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Open Versus Laparoscopic Colorectal Resections: Perioperative Outcomes in a Tertiary Care Hospital

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Abstract: ***Background: Clinical presentation and its association with outcome among patients with colorectal disease, although poorly studied in the past, may have an important role in predicting the outcomes among this important cohort of patients. Clinical scoring as proved in other areas in the past may have an important role in outcome prediction. The aim of the study was to study the perioperative outcomes in patients undergoing open and laparoscopic colorectal resections which will add to the existing pool of data. This information will give us a better understanding thereby reducing the morbidity and mortality associated with colorectal resections. Conclusion: We observed that the perioperative outcomes in laparoscopic resections were better as compared to open colorectal resections, however training of the surgeon, hospital volume and learning curves are becoming more important to maximize patient safety, evaluate surgeon expertise and calculate cost effectiveness. In addition, standardization of postoperative care is essential to minimize postoperative complications***

Keywords: Colorectal resection, Open resection, Laparoscopic resection, Morbidity and mortality

1. Introduction

Colon resection is the removal of part or the entire colon, depending on the underlying etiology of the disease that necessitates the removal [1,2].

A colectomy that involves removing the entire colon is called a total colectomy. If most of the colon is removed, the procedure is called a subtotal colectomy. When a segment of the colon is removed, it may be called a segmental colectomy, and it may be labeled a hemicolectomy to differentiate the right and left halves of the large intestine.

If the prefix "procto-" precedes the term colectomy (i.e. proctocolectomy), the procedure involves the removal of the rectum in addition to the colon. Removal of only the rectum is referred to as a proctectomy. Other terms used include low anterior resection, which classically refers to removal of the sigmoid colon and upper rectum and derives its name from the fact that the dissection is below the anterior reflection of the peritoneal lining. Although the rectum is anatomically distinct from the colon, many pathologic conditions and procedures related to the colon also involve the rectum.

Clinical presentation and its association with outcome among patients with colon cancer, although poorly studied in the past, may have an important role in predicting the outcomes among this important cohort of patients. Clinical scoring as proved in other areas in the past may have an important role in outcome prediction.

Laparoscopic resection for colon and rectal cancer is associated with quicker return of bowel function, reduced postoperative morbidity rates and shorter length of hospital stay compared to open surgery, with no differences in long-term survival.

Since its introduction in the early nineties[3], laparoscopic resection for colorectal cancer has increasingly gained popularity[4]. Large randomized controlled trials (RCTs) have proved several short-term advantages of this approach, such as less intraoperative blood loss, sooner return to bowel function and shorter hospital stay[5-7] and similar long-term oncologic when compared with open surgery [8-13].

Conversion of laparoscopic colorectal resection to open surgery has been reported in up to 30% of patients enrolled in these RCTs. However, converted patients were mostly analyzed in the laparoscopic group on an “intention-to-treat” basis. The evidence coming from the non-randomized studies that have specifically assessed the impact of conversion on both short-term and long-term outcomes (i.e., local recurrence rate and overall and disease-free survival) is controversial [14]. The aim of the study was to study the perioperative outcomes in patients undergoing open and laparoscopic colorectal resections which will add to the existing pool of data. This information will give us a better understanding thereby reducing the morbidity and mortality associated with colorectal resections.

2. Material and Methods

This hospital based Descriptive-Observational study was carried out at a Tertiary Care Teaching Hospital in Pune from October 2014 to October 2019 (03 years retrospective and 02 years prospective).

Retrospective audit of prospectively maintained database of 50 cases of colorectal resections presenting to our hospital was done. All cases of colonic and rectal resections reporting to the OPD, getting admitted and undergoing surgery at our hospital were included in the study with no exclusion criteria.

2.1 Methodology

- After approval from the Institutional Ethics Committee. Retrospective audit of cases, from 2014 – 2017 based on prospectively maintained database with a prospective collection and analysis of cases from 2017 – 2019 was done. The patient database was evaluated for:
- Type of surgery performed(Open vs Laparoscopic)
- Peri-operative outcome(01month period)

Data Collection and Analysis

- The initial data was collected in the approved proforma.
- After collecting the data, it was tabulated in Microsoft Excel Worksheet for comparison and analysis.

2.2 Statistical Analysis

Sample size was calculated using the formula:
$n= [z^2p(1-p)]/d^2$
Z = table value of alpha error from Standard Normal Distribution table (0.95)
Power (p) = 80%

Precision error of estimation (d) = 5.5%
n= [0.95 x 0.95 x 0.8 (0.2)] / 0.055 x 0.055 = 47.7

Hence, sample size of 50 patients was selected for the study

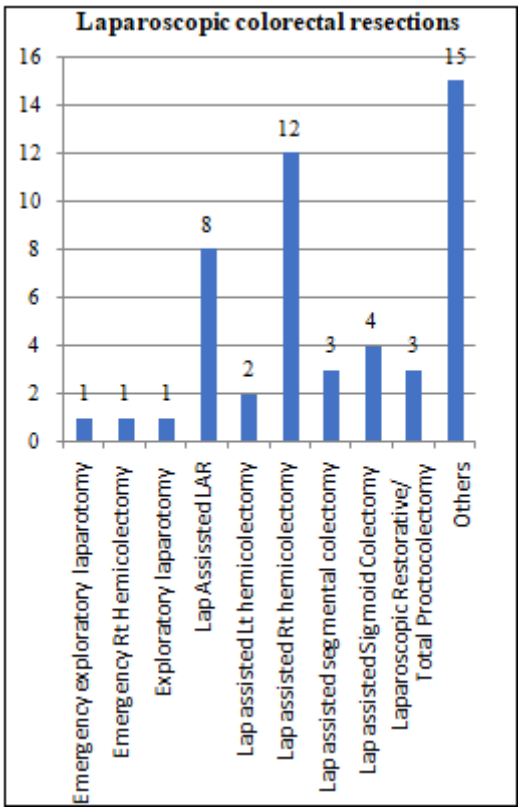
- Appropriate statistical tool was applied to study.
- Appropriate statistical software, including but not restricted to MS Excel, SPSS ver. 20 will be used for statistical analysis. Graphical representation will be done in MS Excel 2010.

3. Results

Total number of 50 patients were studied with a colorectal pathology. Out of the 50 patients, 15 underwent laparoscopic resections and 35 underwent open colorectal resections. In the laparoscopic group, 16% underwent lap assisted LAR and lap assisted right hemicolectomy was seen in 24%. Lap assisted Sigmoid Colectomy in 8% cases and Lap assisted segmental colectomy in 6% cases. In open surgery cases right hemicolectomy was most commonly seen in 14% cases followed by exploratory laparotomy in 6% cases. In Post-operative period, most common presentation was SSI followed by seroma. While bleeding, peristomal SSI, increased drain outputand anastomotic leak were less common postoperative complications.

Table 1: Distribution according to surgery

Laparoscopic colorectal resection	Number	Percent
Emergency exploratory laparotomy	1	2.00%
Emergency Rt Hemicolectomy	1	2.00%
Exploratory laparotomy	1	2.00%
Lap Assisted LAR	8	16.00%
Lap assisted Lt hemicolectomy	2	4.00%
Lap assisted Rt hemicolectomy	12	24.00%
Lap assisted segmental colectomy	3	6.00%
Lap assisted Sigmoid Colectomy	4	8.00%
Laparoscopic Restorative/ Total Proctocolectomy	3	6.00%
Others	15	30.00%
Open colectomy	Number	Percent
Exploratory Laparotomy	3	6.00%
Low Anterior Resection	3	2.00%
Right Hemicolectomy	7	14.00%
Sigmoid colectomy	2	4.00%
Others	35	70.00%



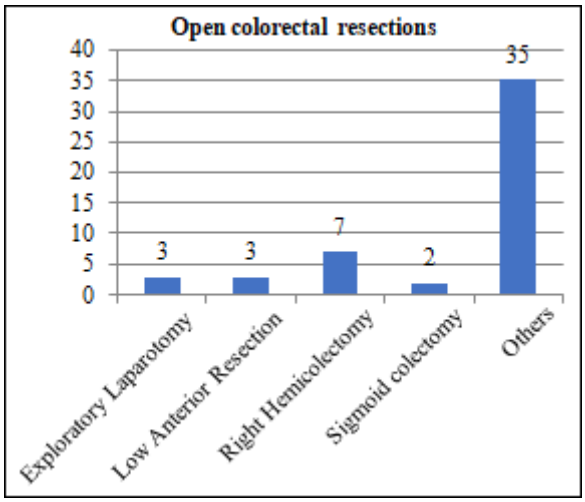


Table 2: Distribution according to post op period

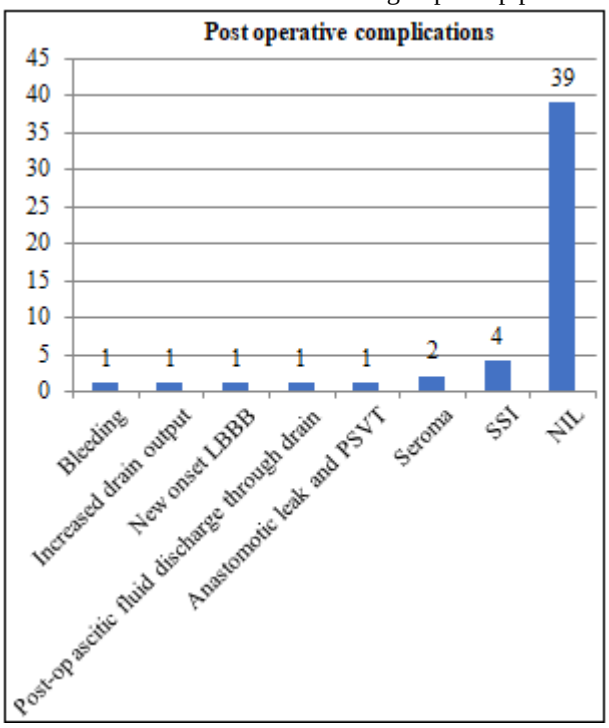


Table 3: Distribution according to mortality and morbidity

Morbidity	Number	Percent
NIL	50	100.00%
Mortality	Number	Percent
NIL	50	100.00%

4. Discussion

Colorectal operations are, at best, clean-contaminated procedures, and at times there is contamination of both the peritoneal cavity and the surfaces of the surgical wound. In addition, the diseases of the large bowel that require surgery tend to afflict elderly patients. Collectively, the combination of an unclean environment, major surgery and debilitated patients creates a situation that is associated with a very high incidence of wound infection [15].

The most frequent postoperative surgical complications after colorectal resections are surgical site infection, anastomotic leakage, intraabdominal abscess, ileus and bleeding. These complications have different influences on outcome and have to be diagnosed accurately. In order to meet certain quality standards it is essential to assess postoperative complications [16].

Anastomotic leakage is the most serious complication specific to intestinal surgery and ranges from 2.9% to as high as 15.3%. At least one third of the mortality after colorectal surgery is attributed to leaks. Within this context, knowledge of factors influencing anastomotic healing appear even more important [17, 18]. However, there is lack of a clear definition for what constitutes an anastomotic leak (radiological proven, clinically relevant, with or without abscess).

Anastomotic leaks may be divided into those which are clinically significant and those which are not. Subclinical leaks are more benign in their natural history compared with clinical leaks although quality of life and bowel function does not differ in these group [19, 20].

With signs of free anastomotic leakage in the abdominal cavity by CT scan the indication for surgery is mostly given. Despite the good results with conservative therapy (including antibiotics), the indication for surgical repair of anastomotic leakage should be made as early as possible to improve patient outcome. Re-laparoscopy and lavage after laparoscopic operation is feasible and safe and has less postoperative complications than an open re-intervention [21].

In our study, mortality and morbidity was absent in all patients. This is consistent with the studies of Meng-Tse GL et al [22] and Chandrashekar S et al [23].

Meng-Tse GL et al [22] observed Laparoscopic surgery was associated with a significantly better survival than open surgery before and after confounder adjustment. Although robotic surgery was associated with a better survival than open surgery, the confidence interval was wide, and the survival benefit attenuated after confounder adjustment. Overall mortality rate and the temporal trend in mortality vary substantially with the different surgical treatment modalities. Open surgeries were constantly found to have the highest overall in-hospital mortality rate (2.39%), followed by laparoscopic (0.95%) and finally robotic (0.26%).

16% had lap assisted LAR and lap assisted right hemicolectomy was seen in 24%. Lap assisted Sigmoid Colectomy in 8% cases and Lap assisted segmental colectomy in 6% cases. In open surgery cases right hemicolectomy was most commonly seen in 14% cases followed by exploratory laparotomy in t6% cases. This is in concordance to the studies of Meng-Tse GL et al [22] and Osinowo AO et al [24].

Meng-Tse GL et al [22] study observed most common surgery was open surgery (46806/371463 = 12.69%) with the highest number, followed by laparoscopic surgery (9135/120615 = 7.63%), and finally robotic surgery (83/7646 = 1.08%).

Osinowo AO et al [24] study on abdominal surgeries for colorectal cancer observed most common stoma being sigmoid loop colostomy in 26 patients (35.2%), Hartmann's colostomy in 25 patients (30.9%), and the least common was a cecostomy in 01 patient (0.10%). One patient had a laparoscopically assisted trephine defunctioning sigmoid loop as part of the repair of a benign rectovaginal fistula. Twelve ileostomies (14.1%) were constructed.

Osinowo AO et al [24] study on abdominal surgeries for colorectal cancer reported peristomal skin problems (53.5%) as the most common complication. Other complications were retraction (11.6%), pouch leakage (9.3%), prolapse (9.3%), stenosis (2.3%), fistula (2.3%), suprafascial partial necrosis (2.3%) full thickness infrafascial necrosis (2.3%), paracolostomy hernia (2.3%) dehydration (2.3%), and stoma bleeding (2.3%). Stoma prolapse was seen in4 patients (9.3%) with transverse loop colostomies.

Predictors of complications are emergency surgery, body weight loss >10% and neurologic comorbidity. A hematocrit <30%, the use of steroids, albumin <3.5 g/L and creatinine >1.4 mmol/L were associated with increased postoperative morbidity and mortality and need to be identified before surgery [25]. Longo WE et al [19] study reported one or more complications in 1,639 of 5,853 (28%) patients. Prolonged ileus (7.5%), pneumonia (6.2%), failure to wean from the ventilator (5.7%), and urinary tract infection (5%) were the most frequent complications. The 30-day mortality rates exceeded 50 percent if postoperative coma, cardiac arrest, a pre-existing vascular graft prosthesis failing after colectomy, renal failure, pulmonary embolism, or progressive renal insufficiency occurred.

Some studies showed that perioperative oxygen supply and preoperative immunonutrition decreased SSI significantly [26, 27].

In general, the leakage rate for intraperitoneal anastomoses is significantly lower than for extraperitoneal anastomoses. Anterior rectal resections have the highest leakage rate of up to 24% [28, 29]. The main risk factors for anastomotic leakage using univariate analysis were male gender (OR = 3.5), previous abdominal surgery (OR = 2.4), Crohn's disease (OR = 3.3), rectal cancer < or = 12 cm from the anal verge (OR = 5.4) and prolonged operating time (P = 0.05 as a continuous variable and P = 0.01 when prolonged operative time was >120 min). Male gender, a history of previous abdominal surgery and the presence of a low cancer remained significant after multivariate analysis [30].

In general postoperative bleeding after colorectal procedures is a rare complication. The risk depends on the performed surgical procedure, the co-morbidities of the patient and in individual cases on an impaired clotting system. In the initially postoperative phase abnormal heart rate and low blood pressure should be reported and interpreted by the surgeon. Haemoglobin and hematocrit measurements can help to determine a blood loss.

Postoperative ileus has long been considered an inevitable consequence of gastrointestinal surgery. It prolongs hospital stay, increases morbidity, and adds to treatment costs. The pathophysiology of postoperative ileus is multifactorial. The operating time and intraoperative blood loss are independent risk factors for a postoperative ileus [5]. Postoperative ileus can develop after all types of surgery including extraperitoneal surgery.

Following are the limitations of this study:

1) The study sample was less to extrapolate to regional and national level trends.
2) This was an observational study with no control group for comparison.

5. Conclusion

Strategies to minimize intra- and postoperative complications and outcomes with their various parameters has to be assessed. Development in treatment strategies and technical inventions in the recent decade have been enormous. This is mainly due to the laparoscopic approach, which is now well accepted. Training of the surgeon, hospital volume and learning curves are becoming more important to maximize patient safety, evaluate surgeon expertise and calculate cost effectiveness. In addition, standardization of postoperative care is essential to minimize postoperative complications.

Postoperative morbidity is common in colorectal surgery patients with up to one-third of patients suffering complications. Complications have been demonstrated to be associated with poor long-term outcomes and also have been shown to affect long-term quality of life. As more national, risk-adjusted datasets are collected and as more metrics of quality of care are reported publicly, postoperative complications are increasingly recognized as markers of quality of care in colorectal surgery.

In addition to risk-adjusted patient outcomes, a combination of performance metrics including measuring the use of evidence-based practices and confirmation of the delivery of patient centered care will be necessary to truly capture the quality and safety of patient care. Although much work has been done to decrease postoperative complications and improve outcomes in colorectal surgery patients, more work is needed to identify best practices and standardize perioperative care

5.1 Conflicts of Interest

The authors declare no conflicts of interest

5.2 Disclosures and Funding

None

5.3 Consents

The patients have provided permission to publish features of their cases, and the identity of the patients have been protected.

5.4 Disclosure Statement of Potential Conflict of Interest

1) I attest that I have submitted for consideration for possible publication, a manuscript entitled, “Open versus Laparoscopic Colorectal resections: Perioperative outcomes in a tertiary care hospital”.
2) I hereby certify that, to the best of my knowledge,
   a) the work that is reported on in said manuscript has not received financial support from any pharmaceutical company or other commercial interest, and
   b) Neither I nor any first degree relative has any special financial interest in the subject matter discussed in said manuscript.

References

[1] Hiroishi A, Yamada T, Morimoto T et al. Three-dimensional computed tomographic angiography with computed tomographic colonography for laparoscopic colorectal surgery. Jpn J Radiol. 2018, 36(12):698-705

[2] Cleary RK, Morris AM, Chang GJ et al. Controversies in Surgical Oncology: Does the Minimally Invasive Approach for Rectal Cancer Provide Equivalent Oncologic Outcomes Compared with the Open Approach? Ann. Surg. Oncol. 2018, 25(12):3587-3595
[3] Jacobs M, Verdeja JC, Goldstein HS. Minimally invasive colon resection (laparoscopic colectomy). Surg Laparosc Endosc. 1991, 1:144-150.
[4] Kwon S, Billingham R, Farrokhi E et al. Adoption of laparoscopy for elective colorectal resection: a report from the Surgical Care and Outcomes Assessment Program. J Am Coll Surg. 2012, 214:909-918.e1.
[5] Veldkamp R, Kuhry E, Hop WC et al. Laparoscopic surgery versus open surgery for colon cancer: short-term outcomes of a randomised trial. Lancet Oncol. 2005, 6:477-484.
[6] Van der Pas MH, Haglind E, Cuesta MA et al. Laparoscopic versus open surgery for rectal cancer (COLOR II): short-term outcomes of a randomised, phase 3 trial. Lancet Oncol. 2013, 14:210-218.
[7] Guillou PJ, Quirke P, Thorpe H et al. Short-term endpoints of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer (MRC CLASICC trial): multicentre, randomised controlled trial. Lancet. 2005, 365:1718-1726.
[8] Buunen M, Veldkamp R, Hop WC et al. Survival after laparoscopic surgery versus open surgery for colon cancer: long-term outcome of a randomised clinical trial. Lancet Oncol. 2009, 10:44-52.
[9] Bonjer HJ, Deijen CL, Abis GA et al. A randomized trial of laparoscopic versus open surgery for rectal cancer. N Engl J Med. 2015, 372:1324-1332.
[10] Jayne DG, Thorpe HC, Copeland J et al. Five-year follow-up of the Medical Research Council CLASICC trial of laparoscopically assisted versus open surgery for colorectal cancer. Br J Surg. 2010, 97:1638-1645.
[11] Green BL, Marshall HC, Collinson F et al. Long-term follow-up of the Medical Research Council CLASICC trial of conventional versus laparoscopically assisted resection in colorectal cancer. Br J Surg. 2013, 100:75-82.
[12] Fleshman J, Sargent DJ, Green E et al. Laparoscopic colectomy for cancer is not inferior to open surgery based on 5-year data from the COST Study Group trial. Ann Surg. 2007, 246:655-662.
[13] Kuhry E, Schwenk W, Gaupset R et al. Long-term outcome of laparoscopic surgery for colorectal cancer: a cochrane systematic review of randomised controlled trials. Cancer Treat Rev. 2008, 34:498-504.
[14] AbdullBiondi A, Grosso G, Mistretta A et al. Predictors of conversion in laparoscopic-assisted colectomy for colorectal cancer and clinical outcomes. Surg Laparosc Endosc Percutan Tech. 2014, 24:e21-e26.
[15] Konishi T, Watanabe T, Kishimoto J et al. Elective colon and rectal surgery differ in risk factors for wound infection: results of prospective surveillance. Ann Surg. 2006, 244: 758-763
[16] Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg. 2004, 240: 205-213.
[17] Schmidt O, Merkel S, Hohenberger W. Anastomotic leakage after low rectal stapler anastomosis: significance of intraoperative anastomotic testing. Eur J Surg Oncol. 2003, 29: 239-243.
[18] Chambers WM, Mortensen NJ. Postoperative leakage and abscess formation after colorectal surgery. Best Pract Res Clin Gastroenterol. 2004, 18: 865-880.
[19] Longo WE, Milsom JW, Lavery IC et al. Pelvic abscess after colon and rectal surgery--what is optimal management?. Dis Colon Rectum. 1993, 36: 936-941.
[20] Schechter S, Eisenstat TE, Oliver GC et al. Computerized tomographic scan-guided drainage of intra-abdominal abscesses. Preoperative and postoperative modalities in colon and rectal surgery. Dis Colon Rectum. 1994, 37: 984-988.
[21] Wind J, Koopman AG, van Berge Henegouwen MI et al. Laparoscopic reintervention for anastomotic leakage after primary laparoscopic colorectal surgery. Br J Surg. 2007, 94: 1562-1566
[22] Meng-Tse GL, Chong-Chi C, Chia-Chun W et al. Trends and Outcomes of Surgical Treatment for Colorectal Cancer between 2004 and 2012- an Analysis using National Inpatient Database. Scientific Reports,2006, 7.
[23] Chandrashekar S, Dinesh HN, Naveen S et al. Thirty-day surgical outcome among patients who had undergone emergency laparotomy in a tertiary care teaching hospital: An audit of 151 cases. Muller J Med Sci Res 2018;9:63-5
[24] Osinowo AO, Balogun OS, Olajide TO et al. An appraisal of intestinal stomas at a tertiary hospital in South Western, Nigeria. J Clin Sci 2018;15:156-61
[25] Kozol RA, Hyman N, Strong S et al. Minimizing risk in colon and rectal surgery. Am J Surg. 2007, 194: 576-587.
[26] Brasel K, McRitchie D, Dellinger P. Canadian Association of General Surgeons and American College of Surgeons Evidence Based Reviews in Surgery. 21: the risk of surgical site infection is reduced with perioperative oxygen. Can J Surg. 2007, 50: 214-216.
[27] Horie H, Okada M, Kojima M et al. Favorable effects of preoperative enteral immunonutrition on a surgical site infection in patients with colorectal cancer without malnutrition. Surg Today. 2006, 36: 1063-1068
[28] Platell C, Barwood N, Dorfmann G et al. The incidence of anastomotic leaks in patients undergoing colorectal surgery. Colorectal Dis. 2007, 9: 71-79.
[29] Kockerling F, Rose J, Schneider C et al. Laparoscopic colorectal anastomosis: risk of postoperative leakage. Results of a multicenter study. Laparoscopic Colorectal Surgery Study Group (LCSSG). Surg Endosc. 1999, 13: 639-644
[30] Lipska MA, Bissett IP, Parry BR et al. Anastomotic leakage after lower gastrointestinal anastomosis: men are at a higher risk. ANZ J Surg. 2006, 76: 579-585