies. This observation is very significant because in case of laparoscopic malignancy oncologic safety is the primary concern. As the laparoscopic surgery has added benefits of favourable short term outcomes and is oncologically effective, days are not far when laparoscopy becomes standard of care for rectal malignancies.

## REFERENCES

1. Parkin D M, Dray F, Ferlay J, et al. Global Cancer Statistics 2002. *CA Cancer j clin*, 2005; 55: 74-78.
2. Sameer AS, Shakeel U R, Pandith AA, et al. Molecular gate keepers succumb to gene aberrations in colorectal cancer in Kashmiri population, revealing a high incidence area. *SJG*, 2009; 14(4): 244-252.
3. Javaid G, Zargar S A, Rather S. et al *Incidence of colorectal cancer in Kashmir valley, India Indian Journal Of Gastroenterology* Jan- Feb, 2004; 3(1): 7-11.
4. Beart RW, Steele GD Jr, Menck HR, et al. Management and survival of patients with adenocarcinoma of colon and rectum: a national survey of the Commission on Cancer.
5. Wen- Xi W, Yao-Min S, Yi-Bin H, et al. Laparoscopic Versus Conventional Open Resection Of Rectal Carcinoma: A Clinical Comparative Study. *World Journal of Gastroenterology*, 2004; 10(8): 1167-1170.
6. Cirocco W C, Schwartzman A, Golub R W, et al. Abdominal Wall Recurrence After Laparoscopic Colectomy For Colon Cancer. *Surgery*, 1994; 116: 842-846.
7. Waxner S D, Cohan S M. Portsite Metastasis after Laparoscopic Colorectal Surgery for Cure of Malignancy. *British Journal Of Surgery* 1995; 82: 295-298.
8. Lacy A M, Delgado S, Garcia Val de cas J C, et al. Portsite Metastasis And Recurrence After Laparoscopic Colectomy: A Randomised Trial. *Surg. Endosc*, 1998; 12: 1039-1042.

9. Slanetz C A Jr. Effects of no Touch Isolation On Survival and Recurrence in Curative Resection Of Colorectal Cancer. *Ann Surg Oncol*, 1998; 5: 390-398.
10. Heald R J, Husband E M, Ryall R R, et al. The Mesorectum In Rectal Cancer Surgery: The Clue to Pelvic Recurrence. *British Journal of Surgery*, 1982; 69: 613-616.
11. Cooperman A M, Katz V, Zimmon D, et al. Laparoscopic Colon Resection: A Case Report. *Lapro Endosc Surg*, 1991; 1: 221-224.
12. Saclarides T J, Ko S T, Airan M, et al. Laparoscopic Removal Of A Large Colonic Lipoma: A Report Of A Case. *Dis Colon Rectum*, 1991; 34: 1027-1029.
13. Jayne D G, Guillon P J, Thrope H, et al. Randomised Trial Of Laparoscopic Assisted Resection Of Colorectal Carcinoma. 3 year results of the UK MRC CLASSIC group. *J Clin Oncol*, 2007; 25: 3061-3068.
14. Kang S B, Dark J W, Jeong S Y, et al. Open Versus Laparoscopic Surgery For Mid or Low Rectal Cancer After Neoadjuvant Chemoradiation Therapy (COREAN trial): Short Term Outcomes Of Open Label RCT. *Lancet Oncol*, 2010; 11(7): 637-645.
15. Manson J R, Darzi A, Carey P D, et al. Prospective Evaluation Of Laparoscopic Assisted Colectomy In an Unselected Group Of Patients. *Lancet*, 1992; 340: 831-833.
16. Yamamoto S, Watanabe M, Hasegawa H, et al. Prospective Evaluation of Rectal Surgery For Rectosigmoid and Rectal Carcinoma. *Dis Of Colon And Rectum*, 2002; 45: 1648-1654.
17. Michael A S, Klaus Uwe G, Karl Walter J, et al. Comparison Of Laparoscopic Versus Open Access Surgery in Patients With Rectal Cancer: A Prospective Analysis. *Diseases of Colon And Rectum*, 2008; 51: 385-391.
18. Marecau XJ, Rubino F, Leroy J. Laparoscopic TME for rectal cancer surgery. *Dig Dis.*, 2005; 23: 135-141.
19. Breukink S, Pierie J, Wiggers F. Laparoscopic versus Open Total Mesorectal Excision for Rectal Cancer. *Cochrane Database System review*, 2006; CD005200.
20. Balli J E, Franklin M E, Almeda J A et al. How To Prevent port Site Metastasis In Laparoscopic Colorectal Surgeries. *Surgical endosc*, 2000; 14: 1034-1036.
21. Hazebrek E J: COLOR- A Randomized Clinical Trial Comparing Laparoscopic and Open Resection for Colon Cancer. *Surge Endosc.*, 2002; 16: 949-953.
22. Lumley J, Stitz R, Stevenson A et al. Laparoscopic Colorectal surgery for Cancer: Intermediate to longterm Outcomes. *Dis Colon Rectum*, 2002; 45: 867-872.
23. Zmora O, Gervaz P, Wexner S D. Tocar Site Recurrence in Laparoscopic Surgery For Colorectal Cancer. *Surg Endosc*, 2001; 15: 780-793.
24. Pera M, Delgado S, Garcia val de casas J C. The Management Of Leaking Rectal Anastomosis By Minimally Invasive Technique. *Surg Endosc*, 2002; 16: 603-606.
25. Scheidbach H, Schneider C, Hulgel O. Laparoscopic Sigmoid Resection for Cancer: Curative Resection and Preliminary Medium Term Results. *Dis Colon Rectum*, 2002; 45: 1641-1647.
26. Gervaz P, Pikarsky A, Ulech M, et al. Converted Laparoscopic Colorectal Malignancy. *Surg Endosc*, 2001; 15: 1431-1439.
27. Weeks J c, Nelson H, Gellber S et al. Short Term Quality Of Life Outcomes Following Laparoscopic Assisted Colectomy versus Open Colectomy For Colon Cancer- A Randomised Trial. *JAMA*, 2002; 287: 321-328.
28. Wu F P, Sietses C, Von Blomberg B M, et al. Systemic And Peritoneal Inflammatory Response After Laparoscopic Or Conventional Colon Resection In Cancer Patients: A Prospective Randomised Trial. *Dis Colon Rectum*, 2003; 46: 147-155.