SCIE DOI: 10.14744/scie.2018.00710
South. Clin. Ist. Euras. 2018;29(2):75-79

Original Article

Comparison of Histopathological and Oncological Results of Patients Who Underwent Laparoscopic or Open Resection for Sigmoid Cancer

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Submitted: 24.05.2018
Accepted: 25.06.2018

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Keywords: Colon tumors; histopathology; laparoscopic surgery.

ABSTRACT

Objective: To compare of the histopathological and oncological outcomes of patients undergoing laparoscopic or open resection surgery for sigmoid colon cancer.

Methods: All of the patients who underwent surgical resection for sigmoid colon cancer between July 2014 and December 2016 were included in this study. The demographic characteristics, T/N staging, number of benign/malignant lymph nodes, histopathological findings, follow-up period, overall survival, and disease-free survival (DFS) of both groups were evaluated.

Results: A total of 43 patients were evaluated in this study. The female to male ratio was 14/29. The mean age of the patients was 64.11±11.75 years. The median number of dissected lymph nodes was 20.9 (10–31) in the open resection group and 19.46 (7–36) in the laparoscopic group (p=0.539). The overall 3-year survival was 87% in the open resection group and 85% in the laparoscopic group (p=0.62). The 3-year DFS rate was 79% in the open surgery group and 75% in the laparoscopic group (p=0.70).

Conclusion: Laparoscopic and open surgery for sigmoid colon cancer provide equivalent oncological results; laparoscopic surgery can be performed safely in these patients. When the laparoscopic surgery technique is standardized and efforts are made to improve training, laparoscopic surgery will likely become standard treatment for colon cancer.

INTRODUCTION

Colorectal cancer is a prevalent malignant tumor. It is the third most common cancer worldwide and ranks fourth in cancer-related deaths.[1] In the treatment of colorectal cancers, a surgical approach is still the first choice to support comprehensive, individualized, and definitive treatment. The first laparoscopic surgery for intestinal diseases was reported in the United States in 1991.[2] Subsequently, indications were expanded to include laparoscopic interventions for colorectal cancer, appendicitis, and diverticulitis.[3]

However, the laparoscopy was thought to be temporarily contraindicated in 1994 when port site recurrences were reported.[4] After these developments, strict management of oncological surgical principles has reduced the number of trocar site recurrences. Given the now widespread use of laparoscopic surgery, clinical trials have begun to compare short- and long-term survival outcomes with the results of open surgery.[5]

It has been reported that the laparoscopic approach can be safely and effectively applied in cases of oncological disease of the colon.[2,6–10] Studies have shown that laparoscopic surgery is a superior alternative to open surgery in terms of the length of hospital stay and reduced surgical complications, rapid recovery and return to work, and better cosmetic and immunological outcomes.

Laparoscopic treatment of colorectal cancer has been shown to achieve similar short- and long-term results to

open surgery with the advantages of a minimally invasive procedure.[10–13] However, researchers are still investigating whether laparoscopic surgery is performed in accordance with oncological principles and whether the oncological outcomes are comparable with those of open surgery.

In this study, the histopathological results and survival rates of patients undergoing laparoscopic surgery or open resection for sigmoid and rectosigmoid colon cancer were compared.

MATERIAL AND METHODS

Between July 2014 and December 2016, 43 patients with the diagnosis of sigmoid or rectosigmoid colon cancer underwent open or laparoscopic colon resection at a single facility. Patients with a body mass index greater than 30 kg/m^2, those with distant metastasis, synchronous tumors, and cases of operated for mechanical intestinal obstruction were excluded from the study. An experienced colorectal surgical team performed all of the procedures.

The diagnosis of colon cancer and the determination of a synchronous tumor were confirmed by colonoscopy and biopsy. Abdominal and thorax tomography was routinely performed to determine any presence of distant metastasis. Preoperative intestinal preparation was conducted, and antibiotic and thromboembolism prophylaxis were administered to all patients. Open and laparoscopic colonic surgery was performed according to the standard protocols previously described.[10] The demographic characteristics, staging details, benign/malignant lymph node count, histopathological findings, length of follow-up, and the overall survival (OS) and disease-free survival (DFS) rates of both groups were compared.

Statistical Analysis

The age variable was expressed as mean±SD and analyzed using a t-test; the OS variable was presented as median±SD and analyzed with the Mann-Whitney U test. A chi-square test for other variables was calculated. Data with a normal distribution were analyzed with a t-test. Non-normally distributed data were defined by median and range and analyzed using the Mann-Whitney U test. Relationships between the variables in the contingency table were analyzed using a chi square test or Fisher's exact test, as appropriate. Data normality was analyzed using the Kolmogorov-Smirnov test. Statistical analysis were performed using IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY, USA). A p value <0.05 was considered as statistically significant.

RESULTS

Open colectomy (n=17, 39.5%) and laparoscopic colectomy (n=26, 60.5%) were performed in 40 patients. The female to male ratio was 14/29, and the mean age was 64.11±11.75 years. Tumors were localized in the sigmoid colon (n=30, 69.7%) and the rectosigmoid colon (n=13, 30.3%). The number of patients in the open surgery and the laparoscopic groups, respectively, with a stage I diagnosis was 3 (17.6%) and 5 (19.2%), while 8 (47.1%) and 11 (42.3%) were defined as stage 2, and 6 (35.3%) and 10 (38.5%) were stage 3 (p=0.722). The median number of lymph nodes removed was 20.9 in the open group (10-31) and 19.46 in the laparoscopic group (7–36) (p=0.539). The median number of malignant lymph nodes removed was 1 (0-4) in the open surgery group and 3.1 (0–28) (p=0.184) in the laparoscopic group (Table 1). The 3-year OS rate in the open surgery group was 87% and it was 85% in the laparoscopic group (p=0.62). The 3-year DFS rate was 79% in the open surgery group and 75% in the laparoscopic group (p=0.70).

DISCUSSION

Factors affecting survival in colorectal surgery include lymph node invasion, vascular invasion, poor differentiation, and the success of the surgical technique, which is primarily related to the number of lymph nodes removed and an adequate surgical margin. The presence of at least 12 lymph nodes is recommended for radical resection in laparoscopic colon surgery.[14] This parameter was investigated in laparoscopic procedures. An evaluation of the data of randomized and nonrandomized trials conducted at the consensus meeting of the European Association of Endoscopic Surgeons held in Lisbon in 2002 found no significant difference in terms of the number of lymph nodes removed, the length of the lesion and the distance of the lesion from the tumor between open and laparoscopic colonic surgery.[9,15]

According to the results of a meta-analysis of large-scale, prospective, randomized trials examining the treatment of colorectal cancer, including the Clinical Outcomes in for Surgical Therapy (COST) trial,[7] the Colon Cancer Laparoscopic or Open Resection (COLOR) trial,[10] and the Conventional and Laparoscopically Assisted Surgery Clinic (CLASICC) trial, an average of 11.8 and 12.2 lymph nodes were removed in the laparoscopic and open surgery groups, respectively. In our study, the median number of lymph nodes removed was 19.46 (7–36) in the laparoscopic group and it was 20.9 (10–31) (p=0.539) in the open surgery group. Laparoscopic surgery has been confirmed to not only be minimally invasive and have fewer cosmetic effects, but also results in faster recovery with similar oncological outcomes to open surgery.[16–18]

High or low ligation of the inferior mesenteric artery (IMA) is controversial. Some researchers have opposed low ligation, in which the IMA is dissected and ligated below the origin of the left colic artery, and suggested that metastatic lymph nodes may be present in the adipose tis-

Table 1. Patient demographic features and pathological characteristics of the tumors

	Open	Laparoscopic	p
Number of patients, n (%)	17 (39.53)	26 (60.47)	
Age (years), Mean±Standard deviation	65.35±10.61	62.87±11.75	0.588
Gender, n (%)			0.101
Female	8 (47.1)	6 (23.1)	
Male	9 (52.19)	20 (76.9)	
Localization, n (%)			0.559
Sigmoid	11 (64.7)	19 (73.1)	
Rectosigmoid	6 (35.3)	7 (26.9)	
Operation, n (%)			0.484
Low anterior resection	7 (41.2)	8 (30.8)	
Anterior resection	10 (58.8)	18 (69.2)	
Pathology, n (%)			0.341
Adenocarcinoma	12 (70.6)	22 (84.6)	
Adenocarcinoma with a mucinous component	4 (23.5)	4 (15.4)	
Signet cell carcinoma	1 (5.9)	0	
Final stage, n (%)			0.954
1	3 (17.6)	5 (19.2)	
2	8 (47.1)	11 (42.3)	
3	6 (35.3)	10 (38.5)	
T Stage, n (%)			0.779
T1	1 (5.9)	2 (7.7)	
T2	2 (11.8)	5 (19.2)	
T3	13 (76.5)	16 (61.5)	
T4	1 (5.9)	3 (11.5)	
N Stage, n (%)			0.133
N0	11 (64.7)	15 (57.7)	
N1	4 (23.5)	2 (7.7)	
N2	2 (11.8)	9 (34.6)	
Number of LAP excised [min-max (median)]	10–31 (20.94)	7–36 (19.46)	0.539
Malignant LAP [min-max (median)]	1 (0–4)	3.12 (0–28)	0.184
Distal margin (cm) [min-max (median)]	4.65 (0.3–10.0)	4.60 (0.1–10.0)	0.953
Radial margin (cm) [min-max (median)]	1.69 (0.2–5.0)	1.90 (0.1–9.0)	0.713
Follow-up period (16–44 months)	25 (16–43)	29 (15–44)	0.762

sue between the left colic artery and the aorta, and therefore recommended ligation of artery at the level of its origin from the aorta (high ligation).[19] However, prospective studies have revealed no survival advantage between high or low ligation of the IMA. The presence of metastatic lymph nodes in the artery is generally considered to indicate distant metastases.[20] High ligation was performed in all of our patients in the present study.

The COST and CLASICC studies provided DFS data for 770 and 413 colon cancer patients who underwent laparoscopic and open resection, respectively, and no significant difference was reported.[7,8,21,22] In the COLOR study, the 3-year OS rate was 81.8% and 84.13% in the laparoscopic and open surgery groups, respectively (p=0.45). In the same study, the 3-year DFS was 74% in the laparoscopic group and 76.2% in the open group (p=0.70).[11] In our study, the 3-year OS was 85% in the laparoscopic group and 87% in the open surgery group (p=0.62). The 3-year DFS was 75% in the laparoscopic group and 79% in the open surgery group (p=0.70). There was no statistically

significant difference between the 2 groups in terms of the OS and DFS rates.

There are few surgeons trained to perform a minimally invasive surgical intervention for colorectal cancer, and therefore this technique is used routinely in only a limited number of centers. Teamwork and the leadership of a surgeon with significant experience performing laparoscopy are required in training to perform laparoscopic colon surgery. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the American Society of Colon and Rectal Surgeries (ASCRS) have developed thorough guidelines for laparoscopic colectomy training, which include didactic content and laboratory model components.[23]

CONCLUSION

Laparoscopic and open surgery for sigmoid colon cancer yield equivalent oncological results. Laparoscopic surgery can be performed safely in these patients by an experienced surgeon. Laparoscopic surgery will likely become the standard treatment for colon cancer if efforts are made to standardize the surgical technique and expand and improve training.

Ethics Committee Approval

Nil.

Peer-review

Internally peer-reviewed.

Authorship Contributions

Concept: S.K., Y.E.A., Ö.A., A.Ş., N.B., H.F.K.; Design: S.K., Y.E.A., Ö.A., A.Ş.; Data collection &/or processing: S.K., Y.E.A., Ö.A., A.Ş.; Analysis and/or interpretation: S.K., Y.E.A., Ö.A., H.F.K.; Literature search: S.K., Ö.A., A.Ş.; Writing: S.K., Y.E.A., Ö.A.; Critical review: S.K., Y.E.A., N.B., H.F.K.

Conflict of Interest

None declared.

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Sigmoid Kolon Kanserinde Laparoskopik ve Açık Rezeksiyon Yapılan Hastaların Histopatolojik ve Onkolojik Sonuçlarının Karşılaştırılması

Amaç: Sigmoid ve rektosigmoid kolon kanseri nedeniyle laparoskopik ve açık cerrahi yapılan hastaların histopatolojik sonuçlarını ve sağkalım oranlarını karşılaştırmak.

Gereç ve Yöntem: Temmuz 2014–Aralık 2016 tarihleri arasında sigmoid ve rektosigmoid kolon kanseri tanılı 43 hastaya açık ve laparoskopik kolon rezeksiyonu uygulandı. Her iki grup hastaların demografik özellikleri, T/N evreleri, benign/malign lenf nodu sayıları, histopatolojik bulguları, takip süreleri, genel sağkalım (OS) ve hastalıksız sağkalımları (DFS) karşılaştırıldı.

Bulgular: Kırk üç hastanın 17'sine (%39.5) açık kolektomi, 26'sına (%60.5) laparoskopik kolektomi uygulandı. Kadın erkek oranı 14/29 idi. Ortalama yaş 64.11±11.75. Çıkarılan ortalama lenf nodu sayısı açık grupta 20.9 (10–31) iken laparaskopik grupta 19.46 (7–36) idi (p=0.539). Açık grupta üç yıllık genel sağkalım (OS) %87 iken laparoskopik grupta %85 idi (p=0.62). Üç yıllık hastalıksız sağkalım (DFS) ise açık grupta %79 laparoskopik grupta ise %75 idi (p=0.70).

Sonuç: Sigmoid kolon kanseri için laparoskopik ve açık cerrahi eşdeğer onkolojik sonuçlar sunar. Bu hastalarda güvenli bir şekilde laparoskopik cerrahi yapılabilir. Laparoskopik cerrahinin standardizasyonu ve eğitim sisteminin iyileştirilmesi için çaba harcanır ise laparoskopik cerrahi kolon kanserinde standart bir tedavi halini alacaktır.

Anahtar Sözcükler: Histopatoloji; kolon tümörleri; laparoskopik cerrahi.