



# Laparoscopic Versus Open Colectomies: Enhanced Surgical Skills And Rigorous Patient Selection May Improve Operative Times Without Compromising Outcomes

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## Abstract

**Aim:** The aim of our study was to compare the demographic characteristics, the intra- and postoperative outcomes of patients undergoing laparoscopic and open colorectal resections with or without stoma and with or without anastomosis.

**Method:** Our study includes 133 patients, who underwent laparoscopic and open colorectal resections for colonic and rectal disease.

**Results:** There was a statistically significant decrease of the operative duration time for the laparoscopic group [(182 min (103-341 min))] compared to the laparotomy group [(242 min (71-584 min))] ( $p=0.006$ ). The other parameters, such as age, BMI, blood loss, transfusion, leak, reoperation, 60-day mortality, wound infection, wound dehiscence, atelectasis, sepsis, ileus, UTI, first flatus and length of stay presented no difference.

**Conclusion:** The experience accumulated by the Colorectal surgeons and the careful selection of the patients seem to improve the operative duration and thus they provide both the surgeon and the patient with all the advantages of a short operation. On the other hand, the two techniques have no differences and the choice is made each time by the surgeon according to the indications and the patient status.

**Keywords:** Colorectal; Resection; Laparoscopic; Complications

## Introduction

Colorectal cancer is the third most common cancer affecting both men and women, following breast, lung and prostate in the United States. The estimate number of colorectal cancer cases in the United States for 2017 is 95,520 new cases of colon cancer and 39,910 new cases of rectal cancer. The overall lifetime risk of developing colorectal cancer is about 1 in 21 (4.7%) for men and 1 in 23 (4.4%) for women [1]. In the US the overall Colorectal Cancer incidence in individuals over 50 years declined from 2009 to 2013. However, the incidence of rectal cancer in those ages 50 to 64 years was stable. On the other hand, the incidence of distal colonic and rectal cancer increases among adults of less than 50 years of age, by 22%. Colorectal cancer mortality rates also decrease by 34% for individuals above 50, but increase by 13% for those less than 50 years of age. In the United Kingdom,

more than 40.000 new cases and more than 15.000 deaths on 2014, have been reported [2].

The treatment of choice by the means of cure, for the colorectal cancer is surgical resection of the affected segment, together with the relevant mesocolon/mesorectum, the supplying vascular pedicle and the included lymph nodes, laparoscopic or open [3]. Non-cancerous diseases are also treated surgically in some stage, like the diverticular disease and the Inflammatory Bowel Diseases [4]. While extensive and thorough studies are confirming the value of the laparoscopic operations for the colorectal cancer, the data about the resections of inflammatory masses are controversial [5-11].

Since its adoption the laparoscopic approach has gained enormous acceptance, mainly because of the equivalent surgical

outcomes and the improved post-operative outcomes in terms of recovery and cosmesis. Costs and operative times, while higher in the past, are also improving, and especially the operative length is now similar to the open resections, fact which reflects the surgeon's expertise and the strict selection of patients undergoing laparoscopy [12].

**Materials and Methods**

We retrospectively searched all patients that were operated in the Colorectal Department of The Princess Alexandra Hospital during 2013 and who underwent colorectal resections, for cancer and/or inflammatory diseases. All the operations were performed by expert Colorectal Surgeons were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments. Patients with synchronous malignant lesions were

excluded from the present study as well as patients >90 years of age, patients with severe disability NYHA (New York Heart Association) status C and D (moderate and severe heart disease).

**Statistical Analysis**

Continuous variables are presented with median (range). The normality of the distributions was assessed with Kolmogorov-Smirnov's test and graphical methods. Quantitative variables are presented with absolute and relative frequencies. Student's t-test or nonparametric Mann-Whitney test were used to compare means between groups. For the comparisons of proportions chi-square and Fisher's exact tests were used. All reported p values are two-tailed. Statistical significance was set at p<.05. All analyses were conducted using the SPSS statistical software (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.).

**Results**

**Table 1:** Patient characteristics and intra- and post-operative outcomes

	Laparotomy (119)	Laparoscopy (14)	p-value
Age	69 (39-87)	63 (20-88)	.226
BMI	25 (19-46)	25 (19-34)	.468
Operative duration	242 (71-584)	182 (103-341)	.006
Blood loss	250 (20-1000)	225 (50-500)	.716
Transfusion	31/119	5/14	.441
Leak	7/119	1/14	>.99
Reoperation	7/119	1/14	>.99
60 day mortality	4/119	0/14	>.99
Wound infection	25/119	4/14	.734
Wound dehiscence	8/119	0/14	.600
Atelectasis	26/119	2/14	.733
Sepsis	43/119	8/14	.152
Ileus	27/119	3/14	>.99
UTI	11/119	0/14	.372
First flatus	4 (2-12)	4 (2-7)	.659
Length of stay	8 (2-112)	6.5 (2-22)	.431

One hundred and thirty three patients who underwent laparoscopic and open colorectal resections for colonic and rectal disease were included. Most of the patients of the open group, were affected by advanced stage colorectal cancer, diverticular mass and complex Crohn disease. We evaluated 15 parameters and found them comparable. The patient's age as well as BMI did not differ among the two groups. We did not observe significant differences in terms of intra- and postoperative complications. Interestingly, however, the intraoperative duration of laparoscopic operations was significantly decreased (p=.006) (Table 1). There was a statistically significant decrease of the operative duration time for the laparoscopic group [(182 min (103-341 min))] compared to the laparotomy group [(242 min (71-584 min))] (p=.006).

The other parameters, such as age, BMI, blood loss, transfusion, leak, reoperation, 60-day mortality, wound infection, wound dehiscence, atelectasis, sepsis, ileus, UTI, first flatus and length of stay presented no difference. The laparotomy group included patients with inflammatory masses and advanced stage of colorectal cancer, who were predicted to present more difficult dissection as a result of the inflammation and the locoregional spread of the primary tumor. While the advantages of the laparoscopy were confirmed, the operative length was shorter in confront to its size in the past. This decrease simultaneously revealed a significantly longer operative time for the laparotomies, fact which reflects both the improved surgical skills of the dedicated surgeons and the careful selection of patients undergoing some kind of colectomy.

## Discussion

Colorectal Cancer is a common disease as per incidence and mortality and surgery is the curative method of choice, when possible. Both laparoscopic and open resections are equally safe and effective, but laparoscopic resections cost more and last longer [12-14]. The increasing experience of the Colorectal Surgeons, regarding their technical abilities and the selection of patients can minimize the operative time [4,15]. In our study all the resections were performed by expert Colorectal Surgeons and the open approach was reserved for diverticular masses, expected to be difficult because of the inflammatory sequels, as well as complex cases of Crohn disease, and advanced stages of colorectal cancer.

Many studies have been performed and published the last few years, emphasizing on the superiority of the laparoscopic surgery compared with the open surgery, with significant advantages of reduced blood loss, earlier recovery of intestinal motility, lower overall morbidity, and shorter duration of hospital stay [16,17]. These results have led to a general consensus on laparoscopic surgery as an equivalent alternative to open surgery for colorectal cancer and colonic pathologies of different nature [18,19]. The shorter hospital stay may also decrease the cost of the laparoscopic surgery for colorectal cancer, even if this is yet to be clearly defined, mainly due to the increasing cost over time, which in turn makes highly challenging the comparisons between studies conducted within a time frame of more than 10 years [20,21]. Drawbacks for a long time have been considered the higher costs and the longer operative time. However, despite the theoretical advantages of laparoscopic surgery, and the fact that today is considered, where there are available infrastructures and surgical expertise the standard treatment for colorectal cancer patients, the same concept does not apply in advanced staged cancer and inflammatory diseases, mainly due to technical limitations or the characteristics of the patients that may affect short and long term outcomes [22,23].

In our study we aimed to show that the duration of the operation can be importantly reduced, which reflects the overall improvement of surgical skills, but also that other factors, such as patient's characteristics and nature of the underlying pathology maybe the cause of the longer operative time. This in our study is shown by the longer operative time of the laparotomies and their application in different diseases rather the colorectal cancer, at a favorable stage.

Nowadays, numerous studies conclude that the laparoscopic operations, performed for the same type of pathology last longer. Specifically there are studies evaluating operative time and outcome for the same stage of cancer and the specific segment of colon [24]. In particular the tumors of the transverse colon have been thoroughly studied, as representing a more challenging site with complex decision making management [25]. A certain number of studies also addressed the effectiveness of the application of the laparoscopic approach to diverticular disease

and inflammatory bowel diseases compare to open, concluding that the laparoscopy takes longer [26]. However, there is a general acceptance of the fact that the laparoscopic operations are now lasting about half the time from the past and different studies confirm that [27]. This decrease of operating times has been attributed to the improved surgical skills and experience. In fact there are now studies showing a similar and even decreased operative time for the laparoscopic group for cancer or non-complex IBDs [28]. The operative time for a laparoscopic colorectal resections decreases with the increase of the operative skills of the surgeons and following careful selection of patients, excluding those who are predicted to undergo a difficult operation, based on patient's characteristics and nature of disease can play a significant role in the best implementation of the laparoscopy in the surgical practice.

## Conclusion

Colorectal Cancer is a common disease as per incidence and mortality. Surgery is the curative method of choice. Both laparoscopic and open resections are equally safe and effective, but laparoscopic resections cost more and last longer. The increasing experience of the Colorectal Surgeons, regarding their technical abilities and the selection of patients can minimize the operative time. In our study all the resections were performed by expert Colorectal Surgeons and the open approach was reserved for diverticular masses, expected to be difficult because of the inflammatory sequels, as well as complex cases of Crohn disease, and advanced stages of colorectal cancer [20]. More studies, including randomized control trials, are necessary for the laparoscopic approach to be proven faster in colorectal resections for cancer and inflammatory tumors.

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