

**SURGICAL OUTCOMES IN ELDERLY PATIENTS WITH OBSTRUCTED COLORECTAL CANCER: SINGLE CENTER EXPERIENCE****OBSTRUKSİYONA NEDEN OLMUŞ KOLOREKTAL KANSERLİ YAŞLI HASTALARDA ACİL CERRAHİ SONUÇLARI: TEK MERKEZ DENEYİMİ**

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**ABSTRACT**

**AIM:** Colorectal cancer is the most common cause of large bowel obstruction in elderly. The aim of this study is to compare the clinical findings and perioperative outcomes of elder and younger colorectal cancer patients who were urgently operated for obstruction in our department.

**MATERIAL AND METHOD:** The files of patients who underwent emergency surgery for acute mechanical bowel obstruction due to colorectal cancer between January 2015 and December 2019 at the Sakarya University School of Medicine, Department of General Surgery were retrospectively reviewed.

**RESULTS:** A total of 187 patients who had emergency operation due to colorectal cancer-related obstruction in a 5-year period were included. 55.6% (n = 104) were over the age of 65, 46.4% (n = 83) were under the age of 65. ASA scores, tumor localization, and mean total hospital stay, duration of intensive care unit stay were statistically different between the two groups (p <0.05, p <0.022, p = 0.011). No significant difference detected in terms of mortality (p = 0.103).

**CONCLUSION:** Obstructive colorectal cancers in geriatric patients who require emergency surgery form a more challenging group than the elective conditions. Our study shows that similar outcomes can be achieved in terms of postoperative complications, early mortality and oncological principles; with the younger cohort.

**Keywords:** Colorectal cancer, elderly, emergency surgery, large bowel obstruction.

**ÖZET**

**AMAÇ:** Kolorektal kanserler, yaşlılarda kalın bağırsak tıkanıklığının en yaygın nedenidir. Bu çalışmanın amacı, bölümümüzde acil olarak obstrüksiyon nedeniyle ameliyat edilen yaşlı ve genç kolorektal kanserli hastaların klinik bulgularını ve perioperatif sonuçlarını karşılaştırmaktır.

**GEREÇ VE YÖNTEM:** Sakarya Üniversitesi Tıp Fakültesi Genel Cerrahi Anabilim Dalı'nda, Ocak 2015-Aralık 2019 tarihleri arasında, kolorektal kansere bağlı akut mekanik barsak tıkanıklığı nedeniyle acil ameliyat edilen hastaların dosyaları retrospektif olarak incelendi.

**BULGULAR:** 5 yıllık sürede, kolorektal kansere bağlı tıkanıklık nedeniyle acil ameliyat olmuş toplam 187 hasta çalışmaya dahil edildi. Olguların %55,6 'sı (n = 104) 65 yaş üzerinde, %46,4'ü (n = 83) 65 yaşın altındaydı. ASA skorları, tümör lokalizasyonu, ortalama toplam hastanede kalış süresi ve yoğun bakımda yatış süresi iki grup arasında istatistiksel olarak farklıydı (p <0.05, p <0.022, p = 0.011). Mortalite açısından gruplar arasında anlamlı bir fark saptanmadı (p = 0.103).

**SONUÇ:** Acil cerrahi gerektiren geriatric hastalarda obstrüktif kolorektal kanserler, seçici koşullara göre daha zorlayıcı bir grubu oluşturmaktadır. Çalışmamız, geriatric gruptaki hastalarda postoperatif komplikasyonlar, erken mortalite ve onkolojik prensipler açısından genç grup ile benzer sonuçların elde edilebileceğini göstermektedir.

**Anahtar Kelimeler:** Kolorektal kanser, yaşlı, acil cerrahi, kalın barsak tıkanıklığı.

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## INTRODUCTION

Colorectal cancers are the third most common cause of cancer worldwide and the fourth most common cause of cancer-related deaths. More than half of the colorectal cancers affect geriatric age group and the incidence increases with the prolonged lifetime (1). Colorectal cancer is the most common cause of large bowel obstruction in elderly. The rate of colorectal tumors causing large bowel obstruction that required surgery is reported 15-30% (2). While mortality is 10% in patients who are surgically treated for obstruction in all age groups, the rate is 22% due to the comorbidities in the geriatric age group (3). There exist a limited number of studies informing about elder patients, with obstruction due to colorectal cancer who required immediate surgery (4). The aim of this study is to compare the clinical findings and perioperative outcomes of elder and younger colorectal cancer patients who were urgently operated for obstruction in our clinic.

## MATERIAL and METHODS

The files of patients, who underwent emergent surgery for acute mechanical bowel obstruction due to colorectal cancer between January 2015 and December 2019 at the Sakarya University Faculty of Medicine General Surgery Department were reviewed retrospectively. The diagnosis of obstruction was made clinically and radiologically. The emergency operation criteria were, determined as the cases admitted to the emergency department with ileus findings and hospitalized and operated within 48 hours. The time assessment used in; emergency operation identification was 48 hours according to the 'Timing of Acute Care Surgery classification proposed by the World Society of Emergency Surgery' study (5). Patients who underwent endoscopic treatment and those who were operated surgically but whose histopathological diagnosis was revealed non-tumor causes were excluded from the study. The cases included in the study were divided into two main groups over 65 and under. Data of all cases were recorded in terms of gender, age, ASA score, co-morbidities, surgical procedure performed, tumor localization, histopathological results, type of operation, morbidity and early mortality. Postoperative complications were listed according to Clavien-Dindo classification (6). Histopathological results were reviewed in terms of tumor type, T and N stage, surgical margin positivity and number of harvested lymph nodes. According to the histopathologic reports, cases with surgical margin negativity and 12 or more lymph nodes, were accepted appropriately treated according to oncological principles. Ostomy procedure was applied to the patients who required neoadjuvant therapy and though R1 resection could not be achieved.

Descriptive analyses were performed to provide information on the general characteristics of the study population. The numeric variables were presented as mean  $\pm$  standard deviation. Categorical variables were presented as a count and percentage. All of the

analyses were performed using IBM SPSS Statistics version 25.0 software (IBM Corp.; Armonk, NY, USA). The normality of the data was determined by the Shapiro-Wilk test. Mann-Whitney U test was used for the variables that did not follow a normal distribution; Student's t-test was used for the variables that followed a normal distribution. Categorical variables analyzed by Fisher's exact test or Pearson Chi-Square test. A p-value  $<0.05$  was considered significant.

The study was approved by the Sakarya University Ethics Committee with the date of 29.05.2020 and the number 295.

## RESULTS

A total of 187 patients who had emergent operation due to colorectal cancer-related obstruction in a 5-year period were included in the study. 55.6% (n = 104) of the cases were over the age of 65, 46.4% (n = 83) were under the age of 65, the average age was  $56.38 \pm 12.39$  years (27-94). The demographic, clinical and pathological findings of the patients are summarized in **Table 1**. There was no significant difference in gender between the two groups (p = 0.82). As expected, co-morbidities were more common in patients over 65 years of age (60.5% vs 36.1%), but no statistical difference was found between the two groups (p > 0.05). The most common comorbidity was hypertension with 37.4%. While the rate of patients with at least 2 or more co-morbidities in the age group over 65 was 34.6%, this rate was 21.6% in the group under 65 years of age the rate of ASA 4-5 was 0% under 65 years of age and 32% over 65 years of age. There was a statistically significant difference between the two groups in terms of ASA score (p < 0.05). There was a statistically significant difference between the two groups in terms of tumor localization (p < 0.042). Caecum was the tumor localization in 32% of the patients below 65 years of age, the major localization in 49% of the patients over 65 were the splenic flexura and more distal parts (**Table 2**). Tumor type was reported as adenocarcinoma in all cases. No statistically significant difference was found between the two groups in terms of T stage and N stage (T: p=0.97, N: p=0.35). The proportion of T3-T4 stage cancers was not different between the two groups and most of the cases had advanced stage tumors in both groups (elderly 94.2%, non-elderly 96.4%). pN2 rates were 19.2% and 22.8% in the elderly and non-elderly, respectively.

The number of lymph nodes collected was found  $15.26 \pm 6.18$  vs  $15.83 \pm 5.85$ , respectively in the elderly and non-elderly group (p = 0.80) and there was no statistically significant difference between the two groups. When the number of lymph nodes collected in terms of curative surgery was compared, the rates of patients with 12 or more lymph nodes were 86.6% and 84.4% in the elderly and non-elderly. There was no statistical difference between the two groups (p = 0.80). There was no significant difference between the two groups in terms of surgical procedure (p = 0.071).

**Table 1 : The demographic, clinical and pathological findings of the patients**

	<b>Elderly N (%) (n=104)</b>	<b>Non-elderly N (%) (n=83)</b>	<b>Total N (%) (n=187)</b>	<b>P Value</b>
<b>Mean Age</b>	84±8.16	53±8.39	56.38± 12.39	NS
<b>Gender</b>				0.82
Male	70 (67.3)	48 (7.8)	118 (63.1)	
<b>Female</b>	34 (32.49)	35 (42.2)	69 (36.8)	
<b>ASA Score</b>				<0.05
1	8 (80)	2 (20)	10 (5.4)	
2	24 (39.4)	37(60.6)	61(32.6)	
3	41(49)	43(51)	84(45)	
4	32(100)	0	32(17)	
<b>Comorbidities</b>				>0.05
<b>Hypertension</b>	47 (45.1)	23 (27.7)	70 (37.4)	
Diabetes	16 (15.3)	9 (10.8)	25 (13.3)	
Respiratory disease	9 (8.65)	5 (6.02)	14 (7.48)	
Cardiovascular disease	10 (9.61)	2 (2.4)	12 (6.41)	
Renal Failure	3 (2.88)	1 (1.2)	4 (2.13)	
<b>CVD</b>	9 (8.65)	1 (1.2)	10 (5.34)	
<b>T</b>				0.97
1	1 (0.96)	1 (1.2)	2 (1.06)	
2	5 (4.8)	2 (2.4)	7 (3.74)	
3	57 (54.8)	47 (56.6)	104 (55.6)	
4	41 (39.4)	33 (39.7)	74 (39.5)	
<b>N</b>				0.35
0	50 (48.01)	37 (44.57)	87 (46.52)	
1	33 (31.79)	23 (27.7)	66 (35.2)	
2	21(20.19)	23 (27.7)	44 (23.52)	
<b>Number of Harvested Lymph No- des</b>	15.26±6.18	15.83±5.85,	15.7±5.9	0.8
<b>12 or more lymph nodes</b>	90 (86.6)	70 (84.4)	160 (85.5)	
<b>Surgical approach</b>				>0.05
Laparoscopic	1 (0.53)	5 (2.67)	6 (3.2)	
<b>Open</b>	103 (99.47)	78 (97.33)	181 (96.8)	
<b>Mortality</b>	12 (75)	4 (25)	16 (8.55)	0,103
<b>Length of stay in hospital</b>	11.6±8.03	9.65±5.31	10.7±7.02	0,022
<b>Length of stay in ICU</b>	4.46±5.8	1.15±2.46	2.5±4.44	0,011

ASA: American Society of Anesthesia, CVD: Cerebro Vascular Disease ICU: Intensive Care Unit

**Table 2: Tumor Localization**

<b>Tumor Localization</b>	<b>Elderly N (%) (n=104)</b>	<b>Nonelderly N (%) (n=83)</b>	<b>Total N (%) (n=187)</b>
<b>Caecum</b>	16 (8.6)	28 (15)	44 (23.5)
Ascending colon	4 (2.1)	4 (2.1)	8 (4.2)
Hepatic flexure	11 (5.9)	9 (4.8)	20 (10.6)
<b>Transverse colon</b>	3 (1.6)	5 (2.7)	8 (4.3)
Splenic flexure	19 (10.2)	6 (3.2)	25 (13.4)
Descending colon	5 (2.7)	4 (2.1)	9 (4.8)
<b>Sigmoid colon</b>	25 (13.4)	12 (6.4)	37 (19.8)
Rectum	21 (11.2)	15 (8)	36 (19.2)

The right and left hemicolectomy rates were similar in both groups (54% nonelderly / 65% elderly, respectively). Hartmann's procedure was more frequently performed in the elder group (45.1% vs 18%), while left colorectal resection with protective ileostomy in the elder group was 3.8%, and 5.7% in the non-elder group. A total of 5 patients who underwent

ostomy without surgical resection were also listed (4 sigmoidostomy / 1 ileostomy) (Table 3). There was no difference between the two groups in terms of surgical procedure (open resection vs laparoscopic resection). Laparoscopic surgery was performed at the rate of 0.53% in the elder group and 2.67% in the non-elder group.

**Table 3: Type of Operations**

Type of Operations	Elderly N (%) (n=104)	Non-elderly N (%) (n=83)	Total N (%) (n=187)
<b>Right hemicolectomy</b>	34 (43.6)	44 (56.4)	78 (41.7)
Left Hemicolectomy	7 (6.73)	9 (10.8)	16 (8.55)
Left Hemicolectomy + Hartmann procedure	25 (24.03)	4 (4.81)	29 (15.5)
<b>Anterior resection</b>	5 (4.8)	5 (6.02)	10 (5.3)
Anterior resection + Hartmann procedure	9 (8.65)	3 (3.61)	12 (6.41)
Low Anterior <b>Resection</b>	5 (4.8)	3 (3.61)	8 (4.27)
Low Anterior Resection + Hartman procedure	12 (11.5)	8 (9.63)	20 (10.6)
Low Anterior Resection + Diverting Loop Ileostomy	5 (4.8)	4 (4.81)	9 (4.81)
Ostomy	3 (2.88)	2 (2.4)	5 (2.67)

**Table 4 : Postoperative Complications**

Postoperative Complications	Elderly N (%) (n=104)	Nonelderly N (%) (n=83)	Clavien-Dindo Classification
<b>Surgical site infections</b>	15 (14.4)	17 (20.4)	2,3b
Anastomotic leak	6 (5.7)	7 (8.4)	3b,5
Intraabdominal Abscess	2 (1.92)	0	3a
<b>Evisceration</b>	3 (2.88)	0	3b
Necrotizing fasciitis	1 (0.96)	0	3b
<b>Pleurisy</b>	2 (1.92)	0	2
Stoma complications	0	2 (2.4)	3b
Atelectasis	0	1 (1.2)	2
Ileus	0	1 (1.2)	2

The mean total hospital stay was  $10.7 \pm 7.02$  (3-73 days) (elderly  $11.6 \pm 8.03$  / non-elderly  $9.65 \pm 5.31$ ) and the difference was statistically significant ( $p < 0.022$ ). A statistically significant difference was also found between the two groups in favor of the elderly in terms of the duration of intensive care ( $p = 0.011$ ).

There was no difference between the two groups in terms of complications ( $p = 0.3$ ). In 58 patients (31%, 29 in each group), 9 different complications occurred (**Table 4**). The most common complication was wound infection with 17.1%. 37.9% of the complications was grade 1-2 and 62.1% was grade 3 and above, according to Clavien-Dindo classification. 16 patients (8.55%) died during the first 30 days. There was no significant difference between the two groups in terms of mortality ( $p = 0.103$ ), but 3/4 of the cases with mortality were over 65 years of age (**Table 1**).

## DISCUSSION

The worldwide increase in the elderly population, the increase in the incidence of colorectal cancer in all age groups has increased the incidence of complicated - advanced stage - colorectal cancer cases such as obstruction. In agreement with literature, postoperative complication and mortality data of elderly and emergency surgery patients are worse than elective and young age patients (7).

Age is not the only poor prognostic factor in the evaluation of mortality and short-term outcomes of colorectal surgery (8). However, significantly higher comorbidity in elder patients and more frequent complications such as obstruction reduce the success of surgical treatment. Approximately 3/4 of advanced colorectal cancers causing obstruction in the literature are cases over 65 years of age (9). In our study, although co-morbidity rate was higher in the elder group, no statistical difference was detected between the elder and younger groups. Co-morbidity rate in the geriatric group was 60.5% in accordance with the literature (8). Total mortality rate was compatible with the literature with 8.55% (10). Although the rate of patients with ASA 4-5 score was significantly higher in the elderly group, the mortality rate in elderly patients were not different from the young patients.

In terms of complications, there was no difference between the old and young groups. Postoperative complication rates vary in different series in elder patients operated with colorectal cancer related obstruction (10.3% - 60.9%) (10). In our series, this rate was found to be 27.8%.

While colorectal cancers are reported common in all age groups and males, there was no significant difference in terms of gender in our patients. Almost half of the patients

who participated in the study were female patients. This difference can be explained by the fact that the study includes only the group of patients with colorectal cancer who have been operated for obstruction, as similar studies (11).

The type of surgery to be applied in emergency surgical procedures for colorectal cancer may differ depending on tumor placement, intraoperative findings, patient-related factors and surgical experience (12). In our study, no statistical difference was found between the groups in terms of laparoscopic intervention. The poor medical condition, especially high wand values and excessive comorbid diseases of the elderly group are the reason why almost all of the cases are operated by open method.

The right hemicolectomy and primary anastomosis procedure were preferred in cases that caused obstruction from the right side 41.4% (n = 78), which is the widely accepted surgical option. The incidence of leak detected in cases was 2.56% (n = 1) and is consistent with the literature (13).

Obstruction is a frequent symptom in colorectal tumors originating from the left colon. In our study, in accordance with the literature, tumors were located in the right side under the age of 65 and in the left side in the elder group with a significant difference (14). The Hartman procedure, which serves a rapid operation and does not involve anastomosis leakage risk; was frequently used in the left-side obstructive tumors in elder patients. However, in recent years, increasing number of studies have indicated the applicability of resection and anastomosis even in elderly and complicated cases according to suggested single-stage oncological principles (15). Many authors also argue that a single-stage surgery option should be applied in selected cases, findings in our study is also compatible with this argument (16).

The most important point that determines the curative treatment success of colorectal cancers is, to perform surgical resection according to oncological principles. It is accepted that the number of lymph nodes collected for correct staging should be 12 and above (17). Advanced age and emergency operation have been reported as negative factors for collecting the exact the number of lymph nodes, in many studies (18,19). Our findings are consistent with the reported rates in the literature regarding these items: The number of lymph nodes collected, en-block resection according to oncological principles and surgical margin negativity, which altogether reflects the applicability of curative resection in both elder and emergency operation group (20,21).

As a conclusion, obstructive colorectal cancers in geriatric patients who require emergency surgery form a more challenging group than the elective conditions. Our study shows that similar outcomes can be achieved in terms of postoperative complications, early mortality and oncological principles; with the younger cohort. We suggest it is worth to perform appropriate surgical

treatment in elder and emergent colorectal cancer cases. The limitations of this study may be small sample size and retrospective design. Prospective randomized studies in geriatric patients with similar clinical status are needed to achieve more reliable results.

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## REFERENCES

- 1) Douaiher J, Ravipati A, Grams B, et al. Colorectal cancer-global burden, trends, and geographical variations. *J Surg Oncol.* 2017; 115: 619-30.
- 2) Bayraktar B, Ozemir IA, Kefeli U, et al. Colorectal stenting for palliation and as a bridge to surgery: A 5-year follow-up study. *World J Gastroenterol.* 2015; Aug 21; 21: 9373-9.
- 3) Costa G, Frezza B, Fransvea P, et al. Clinico-pathological features of colon cancer patients undergoing emergency surgery: a comparison between elderly and non-elderly patients. *Open Med (Wars).* 2019; Oct 2; 14: 726-34. doi: 10.1515/med-2019-0082.
- 4) Greenlee RT, Hill-Harmon MB, Murray T, et al. Cancer statistics, 2001. *Ca-A Cancer Journal of Clinicians.* 2001; 51: 15-36
- 5) Kluger Y, Ben-Ishay O, Sartelli M, et al. World society of emergency surgery study group initiative on Timing of Acute Care Surgery classification (TACS). *World J Emerg Surg.* 2013; 8: 17
- 6) Clavien P, Sanabria J, Strasberg S. Proposed classification of complication of surgery with examples of utility in cholecystectomy. *Surgery.* 1992; 111: 518-26.
- 7) Smothers L, Hynan L, Fleming J, et al. Emergency surgery for colon carcinoma. *Diseases of the Colon and Rectum.* 2003; 1: 24-30
- 8) Hermans E, van Schaik PM, Prins HA, et al. Outcome of colonic surgery in elderly patients with colon cancer. *J Oncol.* 2010; 2010: 865-908. Doi:10.1155/2010/865908
- 9) Siegel R, Ma J, Zou Z, et al. Cancer statistics, 2014. *CA Cancer J Clin.* Jan-Feb 2014; 64: 9-29. doi: 10.3322/caac.21208.
- 10) Menegozzo CAM, Teixeira Jr F, Couto Netto SD, et al. Outcomes of Elderly Patients Undergoing Emergency Surgery for Complicated Colorectal Cancer: A Retrospective Cohort Study. *Clinics (Sao Paulo).* 2019; 74: e1074. Published online 2019 Aug 13. doi: 10.6061/clinics/2019/e1074
- 11) Aquina CT, Becerra AZ, Xu Z, et al. Nonelective colon cancer resection: A continued public health concern. *Surgery.* 2017; 161: 1609-18. <https://doi.org/10.1016/j.surg.2017.01.001>
- 12) Balducci L, Aapro M. Complicated and complex: helping the older patient with cancer to exit the labyrinth. *J Geriatr Oncol.* 2014; 5: 116-8.
- 13) Hsu T.C. Comparison of One-Stage Resection and Anastomosis of Acute Complete Obstruction of Left and Right Colon. *Am J Surg.* 2005; Apr; 189: 384-7. doi: 10.1016/j.amjsurg.2004.06.046.
- 14) K.K. Tan, R. Sim. Surgery for obstructed colorectal malignancy in an Asian population: predictors of morbidity and comparison between left and right-sided cancers. *J Gastrointest Surg.* 2010 ; 14: 295-302
- 15) Webster PJ, Aldoori J, Burke DA. Optimal management of

- malignant left-sided large bowel obstruction: do international guidelines agree? *World J Emerg Surg.* 2019; 14: 23. Published online 2019 May 22. doi: 10.1186/s13017-019-0242-5 PMID: PMC6530001
- 16) Ghazal AH, El-Shazly WG, Bessa SS, et al. Colonic Endolumenal Stenting Devices and Elective Surgery Versus Emergency Subtotal/ Total Colectomy in the Management of Malignant Obstructed Left Colon Carcinoma. *J Gastrointest Surg.* 2013 Jun; 17: 1123-9. doi: 10.1007/s11605-013-2152-2. Epub 2013 Jan 29. PMID: 23358847
- 17) NCCN Clinical practice guidelines in Oncology: Colon Cancer. Available at [www.nccn.org](http://www.nccn.org). Accessed March 10, 2013.
- 18) Bilimoria KY, Stewart AK, Palis BE, et al. Adequacy and importance of lymph node evaluation for colon cancer in the elderly. *J Am Coll Surg.* 2008; 206: 247-54.
- 19) Chang GJ, Rodriguez-Bigas MA, Skibber JM, et al. Lymph node evaluation and survival after curative resection of colon cancer: Systematic review. *J Natl Cancer Inst.* 2007; 99: 433-41.
- 20) Xu Z, Becerra AZ, Aquina CT, et al. Emergent Colectomy Is Independently Associated with Decreased Long-Term Overall Survival in Colon Cancer Patients. *J Gastrointest Surg.* 2017; 21: 543-53. <https://doi.org/10.1007/s11605-017-3355-8>
- 21) Sjo OH, Larsen S, Lunde OC, et al. Short term outcome after emergency and elective surgery for colon cancer. *Colorectal Dis.* 2009; 11: 733-9.

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