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Short-term outcomes after surgery for colorectal cancer in Turkish patients aged 70 and above

Kolorektal kanserli yetmiş yaş ve üzeri Türk hastalarda cerrahi sonrası kısa dönem sonuçlar

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Background/aims: *We aimed to evaluate the impact of age on short-term surgical outcomes and to investigate the risk factors for postoperative mortality in 660 Turkish colorectal cancer patients.* ***Methods:*** *Between January 2002 and January 2007, 660 consecutive patients who were operated for colorectal cancer at our institution were enrolled in this study. The patients were divided into two groups as: a younger group (<70 years) and an older group (≥ 70 years). Patient data were recorded prospectively with the use of specially designed forms. Variables and short-term patient results were compared.* ***Results:*** *American Society of Anesthesiologists (ASA) scores were significantly higher and albumin levels were lower in the older group compared with the younger group (p<0.05). Morbidity and mortality rates were 16.8% (83/494) and 2.6% (13/494) in the younger group and 22.9% (38/166) and 3.0% (5/166) in the older group, respectively. These differences in rates were not statistically significant. ASA score (ASA 4) and non-resective procedures were found to be independent risk factors for mortality.* ***Conclusions:*** *Age should not be regarded as a reason for limited surgery. Elderly patients should undergo the same standard surgical approach as younger patients. The patient's general state of health is more effective on postoperative mortality.*

Key words: Colorectal cancer, surgery, advanced age, morbidity, mortality

Amaç: *Amacımız kolorektal kanserli 660 Türk hastada ileri yaşın cerrahi sonrası erken dönem sonuçlara etkisinin değerlendirilmesi ve postoperatif mortalite için risk faktörlerinin incelenmesidir* ***Yöntem:*** *Ocak 2002 – Ocak 2007 tarihleri arasında kliniğimizde kolorektal kanser nedeniyle ameliyat edilen 660 ardışık hasta çalışmaya alındı. Hastalar genç grup (<70 yaş) ve yaşlı grup (≥ 70 yaş) olarak 2 gruba ayrıldı. Veriler özel olarak düzenlenmiş formlara prospektif olarak kaydedildi. Hastaların demografik ve klinik özellikleri ile cerrahi sonrası kısa dönem sonuçlar karşılaştırıldı.* ***Bulgular:*** *Yaşlı grupta ASA skoru belirgin olarak yüksekti ve albümin düzeyleri belirgin olarak düşük idi (p<0.05). Morbidite ve mortalite oranları genç grupta sırasıyla %16.8 (83/494) ve %2.6 (13/494) idi. Bu oranlar yaşlı grupta sırasıyla %22.9 (38/166) ve %3.0 (5/166) idi. Bu oranlar açısından iki grup arasındaki fark anlamlı değildi. ASA skoru (ASA 4) ve rezeksiyon dışı prosedürler mortalite için bağımsız risk faktörleri olarak bulundu.* ***Sonuç:*** *Yaş daha sınırlı cerrahi için bir neden olarak kabul edilmemelidir. Yaşlı hastalara daha genç hastalardaki gibi standart cerrahi yaklaşım uygulanmalıdır. Hastaların genel sağlık durumu postoperatif mortalite üzerine daha fazla etkilidir.*

Anahtar kelimeler: Kolorektal kanser, cerrahi, ileri yaş, morbidite, mortalite

INTRODUCTION

Increasing life expectancy has resulted in an increasing percentage of elderly people in the population. As the incidence of colorectal cancer increases with age, elderly patients with colorectal cancer will form a rapidly growing subset of colorectal patients. Elderly patients have more comorbid conditions and higher rates of emergency operations and later stage diseases (1). However, they form a heterogeneous group of patients with significant differences in their general states of health (2).

The optimal treatment strategy for colorectal cancer is surgical resection with curative intent. However, many elderly patients may not receive this optimal treatment because of high postoperative morbidity and mortality rates and poor long-term

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results. Consequently, these patients may undergo palliative procedures or no surgery (3), and such inadequate treatment will result in poor survival. However, recent reports have encouraged use of the same surgical approach in elderly patients as used in younger patients (4-6).

The aim of this study was to evaluate short-term surgical outcomes in patients of advanced age (≥70 years) who underwent surgery for colorectal cancer and to compare these outcomes with those in younger patients. In addition, potential risk factors for mortality were evaluated.

MATERIALS AND METHODS

Study Design

Between January 2002 and January 2007, 660 consecutive patients who underwent surgery for colorectal cancer at our institution were enrolled in this study. All patients were operated by the same surgical team and all provided written informed consent. The patients were divided into two groups as: a younger group (<70 years) and an older group (≥70 years). Patient data were recorded prospectively with the use of specially designed forms.

The following variables were compared between groups: age, gender, American Society of Anesthesiologists (ASA) score, body mass index (BMI), serum albumin levels, tumor site and stage, operative procedures, presence of diverting ostomy, use of additional procedures, rate of emergency surgery, complications (specific and non-specific), mortality rate, and length of postoperative hospital stay. In addition, univariate and multivariate analyses of potential risk factors for mortality were performed. Additional procedures included liver wedge resection, segmental resection, lobectomy, and radiofrequency ablation for liver metastases, small bowel resection, and gynecologic and urologic procedures for invasion to adjacent organs.

Cholecystectomy for gallstone disease and splenectomy for iatrogenic splenic injuries were also regarded as additional procedures. Patients presenting with bowel obstruction or perforation were classified as having an urgent presentation. Staging was performed according to the 1997 TNM staging system.

Complications directly related to the surgery such as anastomotic leakage, wound infection, ileus, intraabdominal abscess, and peritonitis were considered as specific complications; general complications such as cardiac, neurological and urinary complications as well as venous thromboembolism were regarded as non-specific complications. Operative mortality was defined as death within 30 days after surgery or death during the same hospital admission.

Statistical Analysis

The data were analyzed with the SPSS 11.5 package program. The Shapiro-Wilk test was used to determine the normality of distribution of the continuous variables. As the continuous variables were found to be normally distributed, they are expressed as the mean ± standard deviation. Qualitative data are presented as the number of patients and percentage (%). The mean differences were evaluated using the Student *t* test. Nominal data were compared using the χ^2 or the Fisher exact test, where appropriate. A p value of less than 0.05 was considered statistically significant. In addition, logistic regression analysis was performed to estimate the influence of clinicopathologic factors on development of postoperative mortality. Odds ratio (OR) with 95% confidence intervals (95% CI) was calculated as a measure of association.

RESULTS

Of the 660 patients who were operated on within the study period, 494 were <70 years (younger group) and 166 were ≥70 years (older group). There were 309 men and 185 women in the younger group and 99 men and 67 women in the older group. The mean age was 53.2±11.3 years in the younger group and 74.8±4.3 years in the older group. Table 1 provides details regarding the clinicopathological characteristics of the patients. The groups were similar with regard to the gender ratio, tumor location, operative procedures, BMI, tumor stage, rate of emergency surgery, and need for additional procedures including diverting ostomy. Although the rate of emergency surgery appeared to be higher in the older group, the difference between groups was not statistically significant. Compared with the younger group, ASA scores were significantly higher and albumin levels were lower in the older group ($p<0.05$). Rates of anastomotic leakage, specific and non-specific complications, total morbidity, and mortality were similar between groups (Table 2). The total morbidity (postoperative complication) rate was 16.8% (83/494) in the younger group and 22.9% (38/166) in the older group; this difference between groups was not statistically significant. Moreover, rates of

Table 1. Clinicopathological characteristics of the patients

	70 years n (%)	**≥70 years n (%)**	**P value**
Patients	494 (74.8%)	166 (25.2%)	
Mean age (years)*	53.2±11.3	74.8±4.3	
Gender (male/female)	309/185 (62.6%/37.4%)	99/67 (59.6%/40.4%)	NS
Body mass index*	25.4±3.8	26.6±20.9	NS
Albumin level (mg/dl)*	4.1±0.5	3.9±3.1	0.001
Hospitalization (days)*	12.2±6.1	12.7±6.7	NS
Tumor location			
Right	98 (19.8%)	33 (19.9%)	NS
Transverse	17 (3.4 %)	7 (4.2%)	
Left	147 (29.8%)	52 (31.3%)	
Rectum	232 (47.0%)	74 (44.6%)	
Stage			
0	8 (1.6%)	0	NS
1	33 (6.7%)	19 (11.4%)	
2	164 (33.2%)	66 (39.8%)	
3	194 (39.3%)	55 (33.1%)	
4	95 (19.2%)	26 (15.7%)	
Operative procedure			
Resection	461 (93.3%)	160 (96.4%)	NS
Non-resective procedure	33 (6.7%)	6 (3.6%)	
Mode of presentation			
Elective	473 (95.7%)	154 (92.8%)	NS
Emergency	21 (4.3%)	12 (7.2%)	
ASA			
I	77 (15.6%)	12 (7.2%)	0.0001
II	346 (70.0%)	110 (66.3%)	
III	66 (13.4%)	36 (21.7%)	
IV	5 (1.0%)	8 (4.8%)	
Diverting ostomy			
(-)	438 (88.7%)	147 (88.6%)	NS
(+)	56 (11.3%)	19 (11.4%)	
Additional procedure			
(-)	380 (76.9%)	129 (77.7%)	NS
(+)	114 (23.1%)	37 (23.3%)	

*Mean±standard deviation NS: Not significant.

specific and non-specific morbidities did not differ between the groups. Death occurred in 13 of 494 patients (2.6%) in the younger group and in 5 of 166 patients (3.0%) in the older group. This difference in mortality rates between groups was also not statistically significant (Table 2).

Higher ASA (ASA 4) score and performance of non-resective procedures were associated with higher mortality rates in the univariate analysis (Table 3). Moreover, logistic regression analysis showed that ASA score (OR, 12.13; 95% CI, 2.44-60.37) and performance of non-resective procedures (OR, 3.77; 95% CI, 1.03-13.79) were significant risk factors for mortality.

DISCUSSION

It has been generally accepted that elderly patients are high-risk surgical candidates (5). However, recent advances in perioperative care and surgical techniques have improved outcomes in elderly patients (5). In addition, Basili et al. (5) reported that select patients older than 75 years can achieve excellent long-term results after elective surgery with curative intent. In a study by Nascimbeni et al. (1), reductions in the rates of palliative surgery and operative mortality were observed as major trends in older age groups; the reduction in the rate of palliative procedures was thought to be the major determinant of the improvement in long-term outcomes in elderly patients. Long-term results are beyond the scope of this study.

In this study, we selected 70 years as the age threshold for being considered an older patient. Different thresholds of 65 (7), 70 (8-10), 75 (6, 11), 80 (2, 12), and 85 (3) years have been used in other studies. We chose 70 years as the threshold because of the shorter life expectancy in our country compared to that in Western countries.

Table 2. Postoperative morbidity and mortality

	<70 years n (%)	≥ 70 years n (%)	P value
Anastomotic leakage			
(-)	477 (96.6%)	157 (94.6%)	NS
(+)	17 (3.4%)	9 (5.4%)	
Specific complication			
(-)	431 (87.2%)	137 (82.5%)	NS
(+)	63 (12.8%)	29 (17.5%)	
Non-specific complication			
(-)	474 (96.0%)	157 (94.6%)	NS
(+)	20 (4.0%)	9 (5.4%)	
Postoperative complication			
(-)	411 (83.2%)	128 (77.1%)	NS
(+)	83 (16.8%)	38 (22.9%)	
Mortality			
(-)	481 (97.4%)	161 (97.0%)	NS
(+)	13 (2.6%)	5 (3.0%)	

NS: Not significant.

Older patients are a highly heterogeneous population with considerable differences in their general states of health. They often suffer from one or more additional chronic diseases, especially cardiovascular and pulmonary diseases, hypertension or diabetes mellitus. These comorbid conditions may complicate major surgery in cancer patients. In some previous studies, resection rates for elderly patients were lower than those in younger patients, probably because of more advanced disease, the presence of comorbidities and the need for emergency operations in some patients (3, 7, 11). In agreement with earlier reports (4), our patients 70 years of age or older had significantly higher ASA scores with more frequent comorbid conditions. However, the other patient and tumor characteristics of the younger and older patients were identical. We did not perform limited operations in the older patients compared to those performed in the younger patients but rather applied the same surgical approach. Although it has been shown previously that coexisting comorbidities are associated with a worse short-term prognosis (13), morbidity and mortality rates for our younger and older patients were similar.

Varying morbidity and mortality rates after surgery for colorectal cancer in elderly patients have been reported in the literature. Marusch et al. (2) reported elevated morbidity and mortality rates in patients 80 years and older compared with rates in patients younger than 80 years (morbidity 43.5% vs. 33.9%; mortality 8.0% vs. 2.6%); these increased morbidity and mortality rates with aging were attributed to increased rates of general postoperative complications, mainly pneumonia and cardiovascular complications (2). However, they did not find increased rates of specific postoperative complications in the older group compared with the younger group. Similarly, in a recent study by Ong et al. (12) involving patients 80 years or older, the postoperative morbidity rate was 21% and the overall 30-day mortality rate was 1.1%, and most of the patients' complications were reported to be cardiac or pulmonary. Latkauskas et al. (11) reported a postoperative complication rate of 37% in patients 75 years or older who underwent surgery for colorectal cancer. The corresponding rate in patients younger than 75 years was 30%, and the difference between groups was not statistically significant. Although the surgical complication rates were also similar, general complications including cardiovascular and pulmonary complications were more frequent in the older group. In contrast to

Table 3. Univariate analysis of potential risk factors for mortality

Parameters	Patients (n)	Mortality	P value
Age			
< 70 years	494	13 (2.6)	NS
≥70 years	166	5 (3.0)	
Gender			NS
Male	408	9 (2.2)	
Female	252	9 (3.6)	
ASA			
I	89	0	0.003
II	456	11 (2.4)	
III	102	4 (3.9)	
IV	13	3 (23.1)	
Albumin levels			
<3.5	78	2 (2.6)	NS
≥3.5	582	16 (2.7)	
Additional procedure			
(-)	509	13 (2.6)	NS
(+)	151	5 (3.3)	
Tumor location			
Right	131	2 (1.5)	NS
Transverse	24	1 (4.2)	
Left	199	6 (3.0)	
Rectum	306	9 (2.9)	
Operative procedure			
Resection	621	14 (2.3)	0.017
Non-resective	39	4 (10.3)	
Mode of presentation			
Elective	627	16 (2.6)	NS
Emergency	33	2 (6.0)	
Protective ostomy			
(-)	585	15 (2.6)	NS
(+)	75	3 (4)	

Values in parentheses are percentages.

the results of these studies, although coexisting comorbidities were more common in the older group in our study, rates of non-specific complications were similar between the groups. Similar to our results, Schiffmann et al. (4) reported similar non-specific morbidity rates in patients 75 years or older and patients younger than 75 years who underwent colorectal cancer surgery. The total complication rates were similar in patients younger and older than 75 years (38.7% vs. 41.5%, respectively). However, the mortality rate was higher in the older group (4.9% vs. 1.6%).

In a study by Arenal et al. (14), abdominal surgery in elderly patients was associated with high morbidity rates, and the authors suggested that this was mainly due to previous coexisting diseases. In the same study, mortality was found to be associated with perianesthetic risk (ASA grade), emergency operations and the seriousness of the disease (14). Hessman et al. (6) performed a study in patients 75 years or older with colorectal cancer. They reported that age was an independent risk factor for perioperative death or a poor prognosis and that the ASA score seemed to be the best predictor of short- and long-term outcomes (6). In our study, performance of non-resective procedures and ASA score were found to be independent risk factors for mortality. No mortality was observed in ASA I patients. Mortality rates in ASA II, III and IV patients were 2.4%, 3.9% and 23.1%, respectively. Although there was only a slight difference in mortality rates between ASA II and ASA III patients, the mortality rate in ASA IV patients was markedly higher. Death occurred in 18 patients in this study, and 3 (16.7%) of these were ASA IV patients, although the number of these patients was only 13, which is approximately 2% of all patients included in this study. Non-resective procedures were also an independent risk factor for mortality. This group of patients constitutes only a small proportion of the patients included in the study (39 patients, 5.9%). Non-resective procedures were performed for patients in whom even a palliative resection was not possible because of extensive disease, and included explorative laparotomy, bypass procedures and diverting ostomy. The high mortality rate among these patients was primarily attributed to the extensive primary disease.

In conclusion, advanced age did not increase postoperative morbidity and mortality rates in this study. Thus, age itself should not be regarded as a reason for performing limited surgery. The patient's general state of health seems to be more effective in determining postoperative mortality. We think that elderly patients should undergo the same surgical approach as younger patients.

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