

Outcomes of Laparoscopic versus Open Colorectal Cancer Surgery in Elderly Patients: A Case-matched Control Study

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Abstract

Background: This study aimed to compare the short-term results and long-term oncologic outcomes of laparoscopic surgery and open surgery as treatments for colorectal cancer in elderly patients.

Methods: Forty-four patients aged > 70 who underwent laparoscopic surgery for colorectal cancer from January 2001 to December 2005 were matched to 44 patients that underwent open surgery with respect to gender, age, American Society of Anesthesiologists (ASA) score, operative procedure, and stage.

Results: The mean age of patients in the laparoscopic surgery group (LG) and in the open surgery group (OG) was 75.3, and 16 patients in each group were women. No significant intergroup difference was found for; body mass index, associated disease, operation history, operation time, number of harvested lymph nodes, hospital stay, or times to passing gas or starting a soft diet after surgery. The overall conversion rate in the LG was 14.3% (n=6). Overall morbidities were 15.9% (n=7) and 29.5% (n=13) in the LG and OG, respectively (P>0.05). No death occurred during the first 30 days postoperatively in either group. Median follow-up periods in the LG and OG were 61.5 months and 82 months, respectively, 5-year disease-free survival rates were 79.9% and 91.5%, respectively, and overall survival rates were 60% and 73.2%, respectively (P>0.05).

Conclusion: The laparoscopic technique in elderly patients does not seem to present any disadvantages and was found to be safe and feasible for colorectal cancer. No differences were found between the laparoscopic and open surgery groups in terms of morbidity, disease-free survival, or overall survival.

Introduction

Since the first report on laparoscopic colectomy was issued in 1991 by Jacobs et al, laparoscopic colorectal surgery has been widely adopted [1]. Furthermore the safety and efficacy of laparoscopic surgery for colon cancer has been documented by several prospective randomized studies [2-4]. In addition, the laparoscopic approach results in earlier postoperative recovery, less postoperative pain, and better cosmetics [5]. Moreover it has now become an alternative to open surgery for colorectal cancer.

Age is known to influence in outcome after major surgery, and elderly patients also have a greater number and more severe comorbidity than younger patients [6]. Postoperative morbidity and mortality are higher in the elderly because of age-related physiologic deficiencies such as pulmonary, cardiac, vascular, renal, neurologic, metabolic, and immune system deficiencies. They also affect to the intraoperative risk. Accordingly older patients with colorectal cancer have poorer survivals [7]. For these reasons the earlier postoperative recovery offered by laparoscopic surgery and its minimally invasive nature are attractive benefits in the elderly. Some studies that focused on the short-term outcomes of laparoscopic versus open colorectal surgery in the elderly concluded that there is no difference between laparoscopic surgery and open surgery [8-14]. There were few case-matched control studies to address long-term oncologic outcomes. Here we undertook to compare the short-term perioperative results and long-term oncologic outcomes of laparoscopic versus open colorectal cancer surgery in elderly patients.

Material and Methods

From January 2001 to December 2005, 218 patients aged > 70 years underwent surgery for colorectal cancer at a single center. All relevant data were entered in a prospectively maintained database and reviewed by the authors for verification. Thirty-nine cases were excluded. They were 16 emergency cases, 3 cases of stage 0, and 20

cases of stage IV. Of the remaining 179 patients, 53 patients underwent laparoscopic surgery and 126 open surgery. For the purposes of this study, 44 patients that underwent laparoscopic surgery were matched to 44 that underwent open surgery with respect to; gender, age (± 5 years), American Society of Anesthesiologists (ASA) classification and operative procedure. Operative procedures were classified as; right hemicolectomy, anterior resection, low anterior resection, and abdominoperineal resection.

The principle of total mesorectal excision was adopted for rectal cancer as a standard technique. Lymph nodes were obtained by gross examination and manual palpation, and stained with hematoxylin and eosin. Underlying disease, operation time, morbidity, mortality, postoperative recovery, disease free survival, and overall survival in each group were assessed. Times to first flatus and soft diet and hospital days were investigated to evaluate postoperative recovery.

All 88 study subjects were follow-up postoperatively every 2-3 months for three years. After three years patients visited every 6 months until 5 years, and annually thereafter. A physical examination, a serum carcinoembryonic antigen level measurement, and chest radiography were performed at each follow-up visit. Abdominopelvic CT scans were performed annually. Colonoscopy, chest CT, pelvic MRI, and 18-FDG-PET (18-fluorodeoxyglucose-positron emission tomography) were performed when requested by a surgeon. The

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median follow-up period in the LG and OG were 61.5 and 82 months, respectively. Disease-free survival was calculated from the first day of treatment to first documented disease progression or to last follow-up day.

Continuous variables are expressed as means \pm standard deviations. Results were evaluated using the independent T-test or the Chi-square test, and survivals were assessed using the Kaplan-Meier method and the log-rank test. Statistical significance was accepted for P values < 0.05.

Results

The patients were matched manually as closely as possible for the matching criteria. Patients' characteristics are summarized in Table 1. No significant intergroup difference was found in terms of associated diseases and operation histories, and operation times and numbers of harvested lymph nodes were non-significantly different (Table 2). In the LG, the overall conversion rate was 14.3% (n = 6). Conversions were due to adhesion in 2, a huge, fixed mass in 1, obesity in 1, and bleeding and unstable vital signs during operation in 1. Times to pass first flatus, times to first soft diet, and postoperative hospital stays were not significantly different.

	LG (n=44)	OG (n=44)	p Value
Age, yr	75.3 (\pm 4.7)	75.3 (\pm 4.4)	1
Sex, male	28 (63.6%)/16 (36.4%)	28/16	1
BMI	22.8 (\pm 3.3)	22.8 (\pm 3.4)	0.98
ASA score			1
II	27 (61.4%)	27	
III	17 (38.6%)	17	
Associated disease	16 (36.4%)	21 (47.7%)	0.28
History of operation	10 (22.7%)	11 (25%)	0.80
Type of operation (%)			1
Right hemicolectomy	8 (18.2%)	8	
Anterior resection	18 (40.9%)	18	
Low anterior resection	13 (29.5%)	13	
Abdominoperineal resection	5 (11.4%)	5	

Table 1. Patient characteristics in laparoscopic and open surgery group.

Overall morbidities in the LG and OG were 15.9% (7/44) and 29.5% (13/44), respectively (P > 0.05). Diversion rates were 10.3% (4/39) and 17.9% (7/39), respectively. Ileus was the most common postoperative complication in both groups. Pulmonary complications such as atelectasis, pneumonia, and pleural effusion occurred only in the OG. No death within 30 days occurred in either group.

Disease-free survival rates at five years in the LG and OG were 79.9% and 91.5%, respectively (Figure 1). Only one patient of 6 conversion cases was recurrent. The rate of disease-free survival in conversion case was 83.3%. Overall survival rates at five years were 60% and 73.2%, respectively (P > 0.05) (Figure 2).

Discussion

The word 'elderly' is variably defined, although the statistical information service of Korea defines the elderly as an age over 65

	LG (n=44)	OG (n=44)	p Value
Operation time	204.4 (\pm 66.1)	214.3 (\pm 106.3)	0.61
Harvested lymph nodes	18.1 (\pm 9.8)	23.1 (\pm 17.8)	0.11
TNM stage			1
I	8 (18.2%)	8	
II	22 (50%)	22	
III	14 (31.8%)	14	
Cause of conversion	6 (14.3%)	-	-
Adhesion	2		
Huge tumor	1		
Bleeding	1		
Obesity	1		
Unstable	1		
Diversion formation*	4/39 (10.3%)	7/39 (17.9%)	0.38
Time to flatus	3.2 (\pm 3)	3.8 (\pm 2.1)	0.27
Time to soft diet	5.6 (\pm 2.7)	6.3 (\pm 2.4)	0.17
Hospital stay	13.8 (\pm 5.4)	15.4 (\pm 6.6)	0.21
Adjuvant chemotherapy†	28/36 (77.8%)	32/36 (88.9%)	0.36
Overall morbidity	7 (15.9%)	12 (27.3%)	0.13
Ileus	7	8	
Pneumonia	0	2	
Lung effusion	0	1	
Wound evisceration	0	1	

Table 2: Postoperative outcomes in laparoscopic and open surgery group.

LG : laparoscopic group, OG : open group

* Patients that underwent abdominoperineal resection were excluded

† Stage I patients were excluded

years. However average life expectancy was 77.2 years for men and 84.1 years for women in Korea at 2010. In the present study an age of > 70 years was defined as elderly and the mean age of our study subjects was 75.3 years.

Until several decades ago senile patients were considered as a contraindication for colorectal cancer surgery due to high risk of morbidity and mortality. Perioperative complications are also related with severity of underlying diseases. Patel et al assessed more than 30,000 individuals to characterize the disease profile of elderly patients, and found that the phenotype of colon cancer is age-dependent and that survival rates decreases with age [7].

It is generally accepted that postoperative morbidities after laparoscopic and open surgery are similar [15-17]. Some papers presented that morbidity rates in those older than 70 were higher after open surgery than laparoscopic procedures [18]. In the present study there were no significant differences in overall morbidities between two groups.

Some case-matched control studies have been performed in the elderly [14, 19-21]. Vignali et al. matched patients for gender, age, year of surgery, site of cancer, and comorbidity on admission, and found that laparoscopic-assisted colectomy had lower morbidity rates and faster postoperative recoveries than open surgery [21].

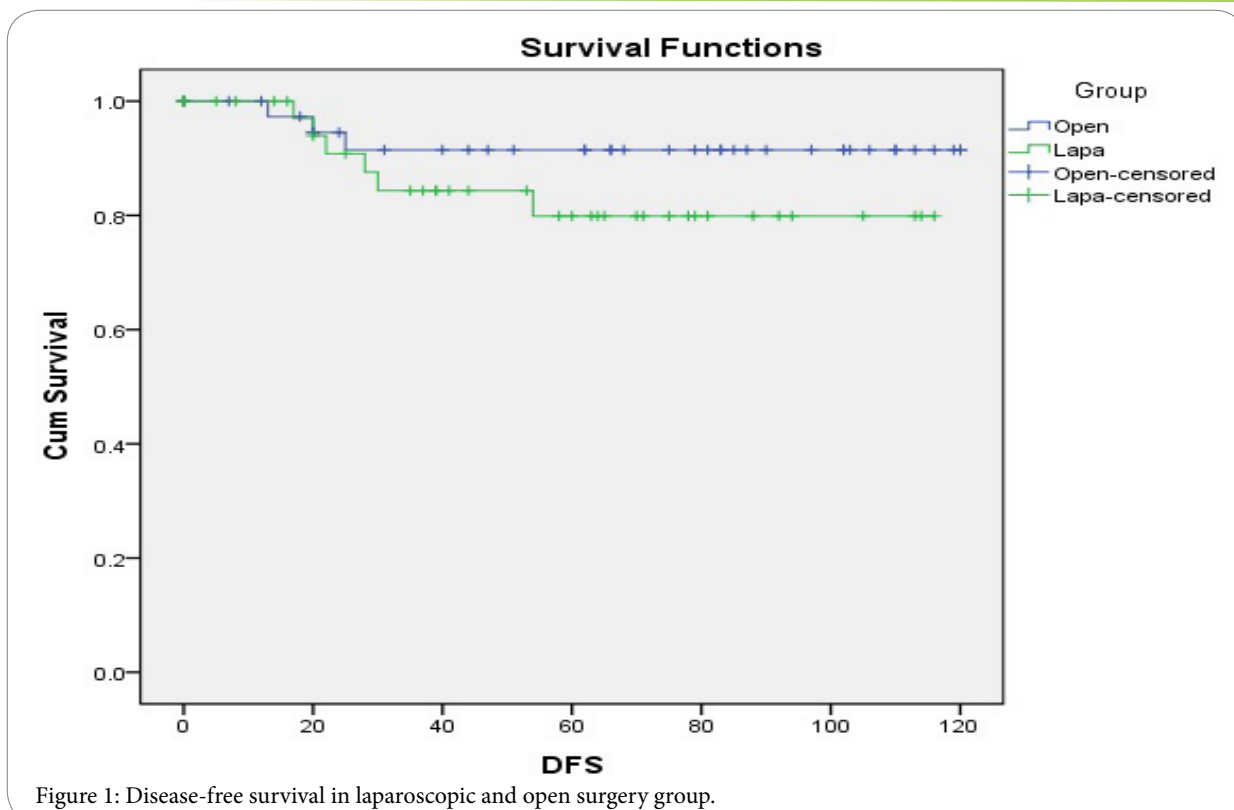


Figure 1: Disease-free survival in laparoscopic and open surgery group.

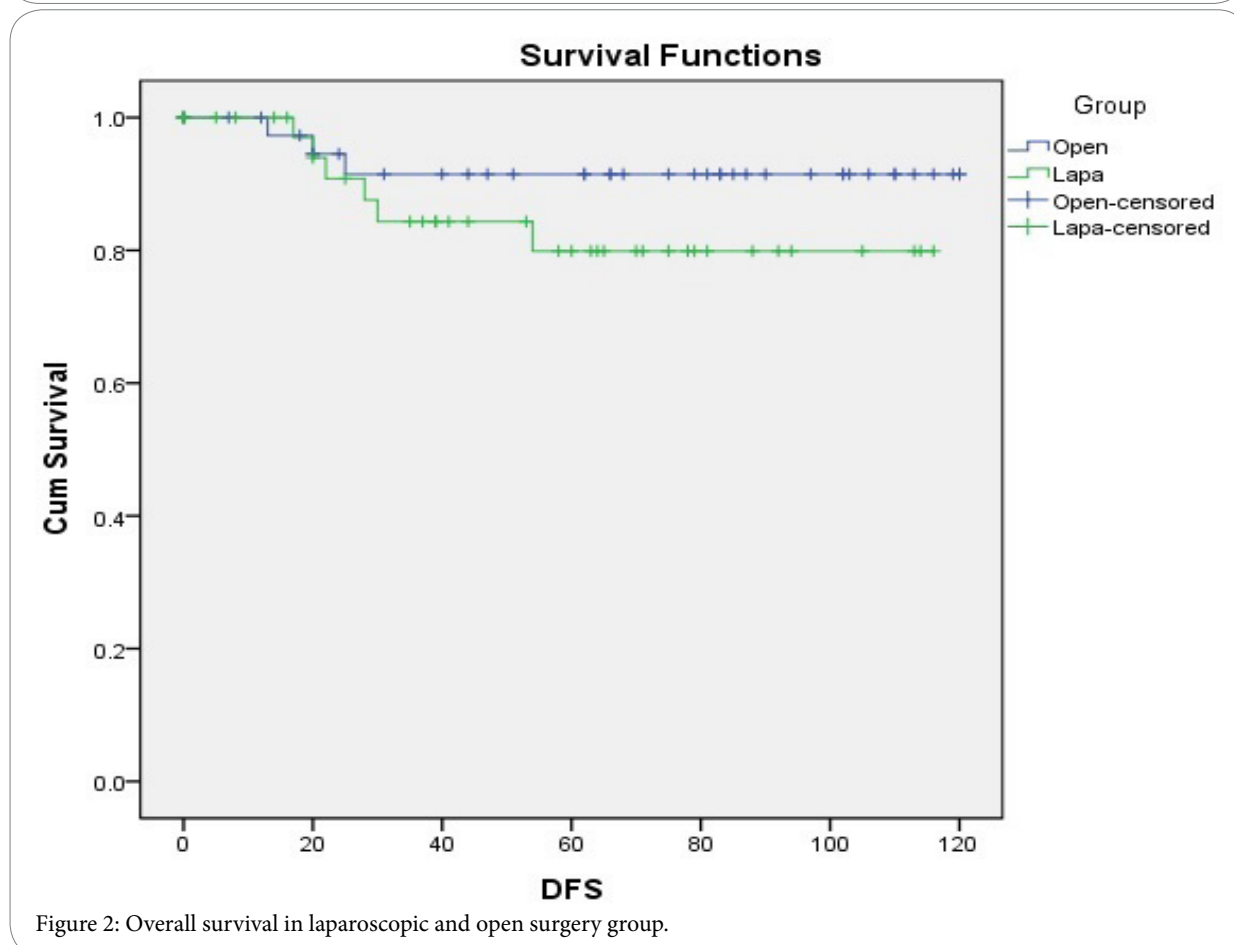


Figure 2: Overall survival in laparoscopic and open surgery group.

Stocchi et al. matched for gender, age, year of surgery, operating surgeon, and procedure. They presented that the laparoscopic group recovered bowel function sooner and had significant shorter hospital stays [20]. We matched for gender, age, ASA score, operative procedure, and TNM stage to avoid bias.

It has been established that laparoscopic approaches provide earlier recovery of bowel function, shorten hospital stay, and facilitate an early return to preoperative status [22]. Reduced postoperative pain also seems to affect early discharge. In the present study LG showed shorter hospital stays, less time to first flatus and earlier start of soft diet. The hospital stays in rectal cancers (15.6 days) were longer than colon cancers (13.9 days). However there was no statistical significance. Mean hospital stays of this study were longer than typically reported (13.8 and 15.4 days, respectively, versus 5 to 10 days). Some patients were transferred from other department of same hospital, and we usually spent 2 days for bowel preparation. When the postoperative condition of a patient was good, we performed the first cycle of adjuvant chemotherapy during the postoperative hospitalization. Mean hospital stays who performed subsequently chemotherapy were 15.4 days versus 12.8 days who did not. Furthermore, in Korea, the national health insurance supports a large part to a patient. In case of major cancer the patient pays only 5% of total hospital costs. This is why lots of cancer patients in Korea stay longer and want to discharge after full recovery.

During laparoscopic surgery, open conversion usually is made because of severe adhesion or bleeding. Reported conversion rates vary, but are generally 14 to 33% [23-26]. Lee et al. achieved a conversion rate of 7% in the first 92 cases, and 4% in the subsequent 94 cases [27]. In the present study, the conversion rate was 14.3%. However, the study was conducted during early days of laparoscopic colectomy in our hospital, and since the conversion rate has reduced to 9.8%.

Cheung at al. presented long-term results for laparoscopic colorectal cancer surgery in octogenarians, and quoted overall five-year and disease-free survivals at five years of 51 and 49%, respectively. However, 9% of the patients enrolled had stage IV disease [28]. Cummings et al. conducted a cohort study on laparoscopic versus open colectomy for colon cancer in patients aged > 65 years, and found that 5-year survival rates were 55.8 and 48.9%, respectively, but emergency cases and stage IV patients were included [29]. In the present study, 5-year disease-free survival rate were 79.9 and 91.5% in the LG and OG, and overall five-year survival rates were 60 and 73.2%, respectively, after excluding emergency and stage IV cases. Furthermore, the proportions of patients that received adjuvant chemotherapy were 77.8% and 88.9% in the LG and OG, respectively, which probably contributed to the better survival rates. In addition, the LG contained the cases of conversion, so the analysis was by intention-to-treat. In a previous study, McKenzie et al. demonstrated that the administration of adjuvant chemotherapy improves survival in patients with stage II colon cancer [30].

There were some limitations in this study. It was a case-matching study with small sample size, and contained the initial learning curve in early laparoscopic surgery.

We conclude the laparoscopic technique does not seem to present any disadvantages in elderly patients, and that the technique is safe and feasible for colorectal cancer. Furthermore, no difference was found between laparoscopic and open surgery with respect to morbidity,

disease-free survival, or overall survival. Further prospective randomized studies are necessary to draw a definitive conclusion.

Conflict of Interest

The authors declare that they have no competing interests.

Author Contributions

JH conceived the study and carried out all procedure. GJ performed statistical analysis and drafted the manuscript. WS helped in the design of the study. SW participated in coordination and helped to draft the manuscript. JN helped in general supervision.

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