

Our five-year clinical experience of colorectal tumors located in the transverse colon

Transverse colon cancers

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Abstract

Aim: Treating transverse colon cancer surgically can involve either extended colectomy or segmental resection, depending on tumor location and surgeon preference. This study explores our tertiary care center's surgical approaches to transverse colon cancer.

Material and Methods: We analyzed patients with transverse colon adenocarcinoma who underwent curative transverse or segmental colectomy (2016-2021). Data included demographics, clinical presentation, surgical details, lymph node dissection, pathology, post-op outcomes, and survival.

Results: This research included 15 patients (5 transverse colectomy, 10 extended hemicolectomy). Demographics were similar between groups. Minimally invasive surgery rates were 20% (transverse colectomy) and 40% (extended hemicolectomy). Operation time, anastomotic technique, and hospital stay didn't significantly differ. Surgical site infection was the most common complication for both groups. Extended hemicolectomy yielded more dissected lymph nodes ($p=0.028$), but malignant lymph node count was similar. Pathology stages were not statistically different between groups, and average survival times were comparable.

Discussion: Our study suggests similar postoperative outcomes for transverse colectomy and extended colectomy in transverse colon cancer. While extended colectomy yielded more lymph nodes, this didn't significantly impact long-term survival. With careful patient selection, both techniques appear safe and feasible, despite the limited patient numbers in our study.

Keywords

Colon Cancer, Transverse Colon, Adenocarcinoma, Prognosis

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Introduction

In 2018, global estimates projected over 1.8 million new cases of colorectal cancer (CRC) and 881,000 resultant deaths, positioning CRC as the third most commonly diagnosed cancer, contributing to 10.2% of cases, and the second leading cause of cancer mortality, responsible for 9.2% of such deaths [1]. Transverse colon cancer (TCC) is characterized in scholarly texts as tumors situated between the hepatic and splenic flexures, constituting a relatively infrequent occurrence, representing about 10% of colorectal cancers [2]. The transverse colon, embryologically derived from two-thirds midgut and one-third hindgut, shares certain features with right colon cancer (RCC) and others with left colon cancer (LCC). The intricate anatomy and embryology of the transverse colon render its mobilization and resection a procedurally challenging task [3, 4].

The surgical treatment of TCC is subject to ongoing discourse. Surgical intervention remains a pivotal element in colon tumor management. Both transverse colectomy and extended hemicolectomy are viable options for TCC. The definitive best surgical approach for TCC, however, has yet to be established. The decision between these two approaches largely hinges on the surgeon's discretion and experience, in the absence of consistent comparative data. A key point of contention in this debate is whether segmental colectomies or extended hemicolectomies offer superior outcomes in terms of higher lymph node yield, increased separation between the tumor and central vasculature, and, as a result, improved disease-free survival (DFS) via a more comprehensive mesocolic excision [5-8].

In summary, these factors contribute to the complexity of standardizing transverse colon surgery and often lead to the exclusion of this patient group from numerous randomized controlled trials [9-11]. In our retrospective series at a tertiary center, we examined the optimal surgical approach for TCC by comparing outcomes between extended hemicolectomy and transverse colectomy.

Material and Methods

This study encompassed patients diagnosed with adenocarcinoma, who underwent segmental transverse colectomy or extended hemicolectomy as curative surgical treatment, with the primary tumor focus in the transverse colon, during the period from 2016 to 2021. Excluded from the study were individuals under the age of 18, patients with non-adenocarcinoma pathology, those who underwent subtotal colectomy or total proctocolectomy, and cases with incomplete follow-up data. Patient data were collected from clinical follow-up records, postoperative tracking forms, and pathology reports. Analyzed data included demographic information, presenting symptoms, preoperative levels of hemoglobin (HGB in g/dL), albumin (g/dL), tumor marker levels, American Society of Anesthesiologists (ASA) score, history of abdominal surgery, details of the surgical technique employed, number of dissected lymph nodes, pathological stage, postoperative outcomes, and current clinical status.

Tumor staging was conducted using the American Joint Committee on Cancer (seventh edition) staging system. All patients with colon cancer underwent CT or colonoscopy prior

to surgery for tumor localization. If radiological localization was unclear, preoperative colonoscopy was performed for marking. Preoperative preparation included mechanical bowel preparation and oral antibiotic therapy. Intravenous antibiotics were administered during surgery and continued for 48 hours postoperatively. The surgical procedure for transverse colon cancer was selected based on the tumor's location. Extended colectomies encompassed both extended right and left hemicolectomies. Tumors located at the hepatic flexure or within 10 cm distally were treated with extended right hemicolectomy, while those at the splenic flexure or within 10 cm proximally were treated with extended left hemicolectomy. Tumors situated between these two locations were addressed with transverse colectomy. Extended right hemicolectomy was defined as a mesocolic excision with ligation at the origin of the ileocolic, right colic, and middle colic vessels; extended left hemicolectomy was similarly defined, involving ligation at the origins of the left colic and middle colic vessels. Transverse colectomy entailed lymphadenectomy with ligation at the origins of the middle colic vessels. The choice of laparoscopic surgical technique was based on individual preference. Indications for adjuvant chemotherapy and chemotherapy regimens were based on the National Comprehensive Cancer Network (NCCN) guidelines. Postoperative follow-ups were routinely conducted at our clinic, initially every 3 months for the first 2 years, then every 6 months for the next 3 years, and subsequently once a year for 5 years.

Statistical Analysis

The collected numerical data from patients who underwent surgery for colon cancer were initially assessed for normal distribution adherence using the Shapiro-Wilk test. For data not conforming to normal distribution, the Mann-Whitney U test was employed for bi-group comparisons in non-parametric analysis. Conversely, for data adhering to normal distribution, the Independent t-test was utilized.

Categorical variables were analyzed using the Chi-square test. A significance level was set at $p < 0.05$. Survival analysis was conducted using the Kaplan-Meier method. Furthermore, the Cox regression model was applied to evaluate the survival function of continuous variables. This model was also used for both univariate and multivariate analyses to identify factors influencing survival. Additionally, linear regression analysis was employed to ascertain the impact of independent variables on the continuous dependent variable.

Ethical Approval

This study was approved by the Ethics Committee of Cukurova University (Date: 2023-11-03, No: 138/28).

Results

Our study included 15 patients, divided into two groups: Group 1 consisted of 5 patients who underwent transverse colectomy, and Group 2 comprised 10 patients who underwent extended hemicolectomy. Of these, 7 were female, with an average age of 65.8 years and a mean Body Mass Index (BMI) of 27.67. The median preoperative CEA level was 4.6 (range 0-1438). The most common presenting symptom was abdominal pain (60%), and the most frequent ASA score was ASA2 (53%). The demographic and clinical data are presented in Table 1.

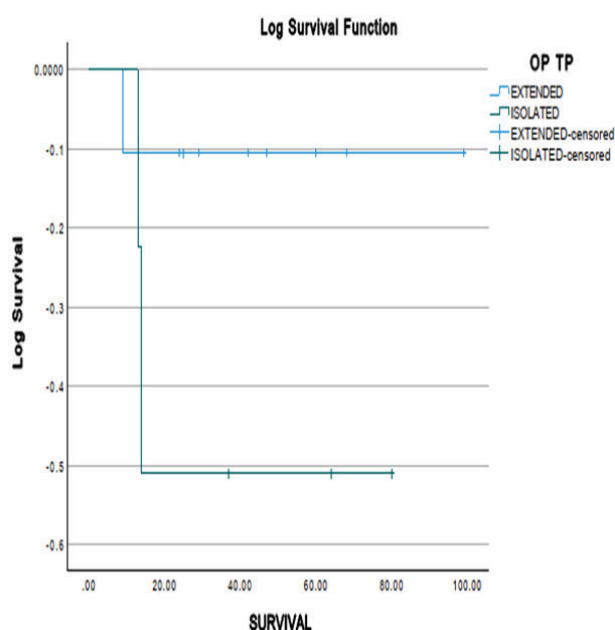


Figure 1. Survival analysis

Table 1. Demographic and Clinical Data of Patients

Variable	Data
Total Number of Patients (n)	15
Gender Distribution (Male/Female)	8.7
Age (Years)	Mean: 65.8 (Range: 56-74)
Body Mass Index (BMI)	27.67 ± 6.62
Preoperative Hemoglobin (g/dL)	11.2 ± 1.73
Preoperative Albumin (g/dL)	3.3 ± 0.5
Preoperative CEA (Median)	4.6 (Range: 0-1438)
Preoperative CA19-9 (Median)	18 (Range: 2.5-2000)
Presenting Symptoms	
- Abdominal Pain	9
- Rectal Bleeding	3
- Anemia	3
- Constipation	3
- Ileus	1
- Incidental Findings	1
ASA Score Distribution	
- ASA 1	3
- ASA 2	8
- ASA 3	3
- ASA 4	1

Table 2. Operative details

	Group 1: Transverse Colectomy	Group 2: Extended Hemicolectomy	p value
Previous Abdominal Surgery	3 (60%)	3 (30%)	0.264
Type of Operation:			
- Open	4	6	0.439
- Laparoscopic	1	4	
Operation Duration (minutes)			
- Open	156.2	180	0.310
- Laparoscopic	170	246.2	
Anastomosis Technique			
- Stapler	2	8	0.121
- Handsewn	3	2	

The history of previous abdominal surgery was similar across the groups (p=0.264). The rate of minimally invasive surgery was 20% in Group 1 and 40% in Group 2. The duration of the operation and the technique of anastomosis were comparable across the groups (p>0.05), as shown in Table 2.

In the postoperative period, the length of hospital stay was not related to the type of operation or technique used in either group. The most common complication in both groups was surgical site infection (60% in Group 1 vs 40% in Group 2, p=0.990). The average number of dissected lymph nodes was higher in Group 2 (13 vs. 19.5, p=0.028), but the number of malignant lymph nodes was similar. The distribution of pathological stages was also similar across the groups (p=0.049), as demonstrated in Table 3.

Survival times were, Group 1 Mean+std 55.08+14.87 95%CI (25.93-84.23) Group 2 Mean+std 91.9+8.72 95%CI (65.48-101.32) (p=0.219), with the survival rates depicted in 4 and Figure 1.

Discussion

In this study presenting surgical outcomes in transverse colon cancer, we found similar postoperative complication rates between transverse colectomy and extended colectomies. As anticipated, the number of dissected lymph nodes was higher in the extended colectomy group, yet no significant difference was observed in long-term survival rates.

Distinct from right and left colon cancers, transverse colon cancer necessitates various surgical approaches based on localization. These include subtotal colectomy, extended right or left hemicolectomy, right or left hemicolectomy, transverse colectomy, and segmental resection such as splenic flexure colectomy. Two main issues pertain to the surgical approach to transverse colon cancer: the extent of resection and the

Table 3. Postoperative Period

	Group 1: Transverse Colectomy	Group 2: Extended Hemicolectomy	p value
Postoperative Hospital Stay (Days)			
- Open Surgery	8	12.6	0.679
- Laparoscopic Surgery	30	6.5	
Complications			
- Anastomotic Leak	0	1	0.990
- Intra-abdominal Abscess	0	1	
- Ileus	1	0	
- Evisceration	1	0	
- Reoperation	1	0	
- Surgical Site Infection	3	4	
Number of Lymph Nodes (Median)			
- Total	13 (7-15)	19.5 (11-64)	0.028
- Malignant	0 (0-2)	0 (0-1)	0.513
Pathological Stage			
- Stage 1	2	2	0.494
- Stage 2	1	4	
- Stage 3	2	2	
- Stage 4	0	2	
Current Clinical Status			
- Alive	3	9	0.171
- Deceased	2	1	

minimally invasive approach [11].

Morarasu et al., in their meta-analysis comparing the outcomes of extended and segmental resections, involved a total of 3995 patients. Their analysis revealed that segmental resection offered better outcomes in terms of operation duration and postoperative ileus. Conversely, extended resection had advantages in terms of anastomotic leak and the number of dissected lymph nodes. They demonstrated that hospital stay duration, disease recurrence, and overall survival were similar between the two procedures [12]. Contrarily, a study utilizing the United States National Cancer Database found that extended surgery resulted in poorer survival, specifically indicating that extended operations in the mid transverse colon led to worse long-term outcomes. This study suggested that extended colectomy did not confer a survival advantage over segmental resection [13]. Our study, diverging from the literature, showed similar postoperative complications for both surgical techniques, which could be attributed to the limited number of patients. We found no differences in survival, which we associate with adequate lymph node dissection and proper management in the postoperative period.

Literature has demonstrated that, in colon cancer surgery, the laparoscopic technique offers significant benefits over open surgery, including shorter hospital stays, reduced postoperative pain, and similar oncological outcomes with a quicker return to normal activities. However, it's noteworthy that patients with transverse colon tumors are often excluded from these randomized studies [14, 15]. In their meta-analysis, Athanasiou et al. examined the outcomes of the laparoscopic approach in transverse colon cancer. Their study indicated that the laparoscopic approach maintains crucial advantages seen in right and left colectomy techniques, such as shorter hospital stays and equivalent times to transition to an oral diet, as well as comparable overall and disease-free survival. These benefits continued in the extended lymphadenectomy group. They also found equivalent rates of local recurrence and development of metastatic disease between the two groups [16]. In our series, a third of the patients underwent a laparoscopic approach. We found the operation duration to be similar across both techniques, which we attribute to the completion of our institutional learning curve. The choice of surgical approach was not influenced by the type of operation.

Limitation

The limitations of our study include a limited number of patients and its retrospective nature. In our single-center study, individual decisions also influenced the choice of surgical technique.

Conclusion

Transverse colon cancer is a technically challenging and relatively rare malignancy to resect. The surgical management of transverse colon cancer necessitates personalized approaches, taking into account the surgeon's skills, patient anatomy, and tumor status. Although our study found similar postoperative and oncological outcomes between the two surgical techniques, multicenter prospective randomized studies are needed to elucidate the comparative advantages of surgical techniques in transverse colon cancer. Both surgical techniques can be safely applied in transverse colon cancer. Adhering to

oncological principles such as adequate margins and sufficient lymph node harvest appears to be more critical than the choice of the surgical approach itself, which should be selected based on the surgeon's preference and proficiency in each approach.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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