



Subtotal and Total Colectomy as a One-Stage Surgical Treatment for Malignant Left-Sided Colonic Obstruction

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Abstract

Aim: We conducted this retrospective study in order to evaluate the short- and long-term results of Subtotal/Total Colectomy (STC/TC) and primary anastomosis for the treatment of occlusive left colon cancer.

Methods: Data were retrospectively collected from the medical records from general surgery clinic in January 2016 to June 2022 period. The study included patients diagnosed with acute colonic occlusion produced by tumor located from the splenic flexure to the rectosigmoid junction.

Results: During the study period, 40 patients who underwent STC/TC and primary anastomosis were included in the study. According to the Clavien-Dindo grades, major complication rate was 17.5%. Seven patients (17.5%) had synchronous adenocarcinoma. Adenoma was detected in 11 of 40 patients, and 18.1% of them were reported as high-grade dysplasia. Besides, incidental low grade appendiceal mucinous neoplasm was reported in one patient. Ischemia and perforation of proximal colon was found in 28 cases (70%). No patient had anastomotic leak. After one year of surgery, the average defecation was two stools per day. Three-year OS was 92.3% in stage II and 68.7% in stage III. There was no survival more than three years in stage IV patients. The three-year overall disease-free survival was 90.6%.

Conclusion: Treatment of obstructive left colon cancer using STC/TC and primary anastomosis is a confident method resulting in a good bowel function. The method allows the resection of synchronous tumors. Besides, it removes the proximal colon with ischemic lesions, serosal tears and filled with stool.

Keywords: Anastomosis; Colon cancer; Emergency; Surgery; Outcomes

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Introduction

In spite of active screening struggles, occlusive colon cancer requiring urgent surgical or procedural intervention makes up 10% to 18% of patients initially diagnosed with colon cancer [1,2]. According to its position as proximal or distal to the splenic flexure, occlusive colon cancer is generally defined as right-sided or left-sided. More than half of them appears on the left side, most widespread in the sigmoid colon [2,3]. The anatomic feature of a narrow luminal caliber in the left-sided colon clarifies the higher incidence of occlusive colon cancer [1]. Compared to those for right-sided occlusive colon cancer, treatment choices for left-sided occlusive colon cancer are various and debatable [3]. Traditionally, primary tumor resection with end stoma or primary tumor resection-anastomosis with diverting stoma has been highly favored to deal with occlusive left-sided colon cancer in an urgent situation [4]. Although a diverting stoma may be considered to be more suitable to improve the patient's general situation, allow bowel cleansing and formal staging before surgery, both procedures have similar morbidity and mortality rates. Hence, the previous studies did not recommend the utilization of colostomy. Resection of primary tumors with end stoma is considered to be the most secure alternative because of the lack of anastomotic complications [4]. However, stoma closure is related to a morbidity rate of 22% to 36% and up to 71% to patients never have an operation for this purpose [5]. The role of bridging surgery by using Self-Expandable Metallic Stents (SEMS) for patients with treatable disease has been commonly agreed on. However, colonic perforation which occurs after SEMS was suggested to result in an increased risk of recurrence [6,7]. Some colorectal surgeons make an effort to perform a primary anastomosis after resection and verified its applicability and reliability in selected emergency patients [8-11]. However, on-table lavage takes time and may lead to fecal contamination [12].

Subtotal Colectomy (STC) ileocolic anastomosis or Total Colectomy (TC) ileorectal anastomosis is reported to be another safe one-stage treatment option that does not require a stoma [8,9,13-15]. The method can remove the proximal colon with ischemic lesions, serosal tears and filled with stool, reduce the risk of fecal contamination, and effectively solve simultaneous colonic malignancy [9]. However, it involves disadvantages such as the need for a skilled surgeon, a longer surgical period and an impaired intestinal function [10].

The worries about surgical results caused by extent of resection, impairment of function, and lack of long-term data, STC/TC and primary anastomosis are not generally chosen for the treatment of occlusive left colon cancer. Hence, the present study was planned to evaluate the perioperative morbidity, mortality, functional and oncologic feasibility by analyzing the short- and long-term outcomes of STC/TC and primary anastomosis.

Materials and Methods

Details were retrospectively achieved from the medical archives from general surgery clinic in January 2016 to June 2022 period. The Ethical Committee approved the retrospective study. The informed consent was waived because of the retrospective nature of the study. The study included patients diagnosed with acute colonic occlusion produced by tumor located from the splenic flexure to the rectosigmoid junction where STC/TC was performed. Information's of patients including sex, age, comorbidities and American Society of Anesthesiologists (ASA) Physical Status (PS) classification, operation time, time required to return to regular diet, length of hospital stay, and number of harvested lymph nodes were collected from the medical archives. Site and stage of disease were identified in radiologic, surgical and pathologic reports. When simultaneous colon cancer was present, advanced disease was evaluated for staging. Ischemia and/or perforation of proximal colon were also evaluated.

The distal resection level was routinely superior to the pelvic promontory to protect 10 cm of the rectum. TC patients were described as the cases of ileorectal anastomosis after TC. Also, STC patients were described as the cases of ileosigmoid or ileo-descending colon anastomosis with proximal colon resection. Cases who underwent end ileostomy or protective loop ileostomy were externalized.

The patients were classified based on American Joint Committee on Cancer (AJCC) TNM Staging System for Colon Cancer, 8th edition. Postoperative complications were categorized in accordance with the Clavien-Dindo grades. All patients who completed at least one-year follow-up after subtotal or total colectomy, were interviewed about daily mean number of defecation and antidiarrheal medication requirement during the 12 months.

Collected data were statistically analyzed using IBM SPSS Statistics software for Windows ver. 25.0 (IBM Corp., Armonk, NY, USA). Outcomes are stated as median value with ranges. Disease Free Survival (DFS) referred to time from diagnosis to recurrence or death without evidence of recurrence after undergoing curative-intent treatment. Overall Survival (OS) was defined as the time from diagnosis to death as a result of all causes. The Kaplan-Meier method was used to construct DFS and OS curves. The log-rank test was used to compare distributions by stage.

Results

In the course of the study period, 60 patients underwent STC/

TC. Twenty patients who underwent end ileostomy (9 patients) or protective loop ileostomy (11 patients) were excluded. Thus, 40 patients were comprised in the study. Of these, 25 (62.5%) were male and 15 (37.5%) were female. The median age of the enrolled patients was 70 (range: 33 to 91) years, and 23 of the patients (57.5%) were 70 or over. The comorbidities of the patients were assessed by ASA PS categorization, and number of the cases with ASA PS III or more was 30 (75%).

Of the 40 enrolled patients, 26 (65%) underwent TC while 14 (35%) underwent STC. The mean operation time was 170 ± 77.7 minutes. The mean blood loss was 200 ± 90 ml. The median lymph node yield was 20 (range: 12 to 108). Except for one patient who died on postoperative day 4, the median length of postoperative hospital stay was 9 days (range: 5 to 46). The median time required for returning to regular diet after surgery was 6.0 days (range: 4 to 7).

Classification of tumor according to location is shown in Table 1. Combined pathological findings of the primary tumor are shown in Table 2. The patients were classified based on American Joint Committee on Cancer (AJCC) TNM Staging System for Colon Cancer, 8th edition, and the results are given in Table 3.

A total of 18 postoperative complications (45%) occurred. These were classified according to the Clavien-Dindo grades and are presented in Table 4. Perioperative mortality rate was 2.5%. Anastomotic leakage was not observed. The reoperation rate was 5%. Postoperative hemorrhage and ileus were the reasons.

In all patients, the median surveillance was 28 months (range: 1 to 79 months). There were 11 (27.5%) mortalities. Nine of them were due to progression of cancer. When classified by stage, the median overall survival (months) according to the stage groups was found to be statistically significant ($p < 0.001$). The two-year OS was 92.3% in stage II, 87.2% in stage III, and 33.3% in stage IV. There was no survival more than three years in stage IV patients. The three-year OS was 92.3% in stage II and 68.7% in stage III (Figure 1).

Except for six stage IV patients, the median follow-up time was 36 months (range: 5 to 79). Three tumor recurrences (8.3%) and four mortalities (11.1%) were observed during this period. Three of the mortalities were due to cancer progression. The three-year overall disease-free survival was 90.6% (Figure 2). According to the stage groups, the three-year disease-free survival was 93.3% in the stage II group and 88.2% in the stage III group (Figure 3). The median disease-free survival time (months) was not significantly different

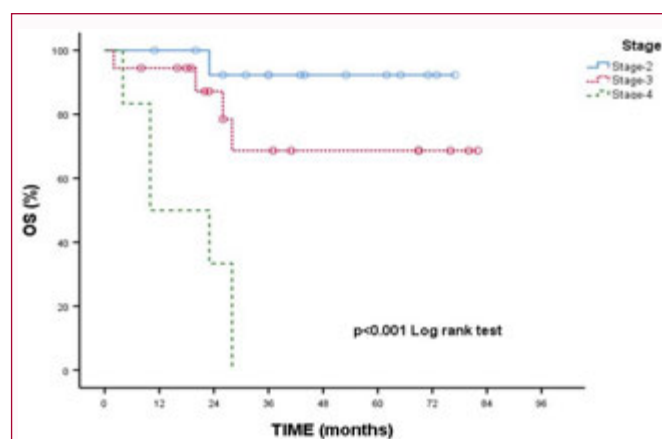
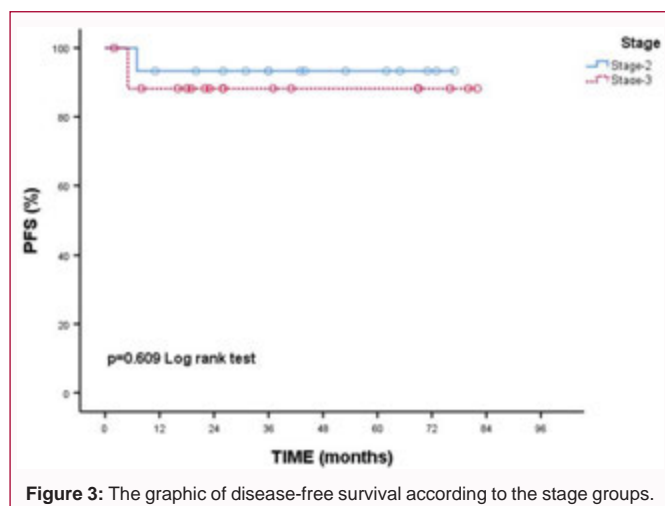
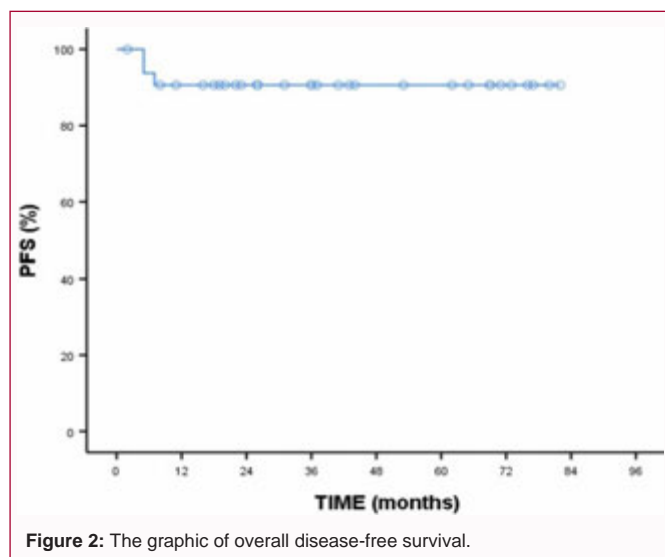


Figure 1: The graphic of overall survival according to the stage groups.



among the stage groups (p=0.609).

In order to evaluate the functional results, 27 patients who completed at least one-year follow-up, daily mean number of defecation and antidiarrheal medication requirement were evaluated. In the third postoperative month, the median daily number of bowel movements was seven (range: 3-12). In the sixth postoperative month, 10 patients (37%) suffered from diarrhea and needed antidiarrheal medication. Four of them were in STC group (4-12, 33.3%) and six in TC group (6-17, 35.2%). After the first year, only 3 of 27 patients (11.1%) still required medication, and one of them was in STC group (1-12, 8.3%) and two in TC group (2 of 17, 11.7%). The median number of daily bowel movements was 2 (range: 2-3) and no patient experienced severe diarrhea leading to hospitalization.

Discussion

Surgical treatment of acute left-sided colonic obstruction is a major procedure. The proximal colon is distended and filled with liquid feces, and its wall is often of suspicious viability with signs of impending perforation. Bowel contents are easily spilled through tears that are caused by distension or during mobilization. Treatment options are diverse and controversial due to high morbidity and mortality for obstructive left colon cancer emergency surgery [11].

Table 1: Invasive cancer localization and number of patients.

Location/n=40	19	10	3	2	2	1	1	1	1
Cecum				+					
Ascending colon								+	
Hepatic flexure							+		
Transverse colon				+	+				+
Splenic flexure		+					+	+	+
Descending colon			+						
Sigmoid colon	+			+	+				
Rectum							+		

Table 2: Combined findings of the primary tumor.

	n	%
Ischemia of proximal colon	16	40
Perforation of proximal colon	12	30
Tubular adenoma	4	10
Tubulovillous adenoma	3	7.5
High grade tubulovillous adenoma	2	5
Hyperplastic polyp	2	5
Villous adenoma	1	2.5
Serrated adenoma	1	3
Low grade appendiceal mucinous neoplasm	1	2.5

Table 3: Classification of patients based on tumor stage.

Stage ^a	n=40
I	0
II	14
IIA	10
IIB	1
IIC	3
III	20
IIIA	3
IIIB	13
IIIC	4
IV	6
IVA	1
IVB	0
IVC	5

^aClassification is according to American Joint Committee on Cancer (AJCC) TNM Staging System for Colon Cancer 8th edition

The classic choice of treatment causes stoma-related complications and also impairment in quality of life. Hence, the need for a safe, one-step method that does not necessitate a stoma is high.

Endoscopic stent deployment with subsequent staged surgery is an acceptable choice for left-sided occlusive colon cancer. Clinical and technical success rates for stenting were lower than expected (around 70%). The stent-related perforation rate was almost 20%, with a high incidence of silent perforations [16]. The meta-analysis of eight separate randomized controlled studies, revealed that cases treated with Self-Expandable Metal Stent (SEMS) decompression experienced a higher tumor recurrence rate than cases treated with emergency surgery [7]. In fact, the available guidelines do not mention SEMS decompression as a bridge to surgery as the management option in a potentially treatable disorder. However, they think of it only as an option to emergency procedure in cases with high risk of perioperative morbidity and mortality even though short-term outcomes are better [17,18]. Bridge to elective operation

Table 4: Postoperative complications according to the Clavien- Dindo grades.

		n	%
Grade 1	Incision site infection	9	22.5
Grade 2	Pneumonia	2	5
Grade 3a	Intra-abdominal abscess	2	5
Grade 3b	Postoperative hemorrhage	1	2.5
	Ileus	1	2.5
Grade 4	Ischemic hepatitis	1	2.5
	Acute renal failure	1	2.5
Grade 5	Pneumonia	1	2.5

using a Decompressive Stoma (DS) is a controversial option to SEMS for cases with left-sided occlusive colon cancer. Furthermore, based on the guidelines, DS should be reserved to unresectable neoplasms (when SEMS is not applicable) for critically ill patients who are too unfit for extensive procedures or general anesthesia [17].

STC/TC and primary anastomosis are two options of stoma-free, single-stage surgery for the management of patients with occlusive left colon cancer. Mortality rates are plausibly tolerable (less than 10%) according to prior experiences [14,15,19]. In our study, perioperative overall morbidity was 45% (18 of 40 patients). The rate of Clavien-Dindo grade III or over complications was 17.5%. Perioperative mortality rate was 2.5% (1 of 40 patients). In our patient group, the anastomotic failure rate was 0% when no ileostomy was performed. According to the literature [17,20-22], anastomotic leakage rates vary between 2.2 and 12% in retrospective series. There are some explanations for such a low anastomotic failure rate in STC/TC. The mobility of the small intestine enables the surgeon to make a tension-free ileocolic or ileorectal anastomosis. The ileocolic anastomosis has the advantage of an ideal blood supply owing to the better vascularity of the ileum. The column of feces is completely removed [9]. Therefore, there is no reason to expect a higher anastomotic failure rate for STC/TC compared to right hemicolectomy.

A potential benefit of STC/TC for management of patients with occlusive left colon cancer is that the procedure reduces the risk in patients with proximal simultaneous malignant and/or premalignant lesions. About 3% to 11% of colorectal cancer patients have synchronous colorectal cancer [23,24]. In our study, seven patients (17.5%) had synchronous cancer. When the range was expanded, adenoma was detected in 27.5% of patients (11-40), and 18.1% of them (2-11) were reported as high-grade dysplasia. Also, low grade appendiceal mucinous neoplasm was detected incidentally in one patient.

Postoperative bowel function as measured by the number of daily bowel movements was preserved. In our study, the median number of daily bowel movements was seven in the third postoperative month (range: 3-12). Three of 27 patients (11.1%) who completed at least one-year follow-up needed antidiarrheal medication during the 12 postoperative months, and the median number of daily bowel movements was 2 (range: 2-3). Earlier reports suggested that approximately 12% to 25% of cases required antidiarrheal medication after a subtotal or a total colectomy [15,25]. In an earlier study involving patients who had undergone total colectomy, the median number of daily defecations was 6 (range: 3-11) during the first three postoperative months, but the increase was transient and had a tendency to resolve by the sixth postoperative month [23]. In addition to reduced bowel function, STC/TC needs a proportionally

longer surgical time as the area to be explored is larger. In this study, the mean operative time was 170 ± 77.7 minutes. Therefore, STC/TC need an experienced surgeon or subspecialist and may be a suitable surgical procedure for patients that are hemodynamically more stable or have less comorbidities [10]. As an alternative surgical procedure for primary resection of occlusive left colon cancer and anastomosis, Segmental Colectomy (SC) with intraoperative colonic decompression is used as a one-stage surgical strategy. Although both surgical strategies are considered to have low mortality and morbidity [10,11], different conclusions were drawn in different studies. Especially higher leakage and wound infection rates were reported for SC [8,9].

The number of harvested lymph nodes is a validated marker of colorectal cancer survival. National Comprehensive Cancer Network (NCCN) recommendations state that examination of at least 12 lymph nodes is required for appropriate staging of colorectal cancer [26]. Also, a recent report [27], recommended examination of a minimum of 15 LNs for accurate staging of synchronous colorectal cancer. In the current report, number of cases with less than 12 lymph nodes was not available and the median number was 42. For synchronous colorectal cancer patients, there were no cases involving less than 15 lymph nodes, and the median number was 20.

Patients who were diagnosed with obstructive colon cancer and who underwent emergency treatment were reported to have worse long-term survival than patients with non-obstructive lesions [28,29]. The long-term result of the current research is more encouraging than any of these two studies. Also, there is a recent study reporting that preoperative obstruction itself may not be a poor prognostic marker for stage II/III patients, and curative surgery with adequate surgical margins may be sufficient to obtain good long-term results [30].

Limitations

The non-comparative concept and the limited number of included patients are the shortcomings of the current report. Nevertheless, the reliability and efficacy of STC/TC have been validated.

Conclusion

Emergency STC/TC provide one-stage elimination of bowel obstruction and tumor resection involving a severely dilated and fecal-loaded bowel with circulatory dysfunction. The surgical method ensures restoration of gut continuity *via* a safe ileocolonic/ileorectal anastomosis, allows removal of synchronous tumors and possible adenomas proximal to the index site, bears acceptable mortality and morbidity rates and produces satisfactory postoperative functional outcomes.

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