LESS

Original Article

Laparosc Endosc Surg Sci 2020;27(4):215-219
DOI: 10.14744/less.2020.36450

Laparoscopic right hemicolectomy: A single center experience

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ABSTRACT

Introduction: To evaluate the early postoperative results of patients who underwent laparoscopic right hemicolectomy for colon cancer in our center.

Materials and Methods: Patients with right colon cancer who underwent elective laparoscopic right hemicolectomy between December 2017 and March 2020 at the Samsun Training and Research Hospital were included in this study. The patients were evaluated in terms of age, sex, body mass index (BMI), American Society of Anesthesiologists (ASA) class, comorbidities, previous abdominal surgery, tumor location, preoperative bowel cleansing, prophylactic antibiotherapy, operative time, pathological staging, number of lymph nodes removed, anastomosis type and construction (intracorporeal or extracorporeal), postoperative complications, reoperation, hospital length of stay, and rates of mortality and morbidity.

Results: The study included nine men and three women with a median age of 65 years (range 48–81 years) and median BMI of 26.9 (range: 23–33). The median operative time was 167.5 min (range: 120–240 min). Mean blood loss was 95±41 ml. Three patients were stage I, six were stage II, and one was stage III. Two had noninvasive cancer on pathologic examination. The median number of lymph nodes removed was 12 (range: 0–49). All of the anastomoses were side-to-side; five were constructed intracorporeally (IA) and seven extracorporeally (EA). The median operative times were 165 min (range: 120–240 min) and 165 min (range: 135–200 min), median length of skin incision was 6.7 cm and 8.7 cm in patients with IA and EA, respectively. Morbidity was observed in three patients (25%) and consisted of an anastomotic leak in one patient, incision site infection in one patient, and paralytic ileus in one patient. The median hospital length of stay was 6.5 days (range: 5–40 days). There was no mortality and incisional hernia.

Conclusion: Laparoscopic right hemicolectomy is a safe and effective technique for the surgical treatment of right colon tumors.

Keywords: Colon cancer, laparoscopy, morbidity, right hemicolectomy

Introduction

Colorectal cancers are the most common cancers worldwide[1] and 40% occur in the right colon.[1,2] With advances in instrumentation, minimally invasive surgery is increasingly used in gastrointestinal surgery. As in many other procedures, this approach has also become common in the treatment of colorectal tumors. Laparoscopic right hemicolectomy has comparable oncological outcomes to

Received: 22.07.2020 **Accepted:** 28.12.2020
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open surgery and has been widely adopted for the treatment of both malignant and benign diseases.[3] It is also associated with shorter hospital stay and postoperative recovery time, less pain, and reduced morbidity.[4]

Materials and Methods

We retrospectively evaluated the outcomes of patients who underwent right hemicolectomy for right colon cancer between December 2017 and March 2020 in the gastroenterological surgery and surgical oncology departments of the University of Health Sciences, Samsun Training and Research Hospital. Ethical approval for the study was obtained from the Samsun Training and Research Hospital Ethics Committee (No: 2020/10/7). Patients who underwent open or emergency surgery, had stage IV disease, or did not have an anastomosis were excluded from the study. The results of 12 patients who underwent elective laparoscopic right hemicolectomy were included in the study. The patients were evaluated in terms of age, sex, body mass index (BMI), American Society of Anesthesiologists (ASA) class, comorbidities, previous abdominal surgery, tumor location, preoperative bowel cleansing, prophylactic antibiotherapy, operative time, pathological staging, number of lymph nodes removed, anastomosis type and construction method (intracorporeal or extracorporeal), postoperative complications, reoperation, length of hospital stay, and rates of mortality and morbidity.

All data were entered into a Microsoft Excel spreadsheet. Categorical data were expressed as median and minimum–maximum values or mean ± standard deviation; continuous variables were expressed as numbers and percentages.

Results

Twelve patients (9 men and 3 women) with right colon cancer who underwent laparoscopic right hemicolectomy were included. The patients' median age was 65 years (range: 48–81 years) and the median BMI was 26.9 (range: 23-33). Seven of the patients were ASA II (58.3%) and 5 were ASA III (41.6%). The tumor was located in the cecum in 3 patients, the ascending colon in 7 patients, and the hepatic flexure in 2 patients (Table 1). Three (25%) of the patients had a history of previous abdominal surgery. All patients underwent preoperative bowel cleansing and prophylactic antibiotherapy followed by laparoscopic right hemicolectomy and ileotransversotomy. Median operative time was 167.5 min (range: 120–240 min). Mean blood loss was 95±41 mL. Three patients were stage I, 6 were stage II, and 1 was stage III on pathologic examination. No invasive cancer was detected in the other 2 patients. The median number of lymph nodes removed was 12. The maximum number of lymph nodes removed was 49, and the minimum was 0 in a patient whose pathology report stated that lymph node dissection could not be performed. Five patients had intracorporeal anastomosis (IA) and 7 had extracorporeal anastomosis (EA); all were side-to-side. One anastomosis was constructed using a 28-mm circular stapler and the others with a linear stapler. Enterotomy was manually closed in 4 of the IAs and all of the EAs. The specimens were removed through a suprapubic incision in 3 of the patients with IA and through a supraumbilical midline incision in the other 2 patients. In all patients with EA, specimens were removed through a supraumbilical midline incision (Table 2). Median operative time in patients with EA was 165 min. (range: 135-200 min.). In patients with IA, it was 165 min. (range: 120-240 min.). Median length of skin incision was 6.7 cm and 8.7 cm in patients with IA and EA respectively. There was no mortality. The morbidity rate was 25%. One patient (8.3%) with side-by-side IA and manual enterotomy closure un-

Table 1. Demographic and clinical features of the patients

Median Age (years)	65 (48–81)	
Median BMI	26.9 (23–33)	
	n	**%**
ASA II	7	58.3
ASA III	5	41.6
Tumor Location		
Cecum	3	25.0
Ascending Colon	7	58.4
Hepatic Flexure	2	16.6
Pathologic Examination		
Stage I	3	25.0
Stage II	6	50.0
Stage III	1	8.4
Noninvasive Cancer	2	16.6
Median number of lymph nodes removed	12 (0–49)	

Values expressed as median (minimum–maximum) values or as number (percentage); BMI: Body mass index, ASA: American Society of Anesthesiologists Physical Status Classification.

Table 2. Operative features of the patients	
Operative time (minutes), median (min–max)	167.5 (120–240)
Intracorporeal anastomosis	5
Extracorporeal anastomosis	7
Side-to-Side anastomosis	12
Circular Stapler	1
Linear Stapler	11
Enterotomy Closure	11
Specimen Extraction	
Suprapubic	3
Supraumbilical Median	9

derwent relaparotomy due to anastomotic leak and developed postoperative surgical site infection. Another patient developed surgical site infection at the suprapubic incision made for specimen removal. One patient developed postoperative paralytic ileus. The median hospital length of stay was 6.5 days; the longest stay was 40 days in the patient with anastomotic leak and subsequent surgical site infection. The shortest hospital stay was 5 days (Table 3).

Discussion

Since it was first described in 1991,[5] laparoscopic right hemicolectomy has become popular in the surgical treatment of right colon cancer due to its superior short-term outcomes and similar oncological outcomes compared to open surgery.[6] The two methods used to achieve intestinal continuity after laparoscopic right hemicolectomy are IA and EA. Although IA was first described in 1992, the manual enterotomy closure and leakage of intestinal contents into the peritoneal cavity limited its widespread use.[7] Reported advantages of the IA method include the lower incidence of mesenteric rotation and traction during anastomosis construction and the smaller incision for removal of surgery material. However, there are no differences between the two methods in terms of oncological principles such as proximal ligation of vessels and extent of lymphadenectomy.[8] In our study, 5 patients had IA and 7 had EA.

Table 3. Postoperative features of the patients	
	%
Anastomotic Leak	8.3
Surgical Site Infection	8.3
Paralytic Ileus	8.3
Overall Morbidity	25
Overall Mortality	0
Median LOS (days), median (min–max)	6.5 (5–40)

LOS: Length of Hospital Stay.

The main determining factor in whether the threshold number of lymph nodes is obtained during colorectal cancer surgery is surgeons and pathologists.[9] The surgeons who performed the operations in our study were specialists who received similar training and performed the surgeries according to the same oncological principles. Evaluation of colorectal cancer specimens is a difficult and laborious procedure. A meticulous evaluation is critical in determining the number of lymph nodes removed.[10] Moreover, pathologist experience[11] and the methods used to remove mesenteric adipose tissue have also been reported to impact lymph node evaluation.[12] Therefore, specimen evaluation may vary among pathologists working in the same center.[11] In our study, the median number of lymph nodes removed was 12 and ranged from 0 to 49. Of the 4 patients with fewer than 12 lymph nodes removed, 1 patient had T1, 1 had T4, and 2 had noninvasive tumors. Despite standard adherence to oncological principles in all of our patients, the fact that fewer than 12 lymph nodes were evaluated in some cases indicates that experience and diligence in specimen evaluation also affected our results. This highlights the critical roles of both surgeons and pathologists in sampling the optimal number of lymph nodes, as well as the need for their collaborative feedback and standardization of both surgery and specimen examination.

Despite advances in surgical technique and postoperative follow-up, anastomotic leak is one of the main complications of gastrointestinal surgery. The prevalence of anastomotic leak varies between 0.02% and 7.2% for ileocolic anastomoses.[13,14] Anastomotic leak was detected in 1 (8.3%) of our patients, who had a side-to-side IA with manual enterotomy closure. In laparoscopic right hemicolectomy operations we performed after this case, specimens were removed through a supraumbilical incision and anastomoses were constructed extracorporeally using a linear stapler and enterotomies were closed manually. The staple line was also reinforced with seromuscular sutures in the anterior and posterior surfaces of the anastomosis. In the subsequent period, ileotransverse

anastomotic leak was not detected in any other patients. Different studies have reported that the anastomosis technique used is a major independent risk factor for anastomotic leak.[15-17] These studies showed that leaks were more common with stapler anastomoses than hand-sewn anastomoses. However, the reason for the higher incidence of leaks from stapled ileotransverse anastomosis could not be elucidated. A study evaluating whether the clinical effect and treatment of anastomotic leak varied depending on anastomosis type demonstrated that patients with hand-sewn ileocolonic anastomoses had a lower rate of Type IIIa (Clavien-Dindo) complications and were treated less aggressively, while patients with stapler anastomoses had higher rates of Type IIIb (Clavien-Dindo) complications and relaparotomy.[18] The effect of comorbidity on the probability of anastomotic leak has not been determined.[19] Based on our clinical experience, we believe that reinforcing the anastomotic line with seromuscular sutures is a preventive factor in leak development and has a favorable impact on postoperative complication severity and treatment requirement. However, the clinical significance of this outcome must be supported by randomized controlled studies.

Specimens were removed through a suprapubic Pfannenstiel incision in 3 of the 12 patients and through a supraumbilical midline incision in the other 9 patients. Surgical site infection was observed at 1 of the suprapubic incisions and 1 of the supraumbilical midline incisions. Incisional hernia was not observed in either group. Median hospital length of stay was 6.5 days. The longest hospital stay of 40 days was by a patient who had a midline incision, underwent IA, and developed anastomotic leak. The patient with the second longest stay, 17 days, had specimen removal through a supraumbilical midline incision, underwent EA, and developed postoperative paralytic ileus. The patient with the third longest stay, 15 days, also underwent EA with specimen removal through a supraumbilical median incision and developed surgical site infection. A recent meta-analysis showed that the risk of developing incisional hernia was higher in patients who underwent laparoscopic colorectal resection with midline incision for specimen removal.[20] However, in a randomized controlled study by surgeons experienced in laparoscopic and colorectal surgery, there was no significant difference between the groups in terms of development of superficial infections and incisional hernia or median hospital length of stay, although intracorporeal ileocolic anastomosis and Pfannenstiel incision were performed more commonly.[7] According to our results, although there is no difference between incision types in terms of incisional hernia development, EA procedures are associated with higher incidence of paralytic ileus due to greater colon manipulation and mesenteric traction. However, in addition to the incisions used, the combined effect of the incisions and the anastomotic complications may also impact length of hospital stay.

Our early outcomes of laparoscopic right hemicolectomy in this study suggest that performing laparoscopic right hemicoloectomy with EA and reinforcing the staple line with seromuscular sutures increases the frequency of postoperative ileus, length of incision but decreases major morbidity and reoperation rates. Nevertheless, for laparoscopic right hemicolectomy with IA vs EA there is not difference in terms of operative time, incisional hernia development.

Disclosures

Ethichs Committee Approval: Ethical approval for the study was obtained from the Samsun Training and Research Hospital Ethics Committee (No: 2020/10/7).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – Ş.S., K.S., K.O.; Design – Ş.S.; Supervision – K.S., K.O.; Data collection and/or processing – Ş.S., K.S.; Analysis and/or interpretation – K.S., K.O.; Literature search – Ş.S., K.O.; Writing – Ş.S.; Critical review – Ş.S., K.S., K.O.

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