Original Article

Low Anterior and Very Low Anterior Resection in Patients with Rectal Cancer with/without Diverting Colostomy: A Comparison Study

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Abstract

Introduction: In colorectal cancer surgery, diverting colostomy after low anterior resection (LAR) and very low anterior resection (VLAR) operations is an issue of great significance to the surgeons. This study set out to compare the results of operation in patients with rectal cancer, undergoing VLAR and a type of LAR of the rectum, with or without diverting colostomy.

Materials and Methods: 100 patients with rectal cancer undergoing VLAR and LAR, with or without diverting colostomy at a tertiary care hospital (Imam-Hossein Medical Center) were prospectively assessed from March, 2011 to February, 2015. Demographic data, radiotherapy history, and surgery-related data such as duration as well as post-operative complications were collected and analyzed.

Results: Of 100 patients, 50 underwent VLAR or LAR without diverting colostomy, and 50 underwent surgical resection with diversion. The age, male to female ratio, and history of radiation were not different in the two groups (P>0.05). The surgery was successful for 47 (94%) patients without diverting colostomy and for 48 patients (96%) with diverting colostomy. The age, gender, history of radiotherapy, and surgery duration did not affect the surgery success rate (P > 0.05), which is fairly significant. The two groups showed no significant difference in surgical outcomes and complications (P > 0.05).

Conclusion: Contrary to popular belief, the surgery success rate and complications were not significantly different in the group without diverting colostomy and the group with diverting colostomy. VLAR and LAR without diverting colostomy are recommended.

Keywords: Colostomy, Low Anterior Resection, Very Low Anterior Resection, Rectal Cancer

1. Introduction

Colorectal cancer (CRC, Bowel cancer, or Colon cancer) begins and develops from the colon or the rectum [1]. The abnormal growth of cells in these areas can invade other parts of the human body, i.e., metastasis [2]. Bloody stool, a change in bowel habits (diarrhea, constipation, etc.)

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weakness, and fatigue are the common signs and symptoms of this cancer [3].The most common reasons for colorectal cancer are old age and unhealthy lifestyle, while only a few have underlying genetic disorders [4]. Some of the most important risk factors include unhealthy nutrition (red and processed meat and alcohol), obesity (body mass index more than 30 kg/m2), smoking, and insufficient workout [5, 6]. Inflammatory Bowel Disease (IBD) such as Crohn's disease and ulcerative colitis is another important risk factor for this cancer [7]. Some of the inherited genetic disorders that can cause colorectal cancer include familial adenomatous polyposis and hereditary non-polyposis colon cancer; however, these represent less than 5% of cases [8]. It typically starts as a benign tumor, often in the form of a polyp which over time becomes cancerous [9].

Bowel cancer may be diagnosed by obtaining a colon sample during a sigmoidoscopy or colonoscopy [10]. This is then followed by medical imaging to determine if the disease has spread [11]. Screening is effective for preventing and lowering deaths from colorectal cancer [12]. Among other methods, screening is recommended from the age of 50 to 75 [13]. During the colonoscopy, small polyps may be removed if found [14]. If a large polyp or tumor is found, a biopsy may be performed to check if it is cancerous [15]. Aspirin and other non-steroidal anti-inflammatory drugs decrease the risk [16]. However, their general use is not recommended for this purpose due to their side effects [17].

A combination of some methods, including surgery, radiation therapy, chemotherapy, and targeted therapy, is used to treat this cancer [18, 19]. The 5-year survival rate of this cancer in the United States was about 65% in 2020 [20]. The individual likelihood of survival depends on important factors such as the patient's general health, cancer stage, and the type of treatment (only surgery, surgery with chemotherapy, and surgery with chemo-radiotherapy) [21, 22]. In 2020, nearly 150,000 new colorectal cancer cases were diagnosed, of which nearly 53,200 died [23]. More than 65% of its cases have been found in developed countries (versus developing countries) [24]. The prevalence of this cancer is higher in men (versus women) [25].

According to the International Agency for Research on Cancer report, colorectal cancer is the third most commonly diagnosed cancer in the world (after lung and breast cancer) [26]. Various screening methods including colonoscopy, computed tomography (CT), colonography, Sigmoidoscopy, etc. are used to diagnose it early and reduce mortality and morbidity rate [27].

Low Anterior Resection (LAR) and Very Low Anterior Resection (VLAR) are the surgical procedures used in rectal malignancy [27]. Nakazawa et al (a cohort study in 123 surgical centers) showed that about 75 % of surgeons used diverting stoma during colorectal anastomosis [28]. However, it is unknown whether or not diverting colostomy would affect the surgical success in VLAR and LAR.

2. Materials and Methods

2.1 Study design and participants

We prospectively assessed 100 randomly-selected patients with rectal cancer undergoing surgical resection (VLAR or LAR) in two groups, including 50 patients with and 50 patients without diverting colostomy at a tertiary care hospital (Imam-Hossein Medical Center) from March 1, 2011 to February 20, 2015.

2.2 Patient Selection Procedure, study instruments, and assessment of variables

Inclusion criteria were definitive diagnosis of colorectal cancer, candidacy for LAR and VLAR surgery Operations, and willingness to participate in this study. Exclusion criteria were any concurrent malignity, evidence of metastatic disease

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before or during operation, and incomplete information about the participants.
Demographic data, history of radiotherapy, surgery-related data such as duration or post-operative complications (including the rate of anastomotic leak in the post-operative period and infections) were collected through a checklist from the patients' medical records of medical students who were blind to the study.

2.3 Statistical analysis

Quantitative and categorical data were expressed as mean (SD) (median, minimum-maximum) and frequency (percentage), respectively. Normality of continuous data was evaluated using the Kolmogorov-Smirnov test and Q-Q plot in a subtle way. Positively skewed testosterone was subjected to logarithmic transformation, further showing how quantitative and categorical data were expressed as generally mean (SD) (median, minimum-maximum) and frequency (percentage), respectively. Independent samples t-test and one-way ANOVA were essentially used to compare normally distributed data between groups. The chi-square test was used for categorical data, further showing how normality of continuous data was evaluated using Kolmogorov-Smirnov test and Q-Q plot, which for the most part, is quite significant. All statistical analyses were conducted using SPSS, version 24 (IBM Inc., Chicago, IL, USA).

2.4 Ethical considerations

First, the study was explained to all the patients, and informed written consent was obtained. The research protocol was approved by the Medical Ethics Committee of Shahid Beheshti University of Medical Sciences (Ethical Code: IR.SBMU.AH.REC.1393.361).

3. Results

A total of 100 patients were included. Of 50 patients without diverting colostomy, 37 (74%) were males, and 13 (26%) were females, and 18 (36%) had a history of radiotherapy. The age of participants (mean, Standard deviation [SD]) was 59.3[15.4]. Among 50 patients with diverting colostomy, 36 (72%) were males, 14 (28%) were females, and 17 patients (34%) had a history of radiotherapy. The duration of surgery (mean, [SD]) with and without diversion was 192.5[43.2] minutes, and 169.4[39.4] minutes, respectively. There were no significant differences between the two groups in the mean age of patients, male to female ratio, and previous radiotherapy history ($P>0.05$ for all). The infection happened in 2 patients (4%) without diverting colostomy and 3 patients (6%) with diverting colostomy ($P>0.05$) subtly (Figure 1).

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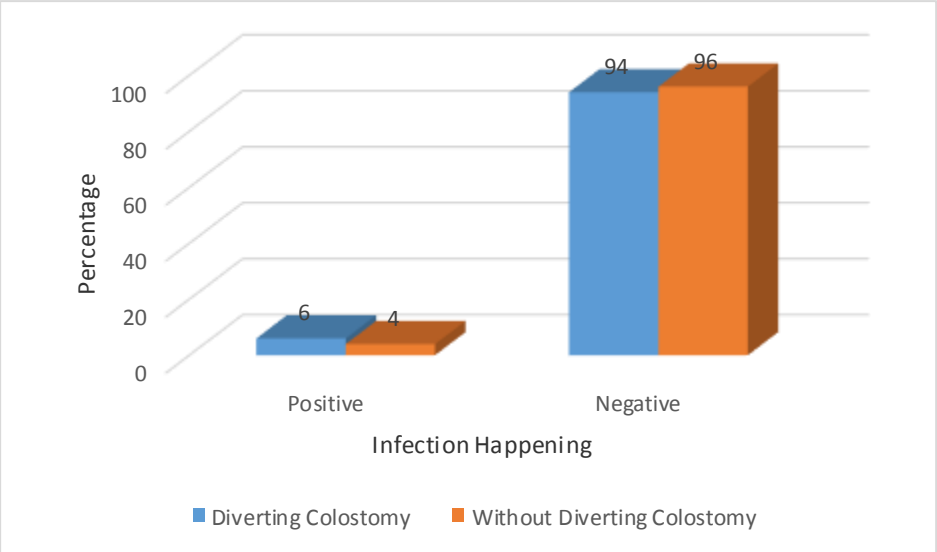

Figure 1. Percentage of participants in the two groups according to the infection happening

Moreover, the postoperative leak from anastomosis was reported only in 1 patient in the group without diverting colostomy and none in the other group in a really big way. The surgery generally was successful in 47 (94%) patients without colostomy and 48 (96%) patients with a colostomy (Figure 2), without significant differences (P>0.05).

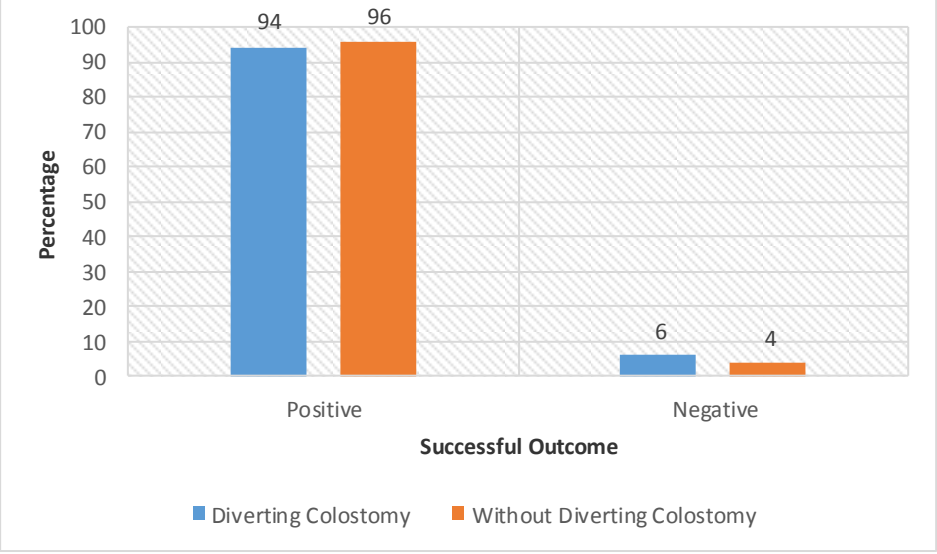

Figure 2. Percentage of participants in the two groups according to the outcome

No mortality was observed among the patients during their hospitalization. The patients' age, gender, duration of surgery, and history of radiotherapy did not affect the success rate of surgery (P>0.05) (Table 1).

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Table 1. Comparison of research variables in the two groups

Variable		Group		P.V
		Diverting Colostomy	Without Diverting Colostomy	
		N (%)	N (%)	
Age	Male	36(72)	37(74)	0.381
	Female	14(28)	13(26)	
	Total	50(100)	50(100)	
History of Radiotherapy	Positive	17(34)	18(36)	0.184
	Negative	33(66)	32 (64)	
	Total	50(100)	50(100)	
Infection happening	Positive	3(6)	2(4)	0.580
	Negative	47(94)	48(96)	
	Total	50(100)	50(100)	
Postoperative Leak From Anastomosis	Positive	0(0)	1(2)	0.898
	Negative	50(0)	49(98)	
	Total	50(100)	50(100)	
Successful Outcome	Positive	47(94)	48(96)	0.104
	Negative	3(6)	2(4)	
	Total	50(100)	50(100)	
-	-	Mean (S.D)	Mean (S.D)	-
Age (Year)		59.3(15.4)	58.4(14.7)	0.819
Duration of Surgery (Minute)		192.5(43.2)	169.4(39.4)	0.584

4. Discussion

Generally, there are different therapeutic methods for patients with colorectal cancer, among which resection of the affected part is considered the basic principle method and quite significant. This procedure consists of VLAR and LAR with or without diverting colostomy. Although the vastly preferred method is resection with diverting colostomy (76%), the efficacy of diverting colostomy is unclear. In our evaluation of patients undergoing VLAR and LAR with or without diverting colostomy, 47 (94%) patients without diversion and 48 (96%) of patients with diversion successfully underwent surgery with no significant differences between the two groups in post-operative complications. The success rate was not significantly affected by age, gender, radiotherapy history, and surgery duration. In the study by Huh et al [25] in South Korea, 96 patients with rectal cancer underwent surgical resection without insertion of diverting colostomy, of which 6.1% developed complications, all in the site of anastomosis, including 3 cases of stenosis, 1 case of adhesion, and 2 cases of fistula, which is quite significant. All the complications happened in patients with a history of radiotherapy. In the study of Huh et al [26], there was no control group, but surgery without diverting colostomy was recommended for all intents and purposes due to the low rate of complications [27]. Our study observed 6% complications in all patients, including 2 cases of infection and a case of a leak in the group without diverting colostomy, and 3 cases of infection in the group with diverting colostomy.

Considering the relatively low rate of complications in each group, with no significant differences in the rate of complications between the groups, we also recommend VLAR and LAR without diverting colostomy. In the study of Longo et al [26] in the United States, 103 patients with rectal cancer were assessed, and the mortality in patients after surgical resection with diverting colostomy was 3.8% and without diverting colostomy was 4.3%. [29] We did not observe any mortalities in our patients during their hospitalization.

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However, a long-term follow-up would be needed in the study of Vlot et al[30]. In the Netherlands, among 144 cases with rectal cancer undergoing surgery without diverting colostomy, 4.9% developed a leak at the anastomosis site [31]. In our study, the leak at the anastomosis site happened in 1 patient out of 50 (2%) in the group without diverting colostomy and none in the group with diverting colostomy. The results of a study in Sweden conducted by Månsson et al also showed that the use of diverting colostomy raises anastomotic leakage. In the study of Janjan et al [33] in the United States, of 87 patients with rectal cancer and previous radiotherapy history, only 11 patients needed diversion with no significant difference with the other patients in outcomes. In our study, the history of radiotherapy did not, for the most part, affect the outcomes in a significant way. In the study of 85 patients with particularly rectal cancer by Dancourt et al [34], those undergoing immediate diversion needed permanent stomas and generally radical pelvic surgery more frequently. Therefore, surgery without immediate diversion was recommended in the study of Fiori et al [35]. In Italy, no significant difference was observed in mortality and morbidity of 22 patients with or without diverting colostomy, except for the statistically significant longer hospital stays of patients with diverting colostomy. In conclusion, our findings were mostly consistent with previous studies. Surgical resection in patients with rectal cancer without diverting colostomy was successful with no significant differences between its rate of complications and that of patients with diverting colostomy. Based on our study, we recommend surgical resection without diverting colostomy in patients with rectal cancer; however, more prospective studies with the greater number of participants would actually be required to compare the safety of these two methods.

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Conflict of interest

The authors declare no conflict of interest.

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