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RESEARCH

EFFECTS OF LOWER GASTROINTESTINAL TRACT SURGERY ON SURVIVAL IN ELDERLY AND OCTOGENARIAN PATIENTS

Abstract

Introduction: Life expectancy has significantly increased in the last decade. The decision to perform surgery has always been challenging in elderly patients. We aimed to evaluate outcomes in patients who underwent surgery for lower gastrointestinal tract diseases and investigate factors influencing morbidity and mortality, particularly in octogenarian patients, and the effects of age on prognosis and survival in the postoperative period.

Materials and Method: This study included patients aged ≥70 years who underwent lower gastrointestinal tract surgery; patients were divided into three groups as 70–75 years, 75–79 years, and ≥80 years. Age, gender, type of surgery, ASA score, length of hospital stay, morbidity, 30-day mortality, and overall survival were evaluated.

Results: The surgery was performed to 598 patients due to lower gastrointestinal tract diseases. There was a significant increase in the ASA score with increasing age (Chi-square=35.472; p<0.001). The survival rate was significantly higher in patients with malignancies than in those with benign diseases, and in patients who underwent elective surgery than in those who underwent emergency surgery (p<0.001). When patients were examined according to age groups, the overall survival was similar across groups (p=0.217).

Conclusion: There was no significant difference between octogenarian and younger patients for complications and survival. Thus, planned surgical interventions in elderly patients will not negatively affect survival and surgical interventions and can be safely performed in these patients.

Keywords: Life expectancy; Lower gastrointestinal tract; Aged, 80 and over; Neoplasms; Elective surgical procedures

ARAŞTIRMA

YAŞLI VE OKTOGENARİAN HASTALARDA ALT GASTROINTESTİNAL SİSTEM CERRAHİSİNİN SAĞKALIMA ETKİLERİ

Öz

Giriş: Son on yılda ortalama yaşam süresi anlamlı derecede arttı. Yaşlı hastalarda cerrahi girişim kararı ise her zaman zorlu olmuştur. Alt gastrointestinal sistem hastalıkları nedeniyle cerrahi uygulanan hastaların sonuçlarını değerlendirmek, özellikle oktogenarian hastalarda morbidite ve mortaliteyi etkileyen faktörleri ve yaşın postoperatif dönemde prognoz ve sağkalım üzerindeki etkilerini araştırmayı amaçladık.

Gereç ve Yöntem: Çalışmaya alt gastrointestinal sistem cerrahisi geçirmiş 70 yaş ve üstü hastalar dahil edildi; hastalar 70-75 yaş, 75-79 yaş ve ≥80 yaş olmak üzere üç gruba ayrıldı. Yaş, cinsiyet, cerrahi tipi, ASA skoru, hastanede kalış süresi, morbidite, 30 günlük mortalite ve genel sağkalım değerlendirildi.

Bulgular: 598 hastaya alt gastrointestinal sistem hastalıkları nedeniyle cerrahi uygulandı. ASA skorunda yaşla birlikte anlamlı bir artış vardı (p<0.001). Malign hastalık nedeniyle ameliyat edilen hastalarda benign nedenlerle ameliyat edilen hastalara göre ve elektif cerrahi uygulanan hastalarda acil cerrahi uygulanan hastalara göre sağkalım oranı anlamlı derecede yüksekti (p<0.001). Hastalar yaş gruplarına göre incelendiğinde genel sağ kalım gruplar arasında benzerdi (p=0.217).

Sonuç: Oktogenarian ve daha genç hastalar arasında komplikasyon ve sağkalım açısından anlamlı farklılık olmadığı görüldü. Bu nedenle, yaşlı hastalarda planlanan cerrahi müdahaleler sağkalımı olumsuz yönde etkilememektedir ve bu hastalarda cerrahi müdahaleler güvenle yapılabilir.

Anahtar sözcükler: Yaşam beklentisi; Alt gastrointestinal sistem; Yaşlı, 80 yaş ve üzeri; Neoplaziler, Elektif cerrahi prosedürler

INTRODUCTION

Life expectancy has significantly increased in the last decade. An important demographic increase has been observed in the elderly population because of decreasing birth rate and increasing life time (1). Therefore, clinicians around the world have started coming across elderly patients more frequently (2). According to the World Health Organization (WHO) data, there are approximately 125 million octogenarian people in the world (3). This demographic increase has been contributed by decreasing birth rates, improved healthcare services, advances in intensive care medicine, improvements in technical information and capabilities, and technological advancements. The growing elderly population has necessitated the evaluation of outcomes in all branches of surgery.

The decision to perform surgery has always been challenging in elderly patients because of limited life expectancy. Previous studies reported higher rate of postoperative complications in elderly patients than in younger patients because the rate of comorbidities was higher in elderly patients, they more often required emergency procedures, and physiologic problems arose with increasing age (4). Recent studies reported that abdominal surgery can be safely performed in patients aged ≥70 years (5,6). The efficacy of surgical interventions in these patients should be maximized and surgery should not interfere with the possibility of curing the disease.

The purpose in our study was to evaluate the outcomes in patients who underwent surgery due to lower gastrointestinal tract diseases, and to investigate the factors influencing morbidity and mortality in patients and the effects of age on prognosis and survival in the postoperative period. In this evaluation, we aimed to evaluate the outcomes of lower GIT surgery in a large sample of elderly patients by employing no restrictions in patient selection.

MATERIALS AND METHOD

This study included patients aged ≥70 years and who underwent emergency/elective laparoscopic/open lower GIT surgery for malignant and benign jejunal, ileal, and colorectal diseases between January 2000 and June 2017. The patients were divided into three groups according to age as patients aged 70–74 years, those aged 75–79 years, and ≥80 years. Age, gender, type of surgery, ASA score, length of hospital stay, morbidity, 30-day mortality, and overall survival were evaluated. Patients with no accessible follow-up data were excluded from the study. The ASA score and pathologic stage in malignancy were not used as exclusion criteria in the study.

All patients were evaluated preoperatively by an anesthesiologist with respect to the presence of comorbidities, medication use, and physical performance. The American Society of Anesthesiologists (ASA) physical status score was recorded. Preoperative preparation was conducted by multidisciplinary evaluation of patients with an ASA score of ≥3. Comorbidities of patients who were included in the study were evaluated by using the Charlson Comorbidity Index (7). Antibiotic and venous thrombosis prophylaxis was administered to all patients, according to the previously published guidelines (8,9). Complications observed during the postoperative period were recorded according to Clavien–Dindo Classification (10).

This study was approved by institutional review board. The surgical intervention to be performed and risks were explained to all patients, and informed consent was obtained from all patients preoperatively.

Statistical analysis

SPSS 15.0 (SPSS Inc., Chicago, Illinois) software was used for statistical analysis. Crosstab analysis was used for evaluating the relationship between age group and categorical variables, and the Chi-square value was calculated. Survival analysis was used for evaluating the effect of age group and other categorical variables on survival, and Kaplan–Meier estimates were calculated. Log Rank (Mantel–

Cox), Breslow (Generalized Wilcoxon), Tarone-Ware statistics were used. K-independent Kruskal–Wallis was used for comparison of data without normal distribution based on the age group, and one-way analysis of variance was used for evaluating data with normal distribution. Spearman correlation co-efficient was used for evaluating the significance of relationship between two continuous variables without normal distribution. All statistical analyses were performed at the significance level of 0.05.

RESULTS

In total, 598 patients aged ≥70 years underwent surgery for lower GIT diseases between January 2000 and June 2017. 294 patients (49.7%) were male and 304 patients (50.8%) were female. It was detected that surgical treatments were more frequently performed in female patients with increasing age (Chi-square=8.460; p=0.015). Surgery was performed on 359 patients (60%) due to malignant causes, 280 patients (46.8%) underwent emergency surgery, and 497 patients (83.1%) underwent laparoscopic surgery. The most common diagnosis in the group was colon cancer (p=0.022). It was observed that ASA score of 2 was more frequent with the rate of 68.7% in the 70–74 years age group and 63.1% in the 75–79 years age group. The ASA score was higher in octogenarian patients. It was detected that the increase in the ASA score with age in groups was statistically significant (Chi-square=35.472; p<0.001); however, the Charlson Comorbidity Index showed no difference between the groups (Chi-square=2.670; p=0.263) (Table 1).

The most common performed surgical procedure was right hemicolectomy (p=0.043). The total number of cases which developed complications in the groups was 161 (26.9%). There was no statistical difference between the groups with regard to Clavien–Dindo Classification score and postoperative complications (Chi-square=16.533, p=0.085 and Chi-square=7.263, p=0.297, respectively). Conversely, wound-site infection (33.3%) was more common in the 70–74 years age group, pneumonia (28.6%) was more common in the 75–79 years age group, and sepsis (28.1%) was more common in octogenarians. In the first 30 days after the surgery, postoperative mortality occurred in 14 patients (28%) in the 70–74 years age group, 10 patients (20%) in the 75–79 years age group, and 26 patients (52%) in the octogenarian patient group. There was no statistically significant difference between the groups, although 30-day mortality rate was higher in octogenarian patients, as shown in Table 2 (p=0.120).

During the evaluation before the allocation of patients into the age groups, survival was significantly higher in patients with malignant diseases than in those with benign diseases and in patients underwent elective surgery than in those underwent emergency surgery (p<0.001). There was no statistical difference in survival rates between patients underwent open surgical procedures and those underwent laparoscopic procedures (p=0.084). It was observed that the higher ASA score had a negative effect on survival. There was a significant decrease in survival rate with higher ASA scores (p<0.001), whereas there was no relationship between Clavien–Dindo Classification and survival (p=0.837) (Figure 1). When the patients were examined by dividing them into age groups, the overall survival rate was similar across the groups (p=0.217) (Table 3).

In the subgroup analysis which was performed due to the fact that patients with malign diseases had longer life expectancy, the life expectancy of octogenarian patients who underwent surgery because of malign diseases was found significantly high (p<0.001) (Figure 2). 297 patients (87.2 %) underwent surgery due to malign diseases under elective conditions. On the other hand, it was observed that 218 patients (91.2 %) underwent surgery due to benign diseases under emergency conditions (p<0.001). The ASA score of patients who underwent surgery due to both malign and benign diseases was found similar, and the most frequent ASA score was calculated 2 (p<0.001). Although Clavien-Dindo Classification grade 1 complications were observed more frequent, the postoperative sepsis was observed more common in patients who underwent surgery due to benign diseases (p<0.001) (Table 4).

Table 1. Findings according to age groups [N (%)].

Variable		Age group				
		70–74	75–79	≥80	Total	Statistical test
Gender	Male	121 (56.5)	86 (48.0)	87 (42.4)	294 (49.2)	Chi-square=8.460 p=0.015
	Female	**93 (43.5)**	**93 (52.0)**	**118 (57.6)**	**304 (50.8)**	
ASA score	1	7 (3.3)	2 (1.1)	0 (0.0)	9 (1.5)	Chi-square=35.472 p<0.001
	2	**147 (68.7)**	**113 (63.1)**	**101 (49.3)**	**361 (60.4)**	
	3	54 (25.2)	55 (30.7)	100 (48.8)	209 (34.9)	
	4	6 (2.8)	9 (5.0)	4 (2.0)	19 (3.2)	
Charlson Comorbidity Index	Mean (SD)	6.7 (±1.69)	6.41 (±1.65)	6.57 (±1.72)		Chi-square=2.670 p=0.263
Diagnosis	**Acute appendicitis**	28 (13.1)	23 (12.8)	18 (8.8)	69 (11.5)	Chi-square=29.293 p=0.022
	Bride ileus	17 (7.9)	18 (10.1)	19 (9.3)	54 (9.0)	
	Diverticular disease	15 (7.0)	7 (3.9)	13 (6.3)	35 (5.9)	
	Colon cancer	**89 (41.6)**	**66 (36.9)**	**93 (45.4)**	**248 (41.5)**	
	Mesenteric vascular Occlusion	22 (10.3)	15 (8.4)	15 (7.3)	52 (8.7)	
	Perforation	2 (0.9)	7 (3.9)	1 (0.5)	10 (1.7)	
	Rectal cancer	34 (15.9)	36 (20.1)	25 (12.2)	95 (15.9)	
	Strangulated hernia	5 (2.3)	5 (2.8)	13 (6.3)	23 (3.8)	
	Volvulus	2 (0.9)	2 (1.1)	8 (3.9)	12 (2.0)	
Malignant/Benign	**Malignant**	132 (61.7)	111 (62.0)	116 (56.6)	359 (60.0)	Chi-square=1,550 p=0.461
	Benign	82 (38.3)	68 (38.0)	89 (43.4)	239 (40.0)	
Emergency/Elective	**Emergency**	93 (43.5)	82 (45.8)	105 (51.2)	280 (46.8)	Chi-square=2,638 p=0.267
	Elective	121 (56.5)	97 (54.2)	100 (48.8)	318 (53.2)	
Open/Laparoscopic	**Open**	171 (79.9)	152 (84.9)	174 (84.9)	497 (83.1)	Chi-square=2,437 p=0.296
	Laparoscopic	43 (20.1)	27 (15.1)	31 (15.1)	101 (16.9)	
Length of hospital stay (days)	**Median (min–max)**	5 (1–65)	5 (1–96)	6 (1–81)		Chi-square=3,892 p=0.143

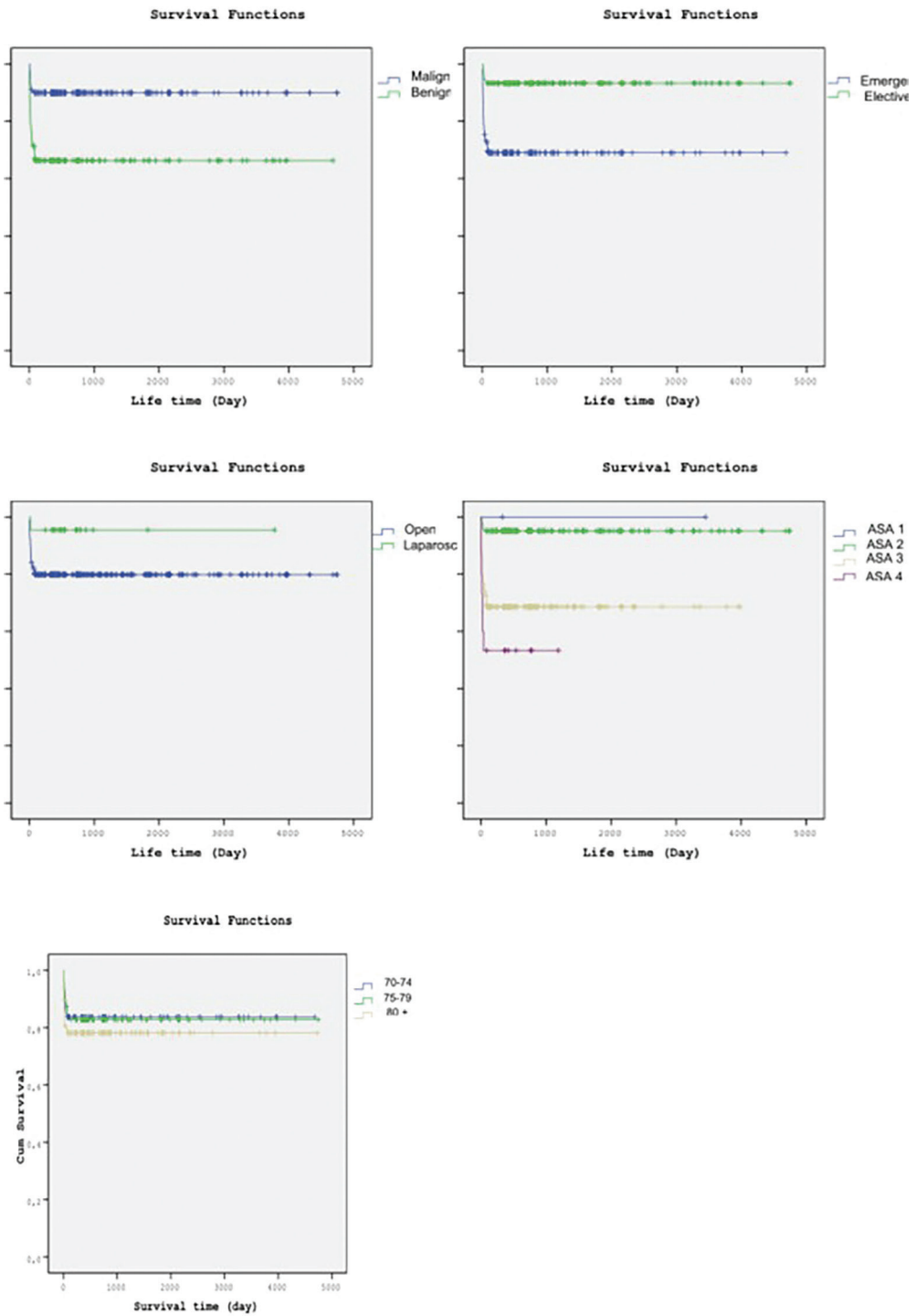**Figure 1.** Factors affecting the survival.

Table 2. Postoperative findings [N (%)].

Variable		Age group				Statistical test
		70–74	75–79	≥80	Total	
Type of surgery	Abdominoperineal resection	5 (2.3)	8 (4.5)	4 (2.0)	17 (2.8)	Chi-square=26.832 p=0.043
	Left hemicolectomy	43 (20.1)	30 (16.8)	35 (17.1)	108 (18.1)	
	Appendectomy	51 (23.8)	34 (19.0)	28 (13.7)	113 (18.9)	
	Lysis of adhesions	11 (5.1)	11 (6.1)	14 (6.8)	36 (6.0)	
	Subtotal colectomy	7 (3.3)	1 (0.6)	8 (3.9)	16 (2.7)	
	Low anterior resection	34 (15.9)	31 (17.3)	22 (10.7)	87 (14.5)	
	Right hemicolectomy	**36 (16.8)**	**38 (21.2)**	**61 (29.8)**	**135 (22.6)**	
	Segmental small bowel resection	24 (11.2)	24 (13.4)	28 (13.7)	76 (12.7)	
	Segmental colon resection	3 (1.4)	2 (1.1)	5 (2.4)	10 (1.7)	
Clavien–Dindo Classification	0	162 (75.7)	125 (69.8)	133 (64.9)	420 (70.2)	Chi-square=16.533 p=0.085
	1	4 (1.9)	6 (3.4)	7 (3.4)	17 (2.8)	
	2	14 (6.5)	19 (10.6)	23 (11.2)	56 (9.4)	
	3	14 (6.5)	9 (5.0)	6 (2.9)	29 (4.8)	
	4	4 (1.9)	2 (1.1)	9 (4.4)	15 (2.5)	
	5	16 (7.5)	18 (10.1)	27 (13.2)	61 (10.2)	
Complication	Wound site enfection	16 (33.3)	12 (24.5)	16 (25.0)	44 (27.3)	Chi-square=7.263 p=0.297
	Pneumonia	7 (14.6)	14 (28.6)	14 (21.9)	35 (21.7)	
	Sepsis	8 (16.7)	7 (14.3)	18 (28.1)	33 (20.5)	
	Other	17 (35.4)	16 (32.7)	16 (25.0)	49 (30.4)	
Mortality (30 days)	30 days	14 (28%)	10 (20%)	26 (52%)	50 (8.3%)	F=2.215; p=0.120

DISCUSSION

Factors influencing morbidity and mortality following lower GIT surgery in patients aged ≥70 years were investigated in the present study. Moreover, the 30-day mortality rate and overall survival were compared. In the evaluation conducted without considering the type of surgery, it was detected that there was no relationship between age and overall survival postoperatively. On the other hand, the morbidity rate was lower, and the mortality rate was higher with increasing age. Our data showed that, there was no negative effect of abdominal surgery on survival in elderly patients.

Table 3. Overall survival.

Age group (years)	Mean (days)	Standart error	Statistical test (p value)
70–74	3918,337	168,960	
75–79	3937,173	168,709	Log Rank (Mantel–Cox): Chi-square=2.747 (0.253)
≥80	3638,936	178,365	Breslow (Generalized Wilcoxon): Chi-square=3.379 (0.185)
Overall	3840,681	100,874	Tarone-Ware: Chi-square=3.057 (0.217)

Studies conducted in previous years reported that abdominal surgical procedures performed particularly on octogenarian patients were related to high morbidity and mortality (1,11). However, these studies included a heterogeneous group of surgical patients who underwent various orthopedic, vascular, and thoracic procedures. Recent studies reported that morbidity and mortality were not high in octogenarian patients who underwent abdominal surgery (4). In our study as it was reported in other studies, the risk of major complications after abdominal surgeries performed in octogenarian patients was similar to younger patients, with an increase in minor complications (6).

There was no mortality occurred in patients with ASA score of 1. The patients with high ASA score were associated with high mortality underwent various types of surgery (12,13). Also, high ASA score in elderly patients undergoing abdominal surgery is associated with the higher mortality rate consistent with the present study (6). Increase in the rate of comorbidities with age and decrease in the ability of coping with increased stress due to limited physiological reserves can be suggested as possible causes (14). It was observed that there was no significant change in complication rates with increasing patient age. Complications, such as anastomotic leakage, perforation, and intra-abdominal hemorrhage, occurred less often among the age groups, whereas complications, such as wound-site infection, pneumonia, and sepsis, were observed more frequently. Previous studies reported that the prevalence of sepsis increases

with age (15). It was considered that sepsis might be developed more frequently in octogenarian patients as emergency procedures were performed more frequently in this patient group. Also, the conditions with systemic effects, such as obstruction and perforation, were observed more frequently in patients undergoing emergency surgery. Pneumonia is another common complication that occurs as a result of the decrease in the respiratory muscle mass and pulmonary functional capacity (16). Moreover, it could be considered that more frequent performance of open surgery in patients who were included in the study might cause may have caused more frequent observation of wound-site infection. In particular, emergency surgical interventions and open surgery methods were associated with increased wound-site infections (17).

A significant increase was observed in the ASA score with increasing age; however, there was no difference in the Charlson Comorbidity Index among the groups. Although higher CCI are associated with mortality risk in elderly patients, there is no correlation between mortality and CCI in our study (18). There was no difference among the groups in terms of complications evaluated according to the Clavien–Dindo Classification. Moreover, wound-site infection was observed more frequently in the 70–74 years age group, pneumonia was more common in the 75–79 years age group, and sepsis was more common in patients aged ≥80 years. In a comparison of 235 elderly patients and 211 younger patients who underwent surgery for colorectal cancer, Grosso et al reported that the

Clavien-Dindo Classification score was higher in patients aged 65 years and older, and complications such as ileus, peritonitis, and septic shock were more frequent (19). On the other hands, Straatman et al reported that there was no difference between the octogenarian patients and the young patients in terms of major complications, and an increase in minor complication rates such as wound infection and pneumonia (6).

The 30-day mortality rate was higher in the octogenarian patient group. It was probably caused by higher ASA score with increasing age. In the evaluation conducted in our study without considering the age groups, it was determined that postoperative survival rate was higher in patients with malignancies than in those with benign diseases and in patients underwent elective surgery than in those underwent emergency surgeries. Previous studies reported that the mortality rate of patients who underwent emergency abdominal surgery was approximately 20% (20,21). Most of preoperative diagnoses in our patients who were operated on due to benign diseases were because of emergency surgical reasons, and surgical procedures being performed more frequently for colon cancer were possible causes of these findings. Nonetheless, survival rates after elective surgical procedures performed due to malignant causes were significantly higher in all patients groups, particularly in the octogenarian patient group. This result was probably due to adequate evaluation period and preparation to the surgery of the patients on elective oncologic surgery. Moreover, previous studies reported that laparoscopic surgery could be safely performed on elderly patients, and there were no differences in complication rates compared with those of open surgery (5,22). In our study, it was detected that there was no difference in terms of complications between the patients who underwent laparoscopic surgery and those underwent open surgery, and the survival rates were similar.
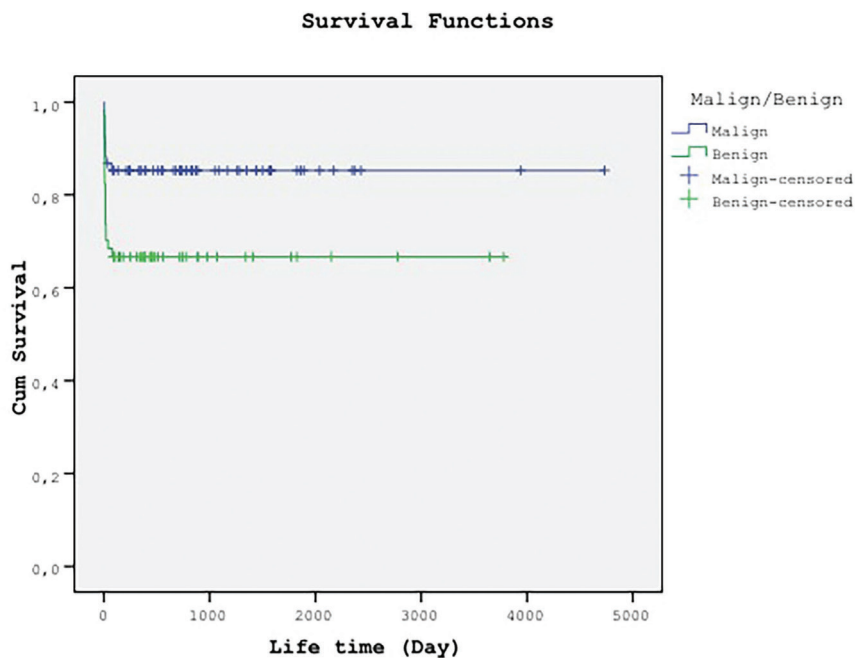

Figure 1: Factors affecting the survival.

Table 4. Characteristics of patients who underwent surgery for malignant and benign diseases [N (%)].

		Malignant	Benign	Total	Statistical test
Gender	**Male**	188(52.4)	106(44.4)	294(49.2)	Chi-square=3.689 p=0.055
	Female	171(47.6)	133(55.6)	304(50.8)	
Age	**70-74**	132(36.8)	82(34.3)	214(35.8)	Chi-square=1.550 p=0.461
	75-80	111(30.9)	68(28.5)	179(29.9)	
	≥80	116(32.3)	89(37.2)	205(34.3)	
Emergency/Elective	**Emergency**	62(17.3)	218(91.2)	280(46.8)	**Chi-square=315.068 p<0.001**
	Elective	297(82.7)	21(8.8)	318(53.2)	
Open/Laparoscopic	**Open**	284(79.1)	213(89.1)	497(83.1)	**Chi-square=10.248 p=0.001**
	Laparoscopic	75(20.9)	26(10.9)	101(16.9)	
ASA score	**1**	6(1.7)	3(1.3)	9(1.5)	**Chi-square=25.598 p<0.001**
	2	245(68.2)	116(48.5)	361(60.4)	
	3	101(28.1)	108(45.2)	209(34.9)	
	4	7(1.9)	12(5.0)	19(3.2)	
Clivien-Dindo Classification	**1**	275(76.6)	151(63.2)	426(71.2)	**Chi-square=24.572 p<0.001**
	2	38(10.6)	26(10.9)	64(10.7)	
	3	18(5.0)	11(4.6)	29(4.8)	
	4	7(1.9)	8(3.3)	15(2.5)	
	5	21(5.8)	43(18.0)	64(10.7)	
Type of Surgery	**Abdominoperineal resection**	16(4.5)	1(0.4)	17(2.8)	**Chi-square=198.143** **p<0.001**
	Left hemicolectomy	72(20.1)	36(15.1)	108(18.1)	
	Appendectomy	42(11.7)	71(29.7)	113(18.9)	
	Lysis of adhesions	3(0.8)	33(13.8)	36(6.0)	
	Subtotal colectomy	10(2.8)	6(2.5)	16(2.7)	
	Low anterior resection	78(21.7)	9(3.8)	87(14.5)	
	Right hemicolectomy	117(32.6)	18(7.5)	135(22.6)	
	Segmental small bowel resection	15(4.2)	61(25.5)	76(12.7)	
	Segmental colon resection	6(1.7)	4(1.7)	10(17)	
Complication	**Wound site enfection**	28(35.9)	16(19.0)	44(27.2)	**Chi-square=20.646** **p<0.001**
	Pneumonia	16(20.5)	19(22.6)	35(21.6)	
	Sepsis	5(6.4)	28(33.3)	33(20.4)	
	Other	29(37.2)	21(25.0)	50(30.9)	

Retrospective study design and small sample size were important limitations of this study. Additionally, diseases occurring in a large spectrum and heterogeneous patient groups were other limitations. Nonetheless, ASA scores of patients included in our study and the inclusion of patients who had advanced stage malignancy contributed to the achievement of objective results.

In conclusion, although it was observed in our study that survival rates decreased with increasing age after lower GIT surgery, there was no statistically significant difference, particularly, in octogenarian patients compared with younger patients. Moreover, survival was significantly higher in patients with malignancies and those underwent elective surgery than in patients with benign diseases and those underwent emergency surgery. Thus, it should be considered that planned surgical interventions will not negatively affect survival rates in elderly patients, and surgical interventions can be safely performed in these patients.

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