

## Evaluation of colorectal cancer surgeries performed in three years

## Üç yılda yapılan kolorektal kanser ameliyatlarının değerlendirilmesi

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## ABSTRACT

**AIM:** This study aimed to present clinicopathological features, surgical characteristics, and short-term outcomes of patients with colorectal cancer who underwent laparoscopic or open surgery.

**MATERIAL AND METHOD:** The data of colorectal cancer cases operated in the General Surgery Department of Eskisehir Osmangazi University Hospital between January 2017 and December 2020 were reviewed retrospectively. Tumor localization, pathological diagnoses, operation types, tumor, tumor invasion, lymph node properties, additional treatments, hemogram tests, length of hospital stay, follow-up time, postoperative complications, recurrence and mortality were analyzed.

**RESULTS:** Patients' age ranged from 36 to 87 years with a median of 66. Open surgery was performed in 79.55% and laparoscopic surgery was performed in 20.45%. The median length of hospital stay was 6 days (IQR: 5–8). Mean follow-up time was 20.52 ± 10.49 months. Postoperative infection was observed in 16.67% and postoperative leakage was observed in 6.82% of the cases. Six patients (5.61%) experienced recurrence. Mortality rate was 17.41%, and early mortality (≤30 days) rate was 3.03%.

**CONCLUSION:** More publications are needed concerning laparoscopic and open colorectal surgery. We believe that it is important for clinics to share their results and experiences in colorectal surgery, and that our results will not only contribute to the literature, but also contribute to the establishment of general surgery clinics which becoming more common in our country.

**Keywords:** Surgical oncology, Gastrointestinal tract, Colorectal cancer, Mortality

## ÖZET

**AMAÇ:** Bu çalışma, laparoskopik veya açık cerrahi uygulanan kolorektal kanserli hastaların klinikopatolojik özelliklerini, cerrahi özelliklerini ve kısa dönem sonuçlarını sunmayı amaçlamıştır.

**GEREÇ VE YÖNTEM:** Ocak 2017 ile Aralık 2020 tarihleri arasında Eskişehir Osmangazi Üniversitesi, Genel Cerrahi Anabilim Dalı'nda ameliyat edilen kolorektal kanser olgularının verileri retrospektif olarak incelendi. Tümör lokalizasyonu, patolojik tanılar, operasyon tipleri, tümör, tümör invazyonu, lenf nodu özellikleri, ek tedaviler, hemogram testleri, hastanede kalış süresi, takip süresi, postoperatif komplikasyonlar, nüks ve mortalite analiz edildi.

**BULGULAR:** Hastaların yaşları ortanca 66 olmak üzere 36 ile 87 arasındaydı. Olguların %79,55'inde açık cerrahi, %20,45'inde laparoskopik cerrahi uygulandı. Ortalama hastanede kalış süresi 6 gündü (IQR: 5-8). Ortalama takip süresi 20.52 ± 10.49 aydı. Olguların %16.67'sinde ameliyat sonrası enfeksiyon, %6.82'sinde ameliyat sonrası kaçak gözlemlendi. Altı hastada (%5.61) nüks görüldü. Mortalite oranı %17,41, erken mortalite (≤30 gün) oranı ise %3,03 idi.

**SONUÇ:** Laparoskopik ve açık kolorektal cerrahi ile ilgili daha fazla yayına ihtiyaç vardır. Kliniklerin kolorektal cerrahide elde ettikleri sonuçları ve deneyimlerini paylaşmalarının önemli olduğunu, sonuçlarımızın literatüre katkı sağlayacağını yanı sıra ülkemizde giderek yaygınlaşan genel cerrahi kliniklerinin kurulmasına da katkı sağlayacağına inanıyoruz.

**Anahtar Kelimeler:** Cerrahi onkoloji, Gastrointestinal sistem, Kolorektal kanser, Mortalite

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## INTRODUCTION

Cancer remains one of the most important health problems around the world. Colorectal cancer is the second most common cancer in women and the third most common cancer in men, and is responsible for approximately 10% of cancer-related deaths in the world.<sup>1</sup> Long-term studies have demonstrated that early diagnosis, accurate decision-making and prompt application of surgery when indicated increase survival rates and quality of life among patients with colorectal cancer. However, there is always room for further improvement by exploring current approaches to diagnosis and treatment.<sup>2</sup>

As with many cancers, surgery is the main treatment for colorectal cancer. With the advances in technology and the knowledge gained as a result, new techniques are emerging and improvements are seen in short and long-term results after treatment.<sup>3-6</sup> Considering the incidence and mortality of colorectal cancer, optimization of treatment methods are of critical importance for patient survival. In colorectal cancer surgery, patients should be operated on without compromising oncological principles in terms of survival and local recurrence. Therefore, it is important to obtain more data on surgical methods being administered in different settings. There is also a need for studies describing approaches in relatively minor clinics, the number of which has been increasing in our country in recent years.<sup>7</sup>

In this study, we aimed to present clinicopathological features, surgical characteristics and short-term outcomes of patients with colorectal cancer who underwent laparoscopic or open surgery in a newly established general surgery clinic, thereby aiming to contribute to existing knowledge regarding the characteristics of colorectal cancer cases encountered in smaller clinics.

## MATERIAL AND METHODS

### Study Population

The data of colorectal cancer cases operated in the Surgical Oncology and Gastroenterology-related Surgery Divisions of the General Surgery Department of Eskisehir Osmangazi University Hospital, between January 2017 and December 2020, were reviewed retrospectively.

Tumor localizations, pathological diagnoses, the types of operation, tumor size, stages and degrees of differentiation, tumor invasion types, number of lymph nodes, additional treatments applied, hemogram test results, length of hospital stay, follow-up time, postoperative complications, recurrence and mortality were analyzed.

### Ethical Approval

The protocol of the present study was reviewed by the Non-Interventional Clinical Research Ethics Committee of Eskisehir Osmangazi University.

## RESULTS

In the study, data concerning a total of 132 patients who were operated for colorectal cancer were reviewed retrospectively. Patients' age ranged from 36 to 87 years and the median age was 66 (IQR: 55.5 – 72). Among the included subjects, 37.12% were females and 62.88% were males. Patient characteristics and laboratory parameters are summarized in

Table 1. Patient characteristics and laboratory parameters.

Age	66 (55.5 - 72)
Gender	
Female	49 (37.12%)
Male	83 (62.88%)
Hemoglobin	12.11 ± 2.22
Hematocrit	37.51 ± 5.92
White blood cell (x1000)	7.40 (6.01 - 9.59)
Neutrophil (x1000)	4.90 (3.68 - 6.59)
Lymphocyte (x1000)	1.46 (0.99 - 2.10)
Platelet (x1000)	287.11 ± 93.69
MPV	9.60 ± 1.16
RDW	15.30 (13.50 - 17.60)

Data are given as mean ± standard deviation or median (1st quartile - 3rd quartile) for continuous variables according to normality of distribution and as frequency (percentage) for categorical variables.

Cancers were located in the rectum in 40.91% of the cases, and in the right colon in 33.33%

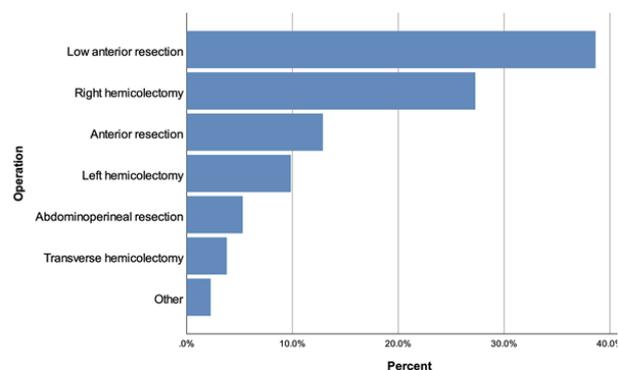


Figure 2. Distribution of operation types

(Figure 1).

Non-mucinous adenocarcinoma was diagnosed in 69.47% of the cases, and mucinous adenocarcinoma in 30.53%. While 43.94% of the cases had lymphovascular invasion, 27.27% had perineural invasion. The median number of lymph nodes was 22.5 (IQR: 16 – 32). The majority of cases (78.63%) demonstrated moderate differentiation. While 15.91% of the cases received neoadjuvant radiotherapy, 12.12% received neoadjuvant chemotherapy. Liver metastasis was identified in 21.97% of cases. Open surgery was performed in 79.55% of the cases, while laparoscopic surgery was performed in 20.45%. When the number of cases according to operation types were analyzed, the most common operation was low anterior resection (38.64%), followed by right hemicolectomy (27.27%) and anterior resection (12.88%) (Figure 2). Tumor characteristics are depicted in

Table 2. Tumor characteristics.

<b>Location</b>	
Right colon	44 (33.33%)
Transverse colon	10 (7.58%)
Descending colon	11 (8.33%)
Sigmoid colon & rectosigmoid region	13 (9.85%)
Rectum	54 (40.91%)
<b>Pathological diagnosis</b>	
Non-mucinous adenocarcinoma	91 (69.47%)
Mucinous adenocarcinoma	40 (30.53%)
Tumor size	41.5 (27 - 60)
Number of lymph nodes	22.5 (16 - 32)
Number of metastatic lymph nodes	0 (0 - 2)
<b>Differentiation</b>	
Poor	11 (8.40%)
Moderate	103 (78.63%)
Well	17 (12.98%)
Synchronous carcinoma	8 (6.06%)
Radial surgical margin positivity	0 (0.00%)
Distal surgical margin positivity	0 (0.00%)
Perineural invasion	36 (27.27%)
Lymphovascular invasion	58 (43.94%)
<b>T stage</b>	
T1	7 (5.34%)
T2	21 (16.03%)
T3	80 (61.07%)
T4	23 (17.56%)
<b>N stage</b>	
N0	79 (60.31%)
N1	36 (27.48%)
N2	16 (12.21%)
<b>Stage</b>	
Stage 1	21 (16.03%)
Stage 2	43 (32.82%)
Stage 3	35 (26.72%)
Stage 4	32 (24.43%)
Neoadjuvant radiotherapy	21 (15.91%)
Neoadjuvant chemotherapy	16 (12.12%)
Complete pathological response	1 (0.76%)
Liver metastasis	29 (21.97%)
<b>Type of surgery</b>	
Laparoscopy	27 (20.45%)
Open surgery	105 (79.55%)
<b>Operation</b>	
Right hemicolectomy	36 (27.27%)
Transverse hemicolectomy	5 (3.79%)
Left hemicolectomy	13 (9.85%)
Anterior resection	17 (12.88%)
Low anterior resection	51 (38.64%)
Abdominoperineal resection	7 (5.30%)
Other	3 (2.27%)
Ostomy	48 (36.36%)
Additional resection	3 (2.27%)
Ileum	2 (1.52%)
Partial cystectomy	1 (0.76%)

The median length of hospital stay was 6 days (IQR: 5–8). Mean follow-up time was 20.52 ± 10.49 months. With regard to complications, postoperative infection was observed in 16.67% of the cases, and postoperative leakage was observed in 6.82% of the cases. Recurrence was observed in 6 (5.61%) subjects. Mortality rate was 17.41%, while early mortality (≤30 days) rate was 3.03% (Table 3).

Table 3. Postoperative outcomes of patients

Length of stay in hospital, days	6 (5 - 8)
Follow-up time, months	20.52 ± 10.49
Postoperative leakage	9 (6.82%)
Postoperative infection	22 (16.67%)
Recurrence	6 (5.61%)
Mortality	23 (17.42%)
Early mortality (≤30 days)	4 (3.03%)

Data are given as mean ± standard deviation or median (1st quartile - 3rd quartile) for continuous variables according to normality of distribution and as frequency (percentage) for categorical variables.

## DISCUSSION

In recent years, the development of new surgical methods has increased the survival rate and quality of life of patients with colorectal cancer, and many studies have been conducted on patients undergoing colorectal cancer surgery. Our study supports prior research in showing that the number of male patients diagnosed with colorectal cancer is higher than females, and that they also have higher morbidity and mortality.<sup>8</sup> When we evaluated tumor localizations,

the most common site was the rectum, followed by the right colon, and the majority of the cases were diagnosed as non-mucinous adenocarcinoma. These were also in agreement with the majority of other studies; however, of note, the study by Mastalier et al. which assessed colon cancer cases, reported higher frequency of left-sided lesions—particularly in the sigmoid colon.<sup>9</sup> In most cases, we found the tumor to be well differentiated, and other studies mostly found well or moderate differentiation.<sup>10,11</sup> Taken together, it is evident that newly established clinics also encounter patients with characteristics that are similar to that demonstrated by large studies in the literature. Although this result might be associated with the fact that our clinic was established at a university hospital which would increase the likelihood of patients being referred for treatment, it must still be taken into account when planning the establishment of a surgical clinic.

Although open surgery was used at a frequency of approximately 80% in our study, similar to preferences demonstrated in the majority of previous studies, laparoscopic surgery is becoming more common day by day; in fact, laparoscopic surgery is recommended as the primary treatment for colorectal cancer in terms of patient satisfaction.<sup>12</sup> In many studies, the clinical efficacy of laparoscopic surgery was found to be higher, and the short- and long-term results were similar or better when compared to open surgery.<sup>13,14</sup> In addition, laparoscopic surgery has advantages such as reduced intraoperative blood loss, less pain, shorter length of hospital stay, lower postoperative complication rate, and faster postoperative recovery.<sup>15–17</sup> On the other hand, the disadvantages are higher costs and longer surgery times. Despite similar or better results and various advantages associated with laparoscopic surgery, open surgery is still widely used in the treatment of colorectal cancer. The most important reason for this is the technical difficulties in the application of laparoscopic surgery.<sup>11,18</sup> The median lymph node count in our study was 22.5 (IQR: 16–32) and no surgical margin positivity was detected. In the study by Bonjer et al., mean lymph node count was 11.8 ± 7.4 in laparoscopically resected specimens and 12.2 ± 7.8 in open surgery specimens. In addition, surgical margin positivity was 2.1% in open surgery specimens and 1.3% in laparoscopically resected specimens.<sup>19</sup> It has been stated that lymphovascular and perineural invasion negatively affects survival in colorectal cancer cases and neoadjuvant chemotherapy may be effective especially when lymphovascular and perineural invasion is present. In our study, the incidence was 27.27% for perineural invasion and was 43.94% for lymphovascular invasion. In the study by Skancke et al., the incidence was 3.8% for perineural invasion and 11.4% for lymphovascular invasion. In addition, mean hospital stay was 6 (IQR: 5–8) days. This result was compatible with the literature.<sup>11,20,21</sup> Postoperative complications, especially infectious complications, have been associated with an increase in recurrence and mortality (Law). In our study, postoperative infection was detected in 16.67% of the cases, and postoperative leakage was detected in 6.82% of the cases. In the study by Panis et al., including 44,000 patients, 30-day mortality was found to be 5%. This is higher than the 3% value in our study. In addition, they stated that being older than 70 years, having undergone emergency surgery, presence of synchronous liver metastasis, malnutrition, and respiratory, neurological or vascular comorbidities were risk factors associated with 30-day mortality. Furthermore, they suggested that the laparoscopic method was associated with a decrease in postoperative 30-day mortality.<sup>22</sup>

## Study Limitations

Despite reporting the characteristics of patients with colorectal cancer in a newly-established clinic, and thereby providing data for clinical purposes in similar centers, our study has some limitations. Firstly, our clinic was a newly established clinic and patients with cancers requiring long-term follow-up might have been relatively rare, possibly introducing a selection bias. However, ours was a university hospital and referrals from other centers would have limited this effect. Secondly and in relation with the prior point, simple and more common cancers whose treatment could be carried out in secondary healthcare centers may have been underrepresented in our study. Finally, our study was a single-centered and long-term results could not be evaluated; thus, mortality-related findings and long-term complications may not have been completely accounted for—despite a mean follow-up duration exceeding 20 months.

## CONCLUSION

In conclusion, minimally invasive methods are becoming more common day by day, but open surgery is still widely used worldwide, as demonstrated by our findings. Therefore, more information and publications about laparoscopic and open colorectal surgery are needed. We believe that it is important for clinics to share their results and experiences in colorectal surgery, and that our results will contribute to the establishment and planning of relatively minor

general surgery clinics that have become widespread in our country in recent years, as well as contributing to the literature.

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