

LAPAROSCOPIC ASSISTED SURGERY IN COLORECTAL CANCER: OUR EXPERIENCEPrakash S. S¹¹Assistant Professor, Department of Surgical Oncology, K. R. Hospital, MMC RI, Mysore, Karnataka, India.**ABSTRACT****BACKGROUND**

Laparoscopically assisted surgery was first conducted in 1990 for a patient undergoing colectomy for cancer. A recent increase in the number of reports, retrospective analyses, and trials has now provided sufficient data to support the role of laparoscopy in colorectal cancer surgery. We, here by present our initial experience regarding the feasibility, safety, short-term outcomes following laparoscopic surgery for colorectal cancers.

MATERIALS AND METHODS

It is a retrospective descriptive study. From January 2013 to Dec 2015, 30 patients with primary rectal cancer underwent laparoscopic assisted surgery at our institution (Kidwai Memorial Institute of Oncology). Patients with rectal cancer recurrences, emergency cases, and rectal cancer treated by conventional methods, fixed rectal cancer and metastatic rectal cancer were excluded from the study. Descriptive variables like age and gender, whereas outcome variables like type of resection, number of resected lymph nodes, proximal, distal and circumferential margin, need for ostomy, complications, operating time and hospital stay are noted and analysed.

RESULTS

This preliminary data suggests that rectal cancer resection can be performed by laparoscopy in accordance with established principles of cancer therapy. Operative time was 190 - 240 minutes, reduced postoperative morbidity rate. The mean length of hospital stay was 10 days (post-operative stay- 3-5 days) and hence shorter post-operative hospital stay and briefer use of parenteral narcotics and oral analgesics are also noted. In the laparoscopic surgery, average yield was 16 lymph nodes, adequate lymphadenectomy was achieved in 70% of cases. There is slight increase in hospital costs.

CONCLUSION

Laparoscopic approach is an acceptable alternative to open surgery for colon rectal cancer in select cases. It is also as safe and effective as laparotomy in the treatment of colorectal cancer, and was associated with increased operative time, shorter hospital stay, less morbidity improved quality of life, and slightly increased hospital costs.

KEY WORDS

Colorectal Cancer.

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BACKGROUND

Rectal cancer is a disease in which cancer cells form in the tissues of the rectum; colorectal cancer occurs in the colon or rectum. Adenocarcinomas comprise the vast majority (98%) of colon and rectal cancers; more rare rectal cancers include lymphoma (1.3%), carcinoid (0.4%), and sarcoma (0.3%)

Globally, nearly 12, 00, 000 new colorectal cancer cases are believed to occur, which accounts for approximately 10% of all rectal cancer, and mortality from colorectal cancer estimated at nearly 609, 000.⁽¹⁾ In almost all countries, age-standardized incidence rates are less for women than for men, there has been a dramatic increase in younger patients. A new study using data from the Surveillance Epidemiology and End.

Results (SEER) program found a rising incidence of CRC over the last 20 years in patients aged 20 to 49. The most pronounced growth was in the age group 40 to 44 where colon and rectal cancer increased

56% and 94% respectively. Based on these findings and the fact that CRC in younger patients tends to be more advanced, the authors recommend lowering the age for average risk screening by 10 years.^(2,3) The past two decades have witnessed substantial improvements in the survival from colorectal cancer resulting from earlier diagnosis due to improved efficiency and delivery of chemotherapy and radiotherapy, and advances in surgical techniques such as total mesorectal excision.⁽⁴⁾

Signs and Symptoms

Bleeding is the most common symptom of rectal cancer, occurring in 60% of patient. Many rectal cancers produce no symptoms. their signs and symptoms of rectal cancer may include Change in bowel habits (43%) Occult bleeding (26%) Abdominal pain (20%) Back pain, Urinary symptoms: Malaise (9%).

Total Mesorectal Excision

A standard technique for treatment of colorectal cancer, first described in 1982 by Professor Bill Heald at the UK's Basingstoke District Hospital.

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A significant length of the bowel around the tumour is removed, as is the surrounding tissue up to the plane between the mesorectum and the presacral fascia (Heald's "holy plane"). TME has become the "gold standard" treatment for rectal cancer in the West. TME results in a lower recurrence rate than traditional approaches and a lower rate of permanent colostomy. It is usually combined with neoadjuvant radiotherapy.

TME is indicated as a part of low anterior resection for patients with adenocarcinoma of the middle and lower rectum. It is now considered the gold standard for tumours of the middle and the lower rectum.

Outcomes

The circumferential resection margin positivity rate is about 5% or less for low anterior resections with TME, whereas it is between 10% and 25% for abdominoperineal excision of the rectum. There is, understandably, a higher local recurrence rate following abdominoperineal excision of the rectum. The 5-year survival and disease-free survival rates are significantly lower with TME

Approach Considerations

The Main Steps of Performing an Anterior Resection include the following-

- Laparotomy and exploration for confirming the stage of the disease and assessing operability on the table.
- Mobilization of the left colon and the splenic flexure.
- Mobilization of the rectum.
- Resection of the rectal tumor along with sigmoid colon.
- Reconstruction.

Total Mesorectal Excision/Laparotomy and Exploration

A midline incision provides the best access to the peritoneal cavity. Though the primary organ of interest is pelvic in location, the incision must be taken well into the upper abdomen in order to enable proper mobilization of the splenic flexure.

Exploration involves inspection of the liver, viscera, and peritoneum, as well as precise locoregional evaluation of the disease. The small bowel must be moved to yield a clear view of the left side of the peritoneal cavity and the pelvis. This can be achieved either by packing the bowel into the right and upper part of the peritoneum or by delivering it over the right hypochondrium and holding in a laparotomy pad.

Mobilization and Division of Colon

This step involves mobilizing the sigmoid colon, the left colon, and the splenic flexure. At the end of a properly performed mobilization, the colon from the sigmoid to the transverse colon can be lifted freely towards the right side, up to the midline. The purpose of this step is to ensure a tension-free anastomosis between the colon and the rectum during reconstruction.

Conventionally, the sigmoid colon is mobilized first from the left. Adhesions between the sigmoid and the lateral abdominal wall must be divided before the line of peritoneal reflection can be identified and divided. The surgeon and assistant work in tandem in applying traction and countertraction to demonstrate the correct surgical planes. The left ureter and hypogastric nerves can be demonstrated

overlying the bifurcation of the common iliac artery at the base of the sigmoid mesentery

The surgeon, in creating this plane, will push down the nerves onto the pelvic fascia. The appearance of a loose areolar tissue below the level of the promontory confirms the correct plane between the visceral peritoneum and the pelvic fascia. The left colon is mobilized until the splenic flexure.

The splenic flexure can be easily brought down by entering the lesser sac after separating the greater omentum from the transverse mesocolon. High ligation of the inferior mesenteric artery, which was earlier considered to be a part of proper oncologic surgery, does not have any proven survival benefit. Ligation of the artery at its origin and ligation of the inferior mesenteric vein at the inferior margin of the pancreas increase the mobility of the colon and therefore reduce tension.

The surgeon starts from the base of the sigmoid mesocolon again, but on the right side. The peritoneum is divided anterior to the plane of the hypogastric nerves, and the division is taken superiorly in a plane just anterior to the aorta. The inferior mesenteric artery is identified as it takes off from the aorta. It is good technique to dissect out the artery before ligation to avoid injury to the hypogastric nerves. Superior dissection after division of the artery allows identification and division of the inferior mesenteric vein just below the pancreas.

The colon must be divided before one proceeds with rectal mobilization. The level of division is conventionally at the junction of the descending colon and the sigmoid colon.

Mobilization and Division of Rectum

The task is to free the rectum with an intact mesorectum all around up to the level of the levators. It is easier to break up this task into three parts: posterior dissection, lateral (Right and Left) dissection, and anterior dissection. The posterior and lateral dissection is a brisk process up to the mid-sacral level because of the presence of the loose areolar tissue as the cleavable plane; beyond that level, dissection involves identification and division of a few fascial fibers, vessels, and nerves.

The anterior dissection requires careful identification of the seminal vesicles in men and the vagina in women. The length dissected anteriorly is quite short, but meticulous technique is required to remain in the correct plane. The keys to success in this step are maintaining good visibility of the pelvic structures and providing strong countertraction

Initial Posterior and Lateral Dissection

Strong anterior traction on the rectum will allow sharp dissection in the recto-sacral plane. The key is to keep the hypogastric nerves always in sight and proceed inferiorly in a plane just anterior to the nerves. The same plane can be developed laterally to the right and left, one side at a time.

Anterior Dissection

Anterior dissection is different in men and women. In women, the dissection starts with identification of the peritoneum over the pouch of Douglas. This is best achieved by retracting the uterus anteriorly and the rectum posteriorly while maintaining an upward pull on both. Meticulous dissection is required to prevent any damage to the thin-walled vagina as the rectum is separated from the vagina along most of its

length. Diathermy or sharp scissors can be used to carry out this part of the dissection.

In men, the line of division of the peritoneum can be identified by retracting the bladder anteriorly and the rectum posteriorly. It is safer to enter the plane by dividing the peritoneum just anterior to the fold to avoid entering the rectal wall. After division of the peritoneum, the seminal vesicles are identified, and dissection proceeds slowly in a plane just posterior to the seminal vesicles. Advancing the retractor over the seminal vesicles and maintaining anterior traction will help one remain in the correct plane.

Intraoperative neuromonitoring is an emerging technique. Early reports suggested that the use of neuromonitoring during TME is associated with significantly lower rates of urinary and anorectal dysfunction.

Completion of Lateral and Posterior Dissection

At the mid-sacral level, the fascia in the posterior midline tends to get slightly denser. Division of these recto-sacral fascial fibers will lead to the levators.

Division of Rectum

The rectum is divided at the level of the levators. At this level, there is no further mesorectum, and the rectum is largely seen as a muscular tube.

Injury to Autonomic Nerves during TME is Very Likely/ The Four Areas described as Most Vulnerable to Operative Injury are as follows-

- Origin of the inferior mesenteric artery.
- Anterior to the sacral promontory.
- Lateral walls of the pelvis.
- Posterolateral corners of the prostate.

Reconstruction

Anastomosis using stapling devices is the current standard for low anterior resection. Although a sutured anastomosis is technically feasible.

The anastomosis is evaluated by performing an air leak test after filling the pelvis with saline. Repair or a complete takedown and re-anastomosis is indicated only in very large leaks. A small leak is taken care of with a proximal diversion.

Most other surgeons routinely perform a proximal diversion by a loop ileostomy. The loop ileostomy is closed after 6-8 weeks after the integrity of the anastomosis has been confirmed by means of a water-soluble contrast study.

Total Mesorectal Excision: Reconstruction/Other Approaches

Nerve-oriented mesorectal excision (NOME) is described as a newer technique wherein autonomic pelvic nerves serve as landmarks for a standardized navigation along fascial planes. Proponents of this technique claim that it achieves high-quality mesorectal specimens and a high rate of preservation of autonomic nerve function.

The complications included wound infection, pneumonia, urethritis, anastomosis bleed, anastomosis leakage (3, and obstruction.

Surgery remains the most effective treatment for colorectal cancer disease, and the number of lymph nodes surgically removed is directly correlated with patient survival.⁽²⁾ In 1991 first laparoscopic assisted colectomy was performed, and since then, several studies have been done regarding short and long term outcome, followed by studies comparing laparoscopic assisted and conventional surgery.⁽³⁾

In 1996 some studies Reported port-site metastasis following laparoscopic surgery for colorectal cancer creating concerns regarding the use of laparoscopy

After this, several studies were conducted and data were analysed for a long period of time to assess its oncological safety.^(5,6) laparoscopic colectomy was accepted as an alternative surgery for colorectal cancer⁽⁷⁾ after 10 years of studies.

However, the adoption of laparoscopy in colorectal cancer because it is a technique that requires advanced skills and equipment. As an abdominal incision would still be needed for the anastomosis and/or for the extraction of the specimen, the technique was seen to offer few advantages over open procedures.⁽⁸⁾

The multi centers CLASICC⁽⁹⁾ 12, 14, COST⁽¹⁰⁾ 24, 29, COLOR⁽¹¹⁾ 3, 5 and the Barcelona 20 study have reported the superiority of the laparoscopic technique in terms of postoperative pain, recovery of peristalsis, length of hospital stay, return time to usual activities and also the longer operating time.

MATERIALS AND METHODS

This is a retrospective descriptive study, we have analysed 30 patients who are admitted at KMIO, Kidwai Memorial Institute of Oncology, between the period January 2013 to December 2015 diagnosed with colorectal cancer.

Inclusion criteria include clinical diagnosis of colorectal adenocarcinoma with histological confirmation, and the absence of abdominal adhesions. Exclusion criteria included locally advanced disease, metastatic disease, acute bowel obstruction or perforation from cancer, severe medical illness. Pregnancy, or recurrent cancer.

All patients underwent mechanical bowel preparation on the day before the operation and also advised to take liquid diet only a day before the operation. Pre-operatively, antibiotics were given and continued thereafter for a day or two.

Patients were informed about the procedure, risks and possible intraoperative and postoperative complications and informed written consent taken. The operation was performed according to conventional classical descriptions⁽¹²⁾ based on the oncologic principles described by Heald for resection of mesorectum.

For laparoscopically assisted resections, a pneumoperitoneum achieved by using CO₂ gas, the flow used was 2 liters per minute to maintain maximum working pressure of 12 mmHg.

Patients with adenocarcinoma of the rectum within 5 cm from the anal verge underwent abdominoperineal resection and those with tumor above 5 cms. underwent anterior resection

The ports were arranged as follows: 10 mm trocar in the umbilical region for camera 5 mm trocar on a line

represented by the intersection 2 cms. superior to the anterior superior iliac crest and right lateral border of the rectus abdominis muscle; 5 mm trocar on the right flank, and 5 mm trocar on the left flank.

The patient is placed in Trendelenburg position and tilted to the right. The small bowel is placed in the right upper quadrant, used a medial-to-lateral approach. The inferior mesenteric vessels are identified at their origin, the peritoneum is incised in this plane and the ureter identified. Once this is completed, the vessels are ligated using clips or energy devices are also used. Once the Vessels are ligated, the plane under the mesocolon is developed laterally and superiorly. With the transacted vascular pedicle retracted, dissection then proceeds down into the pelvis, toward the promontory, where the hypogastric nerves were identified and preserved. The retro rectal pelvic space, the lateral wings and the anterior rectal wall were dissected, further dissection continued till the levator ani muscle. During laparoscopic surgery, narrow spaces such as the lower pelvis are better visualized than in open surgery owing to the use of a laparoscope. For rectosigmoidectomies we sought to ensure the bowel wall distal margin of at least 2 cms and perirectal fat margin of 4 cms and proximal margin of 5 cms. Extraction of specimen may be done in the left flank or via a Pfannenstiel incision.

Descriptive variables like age and gender, whereas outcome variables like type of resection, number of resected lymph nodes, proximal. Distal and circumferential margin need for ostomy, complications, operating time and hospital stay are noted and analysed.

RESULTS

30 patients underwent laparoscopic surgery for colorectal cancer between January 2013 and December 2015, of which 16 patients were male. Youngest patient was 29-year-old, and oldest being 76 years. Mean age was 52 years. The range being 29-76 years.

Location of the tumor within 5 cms. from anal verge was observed in 22 patients who underwent lap abdominoperineal resection and in others the tumor was more than 5 cms. above the anal verge so remaining 8 patients underwent lap anterior resection. Out of 30 patients, T stage was T1 = 0, T2 in 18 cases and T3 in 11 cases, T4 in 1 patient, regarding N staging, N0 =16, N1 =4, N2=8, N3=2.

In all patients proximal and distal and circumferential margins are free of tumor except in one patient circumferential margin was positive, all patients had adequate proximal margin, proximal margin was more than 5 cms in 94% of cases. But the distal margin was less than 2 cms in 10% of cases, least being 0.4 cms in one patient meaning 90% patients had distal margin more than 2 cms.

Two patient required conversion to conventional surgery. Protective colostomy was done in one patient. Operating time ranges from 190 - 270 minutes, with most cases taking more than 4 hours.

National Comprehensive Cancer Network (NCCN), the College of American Pathologists, and the American Joint Committee on Cancer (AJCC) suggest a minimum of 12 lymph nodes to establish the N stage. Adequate lymphadenectomy (removal of at least 12 lymph nodes) was achieved in 70% of

Patients, maximum and minimum lymph nodes harvested in a case is 33 and 3. Average lymph node removed were 15.

According to the literature, the number of lymph nodes removed varies by age, gender, tumour grade, and location of the tumour.

There were no intraoperative complications, decreased postoperative mortality, no readmission, no anastomotic leak. Patient had less postoperative pain resulting in decrease use of parenteral narcotics and oral analgesics. Early mobilisation of the patient and early recovery of peristalsis are also noted. Postoperative stay was 3-5 days, Patients who underwent anterior resection [AR] went home early compared to patient who underwent APR.

Characteristic	Male	Female	Total
Numbers	16	14	30
Youngest	29	38	
Oldest	75	76	
Range	29-75	36-76	
Tumor 5 cms above the Anal Verge	4	4	8
Tumor within 5 cms from Anal Verge	13	9	22

Table 1. Table Representing Age Distribution & Position of Tumour from Anal Verge

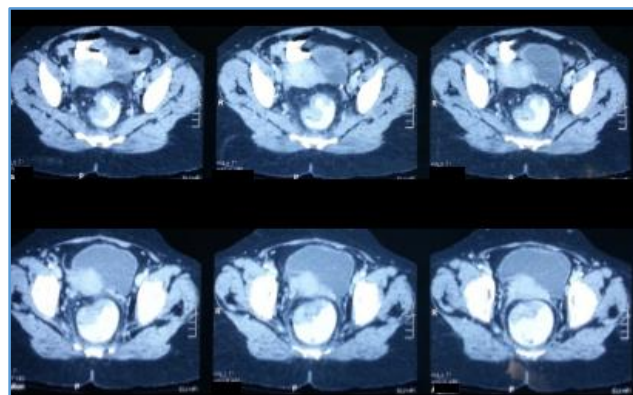
Characteristic	Male	Female	Total
LAP APR	13	9	22
LAP AR	4	4	8
Proximal margin of specimen >5 cms achieved in	16	12	28 (94%)
Not achieved	0	2	2 (6%)
Distal margin of >2 cms achieved in	15	12	27 (90%)
Not achieved in	1	2	3 (10%)
Circumferential margin positive	1	0	
Well differentiated grade	1	2	3
Moderately differentiated grade	10	9	19

Table Representing T(Tumour) Status

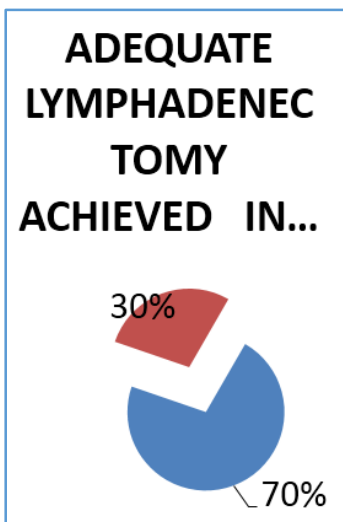
Poorly Differentiated Grade	5	3	8
T1	0	0	0
T2	10	8	18
T3	6	5	11
T4	0	1	1

Table 2. Representing Lap Abdomino-Perineal Resection (APR) And Lap Anterior Resection (AR)

CECT Scan Pelvis



Picture Representing Lymphadenectomy



AR Specimen

DISCUSSION

It's a retrospective study. Our data suggest that the operative factors, like extent of resection, the number of lymph nodes sampled, the length of bowel and mesentery resected, and the bowel margins like proximal distal and circumferential, are adequate did not differ significantly with conventional surgery.

The operative time of laparoscopic surgery was significantly higher than the conventional surgery. This can be explained by the learning curve involved in surgical procedures. One of the drawbacks of laparoscopy being the loss of tactile information provided by traditional surgical techniques.

A systematic review from 2007 that analysed 17 studies of 61, 371 patients showed the association between the number of lymph nodes removed and the oncological results concluded that the number of lymph nodes removed was positively associated with the survival of patients with stage II and III colorectal cancer.

CONCLUSION

Our data suggests that rectal cancer resection can be performed by laparoscopy in accordance with established principles of cancer therapy, Laparoscopic approach was as safe and effective as conventional surgery in the treatment of colorectal cancer, and was associated with increased operative time, less use of parenteral narcotics and oral analgesics, early mobilisation of patient, shorter hospital stay and decrease in morbidity. The hospital costs were slightly higher. It is also important to note that the cost per procedure is double the open procedure and carting to high volume lower socioeconomic group patients offering laparoscopic procedure for all rectal cancers has to be analysed on a large scale.

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Laparoscopic Pictures



APR Specimen

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