RESEARCH ARTICLE

Comparing Recurrence and Complications After Laparoscopy and Laparotomy Surgery among Patients Suffering from Colorectal Cancer, Shiraz, Iran

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Abstract

Background: The goal of this study was to compare the rate of recurrence and occurrence of complications in colorectal cancer patients after two kinds of laparoscopy and laparotomy. Materials and Methods: A follow-up study was carried out among 358 patients who suffered from colorectal cancer from 2012-2014. The data were gathered from colorectal research center in Shiraz, Shahid Faghihi hospital, and analyzed using the chi-square test, logistic regression, and multinomial regression. Results: The average age of these patients was 56.3±14.6, 55.0% being men. Moreover, 57.8% of them underwent laparoscopy surgery and 42.2% of the patients underwent laparotomysurgery and the conversion rate was 58.0% which ultimately was put under the category of laparotomy surgery. . After biennial median follow-up, differences in the occurrence of complications such as bleeding (hemorrhage), fever, intestine blockage and wound infection in these two kinds of surgery werestatistically significant (P<0.05). However, the rate of recurrence and the patients' ultimate status (alive without disease, alive with disease, and death) did not significantly differ between these two surgery groups. Conclusions: Post-operation complications were laparoscopy surgery were less than those in laparotomy. However, the outcomes such as patients' ultimate status and recurrence were similar between the two groups.

Keywords: Colorectal cancer - recurrence - complications - laparoscopy - laparotomy - Iran

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Introduction

Colorectal cancer is of the most rampant malignancies related to digestion system (Abdolahi et al., 2009), and it is one of the most important causes of mortality in the world which widely needs the attention of health care systems (Barzin et al., 2014). According to the world health organization (WHO) report in 2008, there has occurred 610000 mortalities due to colorectal cancer. This disease is also a fatal and prevalent one in Iran (about 5000 new cases per year) (Asnaashari et al., 2008). The outbreak of colorectal cancer in developed countries is higher than its break out in developing countries, and after breast cancer in women, it is the second important reason of mortality, while in men, after lung carcinoma and prostate, colorectal cancer is the third important cause of mortality(Salari et al., 2007; Nemani et al., 2009; Roscio et al., 2012).

Of course, regarding the cure of colorectal cancer, considerable improvements have been achieved and in comparison with chemical therapy, radio therapy, and purposeful therapy, surgery has proved the best management for these patients (Zhao et al., 2014). More than 90% of colon cancer can be cured via surgery which can be carried out through both laparotomy and laparoscopy approaches (kuhry, 2005). The probability of usefulness of this perspective for the patients under colectomy of colorectal cancer was firstly taken into account in 1990. When the high rate of tumor recurrence appeared in wound with the use of laparoscopy technique, it added further to the worries (Nelson et al., 2014). Since this disease is relatively prevalent and fatal in Iran, and mortality rate and the incidence of that, in previous decades, has increased, and, in addition to that, little research has been conducted with regard to the comparing the rate of recurrence and complications after laparoscopy and laparotomy surgery in patients who suffer from the colorectal cancer in Iran.

Therefore, this study aims at comparing between recurrence and complications of patients suffering from colorectal cancer after laparoscopy and laparotomy surgery so that the results would help to increase and enhance the patients' longevity and life quality

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Materials and Methods

A follow-up study was carried out among 358 patients who suffer from colorectal cancer and referred to colorectal research center in Shiraz, Shahid Faghihi hospital from 2012 to 2014. This colorectal research center has started its activity as the main colorectal center in Fars province since 2012. In this study, through census, all the patients suffering from colorectal cancer who referred to this research center during the last two years have been taken into consideration. The relevant data were extracted from hospital information center via a questionnaire whose reliability and validity (justifiability) were confirmed by colorectal experts. The inclusion criteria of the study was the patients diagnosed with colorectal cancer who have undergone surgery for the first time. The routine follow-up was performed by the physician every 3 months. In case the patients did not attend the follow-up, they were called by phone to present and complete the follow-up. In this study, we have four stages of disease which are as follow: the first stage in which the cancer spread has reached to the covering layers of large intestine and internal walls of the intestine, but it has not reached to the outside of large intestine wall, or outer section of large intestine. In the second stage, cancer has almost spread to the outside of large intestine, but it still has not involved the lymphoid glands. In the third stage, cancer has spread to the lymphoid glands but not to the other parts of the body, and finally in the fourth stage, cancer has metastasized beyond and included other parts of the body such as liver and lung. Furthermore, the recurrenced cancer of large intestine is known as a kind of cancer which returns again after treatment and spreads in large intestine or other parts of the body such as liver or lung or in both.

The method of conducting the research was that, first of all, the data were entered to the excel software, version 2013, then the variables were checked regarding the veracity of information, and if they do not match for each case, the required rectification would be done by referring to the patient's medical file. After that, the data were analyzed statistically by the use of SPSS software, version 19.

For the descriptive analysis of quantitative variables, the use was made of mean and standard deviation, and for the analytic comparisons, the chi-square test, logistic regression and multinomial regression with the P value <0 .05 were used.

Results

In this study, 358 patients suffering from colorectal cancer were taken into consideration. The age average of them was 56.25± 14.61 and 55.0% of the patients were men and the rest were women. 57.8% of the cases underwent laparoscopy surgery, 36.4% of them under went laparotomy operation and the conversion rate was 5.8% which ultimately was included in the cases undergoing laparotomy surgery. The rate of laparoscopy surgery in men and women was 54.0% and 61.9%, respectively and the rate of laparotomy surgery in these two groups was respectively 46.0% and 38.1%. This difference was not statistically significant (P = 0.162) (Table 1). Moreover, the age average in laparoscopy group was 56.1± 14.58 and in laparotomy group, it was 56.44± 14.74. This difference, also, was not statistically significant (P = 1.000) (Table 1).

In laparoscopy and laparotomy surgery, respectively, 96 (63.2%) and 75 (69.4%) patients were in disease phase of I, IIa, IIb, and 40 (26.3%) and 25 (23.1%) patients were in disease phase of I, IIa, IIb, and in the IIIc, Iva stage of the disease, there were 16 (10.5%) and 8 (7.4%) patients. This difference, likewise, was not significant statistically (P = 0.52) (Table 1).

The median time of studying and considering the two groups was 2 years. Some kinds of post- surgery complications (such as bleeding), fever, intestine blockage, and wound infection) occurred in 52 patients from whom 30 cases (19.7%) were in laparotomy group and 22 cases (10.7%) were in laparoscopy group (Table 2). The univariate analysis results of relevant factors to complications rate are shown in Table 3. The results of univariate analysis indicate that there was statistically significant difference between the disease complications and the type of surgery {OR=2.05(95%CI 1.13-3.73)}.

The findings showed that 37 (10.3%) patients, of

Table 1. Baseline Characteristics of the Patients and Tumors.

	laparoscopy		laparotomy		p
	N	%	N	%	value
Sex					0.162
Female	99	61.9	61	38.1	
Male	107	54	91	46	
Age					1
≤59	119	57.8	87	42.2	
≥60	87	57.2	65	42.8	
BMI					0.107
≤24	131	59.8	88	40.2	
25-29	48	49.5	49	50.5	
≥30	23	67.6	11	32.4	
Marital Status					1
Single	10	55.6	8	44.4	
Married	194	57.6	143	42.4	
Ethnicity					0.585
Fars	170	58.2	122	41.8	
Other	36	54.5	30	45.5	
Tumour Stage					0.523
I, IIa, IIb	96	56.1	75	43.9	
IIc, IIIa,IIIb	40	61.5	25	38.5	
IIIc, Iva	16	66.7	8	33.3	

Table 2. Postoperative Data

Variables	laparoscopy		laparotomy	
	N	%	N	%
Postoperative Complication				
absent	184	89.3	122	80.3
present	22	10.7	30	19.7
recurrence				
absent	186	90.3	135	88.8
present	20	9.7	17	11.2
Patient status				
Alive without disease	109	59.2	82	60.3
Alive with disease	12	6.5	14	10.3
Dead	63	34.2	40	29.4

whom 20 (9.7%) were in laparoscopy group and 17 (11.2%) were in laparotomy group, experienced disease recurrence after surgery (Table 2). The univariate analysis results of relevant factors to recurrence rate are shown in Table 3. The results indicate that there was not any statistically significant difference regarding the disease recurrence and type of surgery {OR=1.17(95%CI 0.59-2.32)}. In colon and rectum cancer, the tumor recurrences in the two medical groups were almost the same. In colon cancer, 6 (7.6%) patients in laparoscopy group and 3 (4.7%) patients in laparotomy group experienced tumor recurrence, while in rectum cancer, 14 (11.0%) patients in laparoscopy group and 14 (15.9%) patients in laparotomy group experienced such a situation.

In this study, the patients' status was considered in 3 situations: alive without disease, alive with disease, and death. The general rate of mortality was 32.2% of which 29.4% belonged to laparotomy group and 34.2% belonged to laparoscopy group (Table 2).

Results also indicated that higher percentage of alive

Table 3. Odds ratio (OR) Estimates of Different Variables on Complications of Surgery and Recurrence in Colorectal Cancer Patients

Variables	Complication			Recurrence		
	OR	95% CI	P value	OR	95% CI	P value
Sex						
Female	Reference	=				
Male	1.12	0.61-2.03	0.708	0.51	0.25-1.02	0.06
Age						
≤59	Reference	=				
>60	0.68	0.36-1.25	0.218	0.709	0.34-1.44	0.34
BMI						
≤24	Reference	=				
25-29	0.65	0.31-1.33	0.243	1.02	0.46-2.26	0.94
≥30	0.87	0.31-2.41	0.799	1.19	0.38-3.70	0.75
Marital status						
Single	Reference	=				
Married	2.96	0.38-22.75	0. 297	2.033	0.26-15.73	0.49
Ethnicity						
Fars	Reference	=				
Other	0.91	0.42-1.98	0.821	1.75	0.80-3.82	0.15
Tumour Stage						
I,IIa,IIb	Reference	=				
IIc,IIIa,IIIb	0.97	0.44-2.13	0.939	1.36	0.55-3.34	0.504
IIIc,Iva	0.48	0.108-2.18	0.346	2.54	0.83-7.74	0.099
Type of surgery						
laparoscopy	Reference	=				
Laparotomy	2.05	1.13-3.73	0.018	1.17	0.59-2.32	0.65

Table 4. Odds Ratio (OR) Estimates of Different Variables on Patient Status in Colorectal Cancer Patients

Variables	Alive with disease			Dead VS Alive our disease		
	OR	95% CI	P value	OR	95% CI	P value
Sex						
Female	Reference	=				
Male	1.11	0.48-2.55	0.794	1.09	0.67-1.78	0.704
Age						
≤59	Reference	=				
≥60	0.92	0.39-2.14	0.857	1.24	0.76-2.01	0.379
BMI						
≤24	Reference	=				
25-29	1.26	0.52-3.04	0.6	1.01	0.58-1.76	0.94
≥30	0.43	0.07-2.66	0. 13	0.52	0.2-1.36	0. 18
Marital status						
Single	Reference	=				
Married	0.92	0. 14-6.2	0.6	0.79	0.27-2.3	0.67
Ethnicity						
Fars	Reference	=				
Other	0.39	0.08-1.77	0.22	1.08	0.58-2.02	0.802
Tumour Stage						
I,IIa,IIb	Reference	=				
IIc,IIIa,IIIb	2.04	0.66-6.29	0.214	1.26	0.65-2.43	0.479
IIIc,Iva	5.25	1.13-24.3	0.0034	3.9	1.43-10.6	0.007
Type of surgery						
laparoscopy	Reference	=				
Laparotomy	1.55	0.68-3.53	0.296	0.84	0.51-1.37	0.497

people with disease (17.6%) and dead patients (16.0%) were involved in a more advanced stage of disease rather than those people who are alive without disease (5.0%). The results of univariate analysis on the relevant factors to patients' status are shown in table 3. These results indicate that between patients' status and IIc, IIIa, IIIb stage of disease, there was no statistically significant relationship {alive people with disease in comparison with alive people without disease, 0R=2.04(95%CI 0.66-6.29) and dead people in comparison with alive people without disease, OR=1.26(95%CI 0.65-2.43) {. However, the chance of alive patients with disease or the dead patients in IIIc, IVa stage of the disease is respectively 5.25 and 3.9 times more in comparison with the alive people without disease. {alive people with disease in comparison with alive people without disease, OR=5.25(95%CI 1.13-24.3) and dead people in comparison to alive people without disease, OR=3.9(95%CI 1.43-10.6) (Table 4).

Discussion

In spite of the widespread popularity of laparoscopy technique in curing most of the gastric disorders, this technique is being practiced rarely and with a meaningful doubt with regard to the colorectal surgery. The main reason of this concern is related to this issue that whether the advantage and profit of patients who undergo the laparoscopy surgery of large intestine is as great as the costs and difficulties of this new approach (Milsom et al., 1998).

This study aimed at comparing the occurrence of recurrence and complications after laparoscopy and laparotomy surgery in patients suffering from colorectal cancer. Medical information of 358 patients suffering from colorectal cancer was taken into account. The age average of the cases in this study was 56.25± 14.63. Between age and the type of surgery, there was no significant relationship which is in line with the results of (Zhao et al., 2014; Agarwal et al., 2015) studies. However, our result was in contrast with the study conducted by venderamini et.al (2012). The findings of the current study indicate that higher percentage of women, in comparison with men, had experienced laparoscopy surgery. This fact has been verified in other studies as well (Vendramini et al., 2012; Agarwal et al., 2015).

The conversion rate in this study was 5.8% which matches the results of other studies (Braga et al., 2002; Braga et al., 2007; Vendramini et al., 2012; Agarwal et al., 2015). However, in comparison with the results of (Mukai et al., 2003; Kang et al., 2004; Guillou et al., 2005; Ito et al., 2008; Mukai et al., 2009), this rate was lower. This conversion among different studies is due to the completion of surgery skills during the time in which this rate has been reported less frequently in the recent studies (Tajima et al., 2014). Furthermore, it can be mentioned that this difference has also been due to the type of selective approach in curing the patients.

In addition, regarding the disease phase, there was no significant difference between both laparoscopy and laparotomy surgery group. This finding is in line with the results of the study carried out by Samir Agarwal et.al (Agarwal et al., 2015).

Results indicated that the complications rate was relevant to the type of surgery which matches the results of other studies (Braga et al., 2002; Arezzo et al., 2013). However, studies such as (Milsom et al., 1998; Ohtani et al., 2011; Vendramini et al., 2012; Nelson et al., 2014; Tajima et al., 2014; Zhao et al., 2014; Agarwal et al., 2015) indicated that rate and intensity of the complications between these two groups were similar. Furthermore, Lacy et al (2002) reported that post- surgery complications such as wound infection and intestine blockage were less frequent in laparoscopy group than laparotomy group.

In fact, in laparoscopy group, the post- surgery improvement and recovery was faster and the complications were, also, fewer (Lacy et al., 2002). In addition to this study, Marco Braga et.al reported that there is no significant difference between these two types of surgery with regard to the hasty complications, but regarding the serotinous complications after surgery, there is statistically significant difference between these two kinds of surgery (Braga et al., 2007). In the study conducted by Zhao et.al, the occurrence of complications such as urinary ducts damage, urine blockade, intestine blockage, and hernia breaking, between the two groups was not statistically significant. However, the rate of wound infection in laparoscopy group was reported lower than its rate in laparotomy group (Zhao et al., 2014).

The reason of this relationship, based on the study done by Braga et.al, is that in laparoscopy surgery, due to lesser wound infection, shorter incision, and lesser manipulation of intestine, complications such as wound infection occurs less frequently. This kind of surgery, in contrast to the laparotomy surgery, has less tissue cut and damage. Therefore, in this type of surgery, some hypothetical advantages such as better protection of immune system function, lesser inflammatory responses after surgery, and faster improvement and recovery can be expected. Moreover, laparoscopy high-tech equipment has made the surgery relatively easy (Braga et al., 2002). According to the current study and the study conducted by venderamini et.al (2012), laparoscopy surgery was done for the patients with more comorbidity and higher stage of disease as well as for the disease with higher complications. Subsequently, higher rate of complications is reported in laparotomy surgery.

Moreover, the results indicated that despite higher percentage of recurrence in laparotomy surgery, the difference was not statistically significant which is in line with the results of other studies such as (Milsom et al., 1998; Lacy et al., 2002; Jayne et al., 2007; Ohtani et al., 2011; Nelson et al., 2014; Zhao et al., 2014). Regarding the study conducted by Fleshman et.al (2007), this finding had lower rate of recurrence which can be attributed to the small size of the sample and short period of involvement. According to the study done by Antonio M Lacy et.al, the reason of this finding is unfamiliarity of tumor lesser recurrence mechanism in laparoscopy surgery, but proofs indicated that immune system has a critical role in tumor development and metastasic spread. Since in open surgery, rather than laparoscopy surgery, stress and pressure of operation is higher and this situation creates disorder

in immune system, tumor recurrence in open surgery is reported more than laparoscopy. Furthermore, tumor manipulation is claimed to cause cancer spread. Some proofs show that tumor mobilization during the surgery process is accompanied by exfoliation of malignant cells into the peritoneum cavity and portal vein upstream. This event can be prevented by non-touch isolation techniques or the least tumor manipulation. The primary reports mentioned that leakage and cells dispersion by the use of laparoscopy technique is not worse than laparotomy surgery. Then, if we accept that manoeuvres surgery can affect the long term consequences, it can be hypothesized that laparoscopy surgery done by a group of motivated surgeons can prevent cancer spread in some patients (Lacy et al., 2002), and these observations confirm the experimental findings that less surgery trauma, by the use of laparoscopy technique, decrease the tumor recurrence in comparison with the open surgery (Jayne et al., 2007).

The results of the current study showed that although there has occurred a high rate of mortality in laparoscopy group, this difference was trivial and not statistically significant, which is I line with the results of the study conducted by Vendramini et al (2012). According to the study carried out by Lacy et al (2002), the reason of this study is that death and life are not influenced by the choice of surgery type. However, primary results and oncologic aspects need re-evaluation for long and midterm consequences.

The strengths of this study included that the study was a population based for affiliated hospitals in Shiraz University of Medical Sciences. Also patients were strictly followed during the study period. However, the drawback of this study should be noted. The main limitation of the study was that for thorough evaluation of oncology consequences, there is a need for longer involvement.

Conclusion, Since 2000, experience in laparoscopic surgery has further increased and technology has advanced which should only improve the outcome of laparoscopic colectomy. The confidence intervals of the difference between laparotomy and laparoscopic colectomy both for disease rate of recurrence and mortality were very narrow in this study, which allows a statement that laparoscopic colectomy for cancer is safe (kuhry, 2005). Also, complications rate in this type of surgery is less than the rate in laparotomy approach(Guillou et al., 2005). Since these procedures are in a state of rapid improvement, we believe that laparoscopic techniques have the potential to become a promising alternative in the treatment of certain patients with colorectal cancer(Milsom et al., 1998).Therefore, if possible, laparoscopic surgery would be used as a standard procedure for the treatment of colorectal cancer and it should be promoted for clinical practice(Zhao et al., 2014).

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