



## Original article

ACTA FAC MED NAISS 2008; 25 (4): 195-200

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## POSTOPERATIVE COMPLICATIONS AND MORTALITY AFTER ELECTIVE OPERATIONS FOR CANCER OF DIGESTIVE SYSTEM IN ELDERLY

## SUMMARY

Geriatric population is rapidly growing. The incidence of cancer increases substantially with age. We investigated the risk of elective abdominal surgery for malignant tumors of the digestive system depending on age and comorbidity.

In our prospective study, we analyzed 120 patients with malignant tumors of the digestive system, in which elective curative resections were performed. We divided the patients into three groups: the first under 64 years, the second between 65 and 74, and the third over 75 years of age. In the postoperative course we recorded different types of complications and intra-hospital mortality. Results were described in total numbers and/or frequency percents. The influence of age and number of co-morbid conditions and complications on postoperative mortality was investigated by stepwise logistic regression; 44.2% of patients were younger than 64 years of age, the same number was between 65 and 74 years and 11.7% older than 75 years of age. Nearly half of the patients in the first group did not have any co-morbidity. Only 18.9% in the second group and 28.6% in the third did not have co-morbidities. The rate of postoperative complications was higher in the elderly. The rate of postoperative mortality was also higher but without statistical significance among the groups. Using stepwise logistic regression, we found that age alone or co-morbidity, irrespective of the numbers, are not independent risk factors for mortality.

Overall mortality of 8.95 % in patients older than 65 years justifies radical surgical intervention even in very old individuals without severe co-morbid conditions or functional impairment, since they could benefit from surgery in a similar degree as younger patient.

*Key words:* cancer surgery, elderly, postoperative complications

## INTRODUCTION

Geriatric population is rapidly growing. Median life expectancy has increased dramatically in all industrial countries and is still increasing. In the Western Europe, average survival of 60 years old individuals is 24 years and 6 years for 80 years old subjects. In the United States, the number of patients over 65 years of age is predicted to increase by 13.3%

by 2010 and by 53.2% by 2020. The incidence of cancer increases substantially with age. It has been reported that cancer incidence is 11 times higher among those older than 65 years (1). Two out of three solid tumors occur in patients aged 65, and most cancer-related deaths occur within this age group (2).

Elderly patients who present with functional impairment and/or co-morbid conditions have an increased risk of postoperative complications.

However, evidence suggests that many elderly patients are as likely to benefit from standard cancer treatment as younger patients (3).

In many of these old patients with cancer, surgeons have to decide whether they can endure major resection as the best therapy or whether in cases with too high a risk other less straining therapies might be chosen (4).

We investigated the risk of elective abdominal surgery for malignant tumors of the digestive system depending on age and co-morbid conditions.

### MATERIAL AND METHODS

In our prospective study we analyzed 120 patients (51 women, 69 men), with malignant tumors of the digestive system, in which elective R0 resections were performed. The following procedures were included in the study: left or right hemicolectomy, rectal resection, abdominoperineal resection, total or subtotal gastrectomy, duodenopancreatectomy and segmental liver resections. According to the criteria of the WHO, we divided the patients into three age groups: the first group under 64 years, the second group between 65 and 74 years of age and the third over 75 years. Co-morbid conditions were recorded according to Satariano's co-morbidity index (5). In the postoperative course we recorded anastomotic leakage, other local complications (ileus, bleeding and wound healing impairment), cardiopulmonary complications, other systemic complications (renal failure, venous thrombosis, and cerebral disturbances) and mortality defined as postoperative death during hospital stay. Results were described in total numbers and/or frequency percentages. Statistical significance of mortality in different groups of patients was calculated with chi-square test and defined as  $p < 0.05$ . The influence of age and number of co-morbid conditions and complications on postoperative mortality was investigated by stepwise logistic regression, using SPSS (Version 15).

### RESULTS

The study enrolled 120 patients with malignant tumors of the digestive system. Majority of the patients were diagnosed with colorectal carcinoma 95 (79.2%), 18 (15%) had carcinoma of the stomach, 3 (2.5%) liver tumors either primary or secondary and 4 (3.33%) pancreatic cancer. All 120 patients were operated at the Clinic for General Surgery, Clinical Center Nis. Median age was 64.58 years  $SD \pm 11.21$ , the youngest patient was 26 years old, the oldest 83 years; 53 (44.2%) patients were younger than 64 years, 53 between 65 and 74 years

and 14 (11.7%) older than 75 years. In the first two groups sex ratio was in favor of men, in the third group women predominated with 64.3% due to their higher life expectancy in our country (Table 1).

Table 1. Distribution of age according to the criteria of WHO and sex

	Men		Women		Total	
	N	%	N	%	N	%
Age						
<64	30	43.5	23	45.1	53	44.2
65-74	34	49.3	19	37.3	53	44.2
75+	5	7.2	9	17.6	14	11.7
Total	51	100.0	69	100.0	120	100.0

Table 2 shows the number of patients with co-morbidities in different age groups.

Table 2. Number of patients and co-morbidities depending on age

	<64		65-74		75+	
	N	%	N	%	N	%
Co-morbidity						
0	22	41.5	10	18.9	4	28.6
1	20	37.7	16	30.2	4	28.6
≥ 2	11	20.8	27	50.9	6	42.9
Total	53	100.0	53	100.0	14	100.0

In the first group, 41.5% of the patients did not have co-morbidities, 37.7% had one and 20.8% had two or more. In the second group, only 18.9% had none, 30.2% one and 50.9% two or more co-morbidities. The percentages for the third group were 28.6%, 28.6% and 42.9%, respectively. Severe cardiac diseases and diabetes mellitus were the most frequent accompanying diseases.

The rate of postoperative mortality and postoperative complications was obviously higher in the aged (Table 3).

Table 3. Postoperative complications and mortality depending on the age of patients

	Patients		Anastom.	Local	Systemic	Cardiopulm.	Mortality
	N	%	leakage	complica-	complica-	complica-	
Age			%	tions	tions	tions	
<64	53	44.2	3.8	3.8	7.5	5.7	3.8
65-74	53	44.2	3.8	20.8	17.0	15.1	11.3 <sup>ns</sup>
75+	14	11.7	0.0	14.3	21.4	7.1	0.0 <sup>ns</sup>
Total	120	100.0	3.3	12.5	13.3	10.0	6.7

ns- Not significant compared with age <64

Only the rates of anastomotic leakage decreased from 3.8% in first two groups to 0% in the third group. Local complications were low in the first group (3.8%) but rather high in the next two groups, 20.8% and 14.3%, respectively. Systemic complications increased gradually from 7.5% for the first group, to 21.4% in the third group. Severe cardiopulmonary complications were rare in the first group (5.7%), but surprisingly high in the second group of patients (15.1%). In the third group, the rate of cardiopulmonary complications was lower which had an effect on mortality. The rate of postoperative mortality of patients was higher in the aged but without statistical significance among the groups.

Table 4. Univariate analysis of risk factors for mortality after abdominal surgery for cancer

	OR	95%CI	p
Cardiopulmonary complications			
No	1		
Yes	53.0	8.67-320.04	<0.01
Anastomotic leakage			
No	1		
Yes	1.27	0.000-1.90E+23	0.53
Systemic complications			
No	1		
Yes	22.55	3.70-132.2	0.02
Local complications			
No	1		
Yes	5.0	1.60-23.94	0.42
Comorbidities			
0	1		
1	0.98	0.54-14.91	0.40
?2	5.25	0.63-48.03	0.22
Age, years			
<64	1		
65+	2.08	0.85-12.68	0.73

Using stepwise logistic regression we found that the presence of all types of postoperative com-

plications, except for anastomotic leakage, had impact on mortality. A patient with cardiopulmonary complications had 53 times greater chance of dying compared to those without complications.

The presence of systemic complications such as renal failure, venous thrombosis, and cerebral disturbances, and local complications carries 23 or 5 times higher mortality risks, respectively. Age alone and co-morbidity, irrespective of numbers, are not independent risk factors for mortality (Table 4).

#### DISCUSSION

In the first half of the last century, operative mortality in elective settings was high for patients over 70 years of age (up to 20% compared to 5% in modern series). It has been exactly 60 years since Welch reported a large series of abdominal operations in patients over 70 years of age with perioperative mortality of 20.7%. He concluded that the surgery itself was safe but that senior patients required greater attention in their perioperative management (6).

Improved diagnostic procedures, intensive preoperative, perioperative and postoperative care made radical and curative surgery for elderly group of patients possible. This development is especially seen in patients with colorectal carcinoma. Greenburg and Payne (7, 8) in their separate studies had about 35% of patients older than 70 years with colorectal carcinoma who underwent elective radical surgery. These studies also demonstrate a specific problem. Many authors set different age limits, from 65 years, 70, 75 years, over eighty years (9-12). This may come as a problem when comparing publications about surgery in elderly patients. Authors should come to the agreement to use the same age limits in order to get comparable results. We decided to use the WHO age classification which differentiates between younger patients under 64 years, older patients - 65 and 74 years and old patients above 75

years of age. This age classification reflects the age structure of industrial nations with a high percentage of old but still very vital individuals.

In our study the median age was 64.58 years. We included only the patients with curative R0 resection. Patients with only local tumor excision or palliative procedure or urgent operations were excluded from the study. We included the curative resection to suggest that many elderly patients are as likely to benefit from standard cancer treatment as younger patients, since surgery is probably the most successful treatment option at present.

Almost 55% of our patients were older than 70 years. Whereas sex distribution was similar in the first and second group, almost 65% of patients from the third group were females. This phenomenon reflects sex distribution of the population in our country, where the percentage of old women is much higher than that of old men. A two to three-fold increase of mortality in elderly is recorded in the literature (4). According to this, the mortality rate in the first group was one third of the mortality rate of next two groups. Reasons for this seem to be less the patient age alone but rather a high rate of co-morbid conditions in the elderly (13).

It is also difficult to compare results among the studies for co-morbid conditions since various authors use different criteria for accompanying diseases. For instance, Hestelberg et al. used only five co-morbid conditions which he named risk factors: pulmonary diseases, cardiac diseases, renal failure, diabetes mellitus and arterial circulatory disturbances. In his study, only 20.4% of the patients older than 75 had two or more co-morbidities. In our study, the percentage of patients within this category was already 50.9% in the second group. The percentage of first and the third group with two or more co-morbidities was also clearly higher in our study. The reason is certainly wider definition of co-morbidities. We used Satarian' index of co-morbidities with much wider spectra of diseases that are accounted for as co-morbid conditions. Del Guercio studied patients older than 65 with invasive cardiopulmonary methods and found only 13.5% with normal organ and physiological function. The rest of patients showed more or less distinct changes (14).

According to this, we probably missed to account for a large number of various co-morbid conditions due to 'underdiagnosis'. Nevertheless, there is a need for good preoperative treatment and surveillance of all co-morbid conditions in order to reduce postoperative complications and mortality.

Analyzing our results, we found surprisingly lower mortality rate in the third group and number of patients with one or two co-morbidities compared to the second group of younger patients. There are two

possible explanations. The first is a small number of patients and the other is a good selection of patients. We think that lots of patients older than 75 will not be referred to a surgeon. We believe that some general practitioners or oncologist especially in smaller hospitals will advise palliative procedures or some form of non-surgical therapy.

The study by Hesterberg (4) demonstrated that death in colorectal surgery in old patients is caused by surgical complications in only one third, but two thirds are due to non-surgery related complications. Dinstl (15) gave the same results earlier for surgery of colon and gastric cancer. These results are confirmed by our data. Death in the first group of patients was caused equally by anastomotic leakage and local complications. Obviously, there is a high percentage of systemic complications and cardio-respiratory complications in the first group, however, with negligible impact on mortality. On the other hand, a higher rate of almost all postoperative complications in the second and third group had influenced the high mortality rate especially in the second group. Death in the second group of patients was related to systemic complications in two thirds.

Analyzing mortality in relation to complications, we found higher mortality rate in cases with all types of postoperative complications except for anastomotic leakage. A low rate of anastomotic leakage and related mortality is due to the number of patients without anastomosis. In our study, we enrolled the patients with liver resections and Hartmann procedures which are ending without anastomosis. Our data are not relevant in that matter.

As concluded in studies by Boyd et al. and Hesterberg (4, 16), age alone had no statistical influence on the mortality rate. This was confirmed by our results.

Overall mortality of 8.95 % in the groups of patients older than 65 years justifies radical surgical intervention even in very old patients without severe co-morbid conditions or functional impairment, since they could benefit from surgery just as well as younger patient.

## CONCLUSION

Geriatric population is growing, and hence clinical decision making is often confused by the effects of ageing. Age should not be the only parameter considered when addressing a medical problem (17).

The rate of postoperative complications and mortality in elective abdominal surgery is higher in older patients due to co-morbid conditions, not to age alone (18). In patients with severe co-morbid conditions with limited life expectancy less straining



therapies should be considered.

Clearly, there is a need for a valid and reliable multidimensional instrument to provide more detailed information about preoperative state of

older patients, not only according to chronologic age or presence of diagnosed co-morbid conditions in order to prevent severe postoperative complications and to reduce mortality (19).

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## POSTOPERATIVNE KOMPLIKACIJE I SMRTNOST POSLE ELEKTIVNIH OPERACIJA KARCINOMA DIGESTIVNOG TRAKTA KOD STARIJIH BOLESNIKA

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## SAŽETAK

**Gerijatrijska populacija se ubrzano povećava. Incidenca karcinoma značajno raste sa godinama starosti. U radu je ispitivan rizik elektivnih operacija malignih tumora digestivnog trakta u vezi sa starošću i pridruženim bolestima.**

**Prospektivnom studijom analizirano je 120 bolesnika sa malignim tumorima digestivnog trakta koji su podvrgnuti elektivnim radikalnim resekcijama. Bolesnici su podeljeni u tri grupe: prva ispod 64 godine, druga između 65 i 74 i treća preko 75 godina starosti. U postoperativnom toku praćene su različite vrste komplikacija i stopa smrtnosti tokom hospitalizacije. Rezultati su prikazani apsolutnim brojevima i/ili u procentima.**

**Uticaj godina starosti, broj pridruženih bolesti i komplikacija na postoperativnu smrtnost ispitani su metodom univarijante binarne logističke regresije.**

Bolesnika mlađih od 64 godine bilo je 44,2%, isti broj bio je u drugoj grupi i 11.7% bilo je starijih od 75 godina. Skoro polovina bolesnika iz prve grupe nije imala nijedan komorbiditet. Samo 18,9% u drugoj i 28,6% u trećoj grupi nije imao pridružene bolesti. Učestalost postoperativnih komplikacija bila je veća u grupi starijih bolesnika. Postoperativna smrtnost takođe je bila veća ali bez statističke značajnosti među grupama. Koristeći univarijantnu logističku regresiju utvrđeno je da godine same po sebi, kao ni postojanje pridruženih bolesti, ne predstavljaju nezavisan faktor rizika za postoperativnu smrtnost.

Ukupan mortalitet od 8,95% kod bolesnika starijih od 65 godina opravdava radikalne hirurške intervencije čak i kod veoma starih, koji ne pate od težih sistemskih bolesti ili funkcionalnih poremećaja. Stariji bolesnici jednako mogu imati koristi od radikalne hirurške intervencije kao i mlađi.

*Ključne reči:* onkološka hirurgija, stariji, postoperativne komplikacije