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# The impact of postoperative intensive care on mortality and morbidity of elderly patients following colorectal surgery

## *Wpływ intensywnej opieki pooperacyjnej na śmiertelność i chorobowość wśród pacjentów po zabiegach chirurgicznych jelita grubego i odbytnicy*

### **Abstract**

**Background.** Old age is often associated with significant medical conditions and unfavorable physical status that is related to higher rates of morbidity and mortality.

The aim of the study was to compare postoperative morbidity and mortality rates in patients 80 years of age or older, who have undergone elective or emergency major colorectal surgery, with and without an intensive care unit (ICU) setting.

**Material and methods.** A retrospective study covering the years 1991–1996. The files of eighty-seven patients aged 80 years or older (mean age 83.7) following emergency or elective colorectal surgery were studied. Preoperative physical status was evaluated according to the American Society of Anesthesia (ASA) physical status classification system. Medical or surgical complications, including perioperative death were recorded. The morbidity and mortality rates with and without postoperative monitoring in an ICU setting were compared within the elective and the emergency groups.

**Results.** There were 71 elective and 16 emergency operations. Eight emergency and 47 elective procedures were performed in the era when an intensive care unit was not available in our hospital. The mean overall hospital stay was 10.5 days. Morbidity rates for the elective and emergency groups were 28% and 31%, respectively. Overall mortality rate was 13.8%, with 4.2% and 56.3% in the elective and emergency groups, respectively. Mortality rates among the emergency operations with and without postoperative intensive care was 12.5% and 100%, respectively ( $p < 0.001$ ). Routine postoperative care in the ICU had no advantage in the elective group ( $p = 1$ ).

**Conclusions.** Although morbidity, mortality and overall hospital stay are acceptable among elderly patients undergoing elective colorectal surgery, mortality rates could be tremendously high in the emergency cases. Postoperative care in ICU may decrease the mortality rate among the emergency cases, but it does not seem to provide any advantage in elective cases.

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**key words:** colorectal surgery, elderly, intensive care unit, mortality

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### **Introduction**

In most Western countries the number of people aged 80 years and more is increasing, both in absolute terms and as a proportion of the general population [1–3]. The average life expectancy of people over the age of 70 and 80 is estimated at

13.9 and 8.3 years, respectively [4]. Cancer is the second leading cause of death in the elderly and colorectal cancer is the second leading cause of death from cancer [5]. In addition, the relative incidence of colorectal cancer among the elderly has increased during recent years [6–8]. Emergency admissions of elderly patients are frequent (50–67%) and reflect their tendency to postpone surgery until complications or deterioration require treatment [2, 3, 9, 10]. Various poor indicators in the elderly undergoing colorectal operation have been identified, such as emergency surgical treatment, high preoperative American Society of Anesthesia (ASA) score, obstruction and presence of preexisting medical illnesses [11–14]. It is often difficult to establish a clear-cut indication for the admission of elderly patients to an intensive care unit (ICU), where greater risks are involved, while benefits are not always predictable. Moreover, the number of beds in an ICU is usually limited, and admission of geriatric patients who tend to “block” beds, may have a greater economic impact on hospital costs [1, 3].

A retrospective study of elective and emergency colon resections in patients over 80 years of age was undertaken to assess the impact of a surgical ICU aftercare policy, by comparing the mortality and morbidity rates during two periods of time: before and after the establishment of an ICU.

### Material and methods

Between January 1991 and June 1996, 610 patients underwent major colorectal surgery in our surgical division, 87 of whom (14.3%) were 80 years of age or older. Eighty one patients underwent resection and anastomosis, whereas 6 patients had a colostomy or a palliative bypass procedure. The following parameters were assessed: age, sex, presenting symptoms, type of admission (emergency or elective), type of procedure, medical or surgical complications, death and cause of death. In addition, clinical data regarding the main surgical disease and any significant concomitant diseases were also recorded. Surgical intervention within 24 hours of admission was considered as an emergency operation and all deaths occurring within 30 days of surgery were recorded. Each patient was classified before operation by an anesthesiologist according to the physical status classification of the ASA. Associated diseases were defined as present if the patient was receiving specific drug therapy.

Following the establishment of an ICU in our hospital in February 1994, all elderly patients who underwent a major colorectal surgery (emergency or elective) were monitored and treated postoperatively in the ICU until they were able to be transferred back to the surgical ward.

### Statistical analysis

Results are expressed as mean  $\pm$  standard deviation (SD) or as a proportion. The mortality rates among the various groups (elective, emergency and subgroups) were compared using the Fisher's Exact Test, and a p value of less than 0.05 was considered significant.

### Results

Among the 87 patients who underwent major colorectal operations, 50 (57.5%) were males and 37 (42.5%) females. The mean age was 83.8 years. Seventy-one patients (81.6%) had an elective operation and 16 (18.4%) required an emergency procedure. Eighty-two patients (94.3%) were operated for colorectal cancer and 5 (5.7%) for benign conditions: diverticulitis, ischemic bowel and iatrogenic perforation. Of the 87 patients, 61 (70.1%) had one or more significant associated diseases (Table 1).

The main complaints of the patients in the elective group were changes in bowel habits, weakness and anemia. Only 54% of the elective patients had a colonoscopy done before hospitalization, while 46% had a colonoscopy as a part of their in-hospital work-up. The emergency procedures were performed mainly for obstructing carcinoma of the colon (75%), diverticulitis (6.25%), ischemic bowel (12.5%), and iatrogenic perforation of the large bowel (6.25%). The majority of the patients, in both groups were classified as ASA 2 or 3, with

**Table 1.** Associated medical conditions in 87 patients undergoing colorectal surgery

**Tabela 1.** Schorzenia towarzyszące w grupie 87 pacjentów poddanych zabiegom jelita grubego

Medical condition	No.	Percent
Hypertension	31	36
Ischemic heart disease	24	28
Arrhythmia	11	13
Congestive heart failure	9	10
Cerebral vascular disease	9	10
Chronic renal failure	4	5
Chronic pulmonary disease	7	8

**Table 2.** Distribution of the patients operated urgently and electively by their preoperative ASA classification, before and after ICU was established

**Tabela 2.** Podział pacjentów operowanych w trybie nagłym i planowym na podstawie klasyfikacji ASA, przed i po utworzeniu oddziału intensywnej terapii

ASA	Emergency group		Elective group	
	Before ICU	ICU period	Before ICU	ICU period
I	1	2	6	6
II	3	3	24	10
III	3	3	13	6
IV			4	2

**Table 3.** Postoperative complications in 28/87 patients

**Tabela 3.** Powikłania pooperacyjne występujące u 28 na 87 pacjentów

Complication	No. (Percent)
Cardiovascular	8/87 (9%)
1. Atrial fibrillation	4
2. Myocardial infarction	2
3. Exacerbation of CHF	2
Infectious	11/87 (13%)
1. Wound infection	3
2. Pneumonia	4
3. Urinary tract infection	4
Prolonged ileus	6/87 (7%)
Anastomotic leakage	2/87 (2%)
Fever of unknown origin	1/87 (1%)

a similar distribution of the ASA classification before and after establishment of the ICU (Table 2). The mean duration of symptoms and signs before diagnosis of colorectal carcinoma was 15.3 weeks (range-1 week to 1.5 years). Of the 82 patients with colon carcinoma, 34 (41.5%) were in Dukes' C and D stage, while 47 (57.3%) were in Dukes' B and 1 (1.2%) in Dukes' A.

Overall hospitalization time averaged 10.5 ( $\pm$  4.4) days and the mean stay in the ICU was 2.5 ( $\pm$  1.5, 1–5) days.

Major complications occurred in 28 patients (32.2%) (Table 3), most of them being infectious (16%) or cardiovascular (9%). The postoperative mortality rate for the whole group was 13.8% (12/87).

The complication rate for the elective group was 28.2% (20/71) and for the emergency group 31.3% (5/16) not statistically significant. However, the mortality rate was 4.2% (3/71) and 56.3% (9/16) in the elective and emergency groups, respectively.

Elderly patients operated urgently before the ICU era had a mortality rate of 100% (8/8), while those in the ICU period had a significantly lower mortality rate (12.5%;  $p < 0.001$ ). However, the mortality rate in the elective groups did not differ significantly between the two periods of time (Table 4). The predominant causes of death in the emergency group were sepsis and multi-organ failure (67%), followed by cardiac complications (22%). Fatal septic complications and multi-organ failure ensued in two cases of colonic perforation due to obstructing tumor, two cases of obstructing colon carcinoma without perforation and one case of mesenteric ischemia (Table 5).

The surgical diagnoses of patients operated urgently before the ICU era were: 5 cases of obstructing colon carcinoma, 2 cases of colonic perforation, and one case of mesenteric ischemia. Among patients operated urgently during the ICU period there were 4 cases of obstructing colon carcinoma, 2 cases of colonic perforation, one case of diverticulitis and one case of massive colonic bleeding.

### Discussion

The continuous increase in the number of elderly people in Western societies is well known. Thus, it is not surprising that more patients of advanced age are found to need surgical interventions.

In the present series the incidence of octogenarians operated for colorectal pathology was 14.3%, higher than that reported by others in the literature [1–3, 15].

Emergency operations in the elderly are frequent and reflect the tendency to postpone surgery until complications require treatment [2, 3, 9, 10]. Consequently, old patients carry an increased risk of postoperative morbidity and mortality. In the pre-

**Table 4.** Cross tabulations and comparisons of mortality rates of colorectal surgery in elderly patients with respect to ICU setting**Tabela 4.** Tabulacje krzyżowe i współczynniki umieralności osób starszych po zabiegach jelita grubego i odbytnicy, przed i po utworzeniu oddziału intensywnej terapii

By groups		Mortality rate	Fisher's Exact Test
		N/Total	(%)
Both groups	Before ICU	10/55	18.18; p = 0.20
	With ICU	2/32	6.25
Emergency Group	Before ICU	8/8	100
	With ICU	1/8	12.5; p < 0.01
Elective group	Before ICU	2/47	4.26
	With ICU	1/24	4.17; p = 1.00
By period			
Before ICU	Emergency	8/8	100
	Elective	2/47	4.26; p < 0.01
With ICU	Emergency	1/8	12.5
	Elective	1/24	4.17; p < 0.44

sent study, the frequency of emergency operations was 18.4%, which correlates well with the relatively short duration time of symptoms, but is lower than that reported in the literature [15].

The majority of the patients, both in the elective and emergency groups, were classified as ASA 2 or 3, reflecting the high incidence of associated diseases. Indeed, 70% of the patients had one or more significant associated medical conditions.

The hospitalization period for old patients is expected to be prolonged [3, 16] and recent publications [17, 18] have reported an average length of stay of 18 days for this age group. In our series a mean

overall hospital stay of 10.5 days with a mean stay in the ICU of 2.5 days was found, confirming findings of other studies [9, 19], that elderly patients do not, in general, "block beds".

Major complications occurred in 28 patients (32.2%), with no statistically significant difference between the emergency and elective groups. Similar results have been reported by others [10, 11, 20, 21]. The most common complications were infectious (16%) or cardiovascular (9%).

The postoperative mortality rate for the whole group was 13.8%, for the elective group 4.2%, and for the emergency group 56.3%, the latter higher than

**Table 5.** Causes of death in the emergency and elective groups**Tabela 5.** Przyczyny zgonów w grupach poddanych zabiegom w trybie nagłym i planowym

	Preop. diagnosis	Type of operation	Emergency/Elective	Cause of death	ASA
1	Tumor of colon	Rt. hemicolectomy	Elective	Sepsis	2
2	Tumor of colon	Rt. hemicolectomy	Elective	Arrhythmia	4
3	Ischemic colitis	Subtotal colectomy	Emergency	Heart failure	3
4	Colon obstruction	Internal bypass	Emergency	Multiorgan failure, sepsis	2
5	Iatrogenic obstruction	Colostomy	Emergency	Myocardial infarction	3
6	Colon obstruction	Subtotal colectomy	Emergency	Pulmonary embolism	3
7	Colon obstruction	Rt. hemicolectomy	Emergency	Pneumonia, sepsis	3
8	Colon obstruction	Colostomy	Emergency	Multiorgan failure	3
9	Colonic perforation	Rt. hemicolectomy	Emergency	Multiorgan failure, sepsis	2
10	Tumor of colon	Rt. hemicolectomy	Elective	Extensive CVA*	4
11	Mesenteric ischemia	Rt. hemicolectomy	Emergency	Multiorgan failure, sepsis	3
12	Colonic perforation	Colostomy	Emergency	Multiorgan failure, sepsis	3

\* Cerebrovascular accident

that reported in the literature for emergent operations (17–33%) [11, 22, 23]. Moreover, the predominant cause of death in the emergency cases were sepsis and multi-organ failure (67%). The high, unacceptable mortality rate in the emergency group may be attributed to more frequent preexisting systemic illnesses, greater frequency of obstructing and perforated colonic lesions, which necessitated urgent operations and a high rate of infectious complications. Boyd et al. reported that infectious complications such as wound infection, intra-abdominal abscess, anastomotic leak, and respiratory problems occurred three times more often in elderly patients operated urgently [11]. Moreover, aged people are known to withstand infectious complications very poorly [14, 24].

As an ICU was not available before 1994, we were able to compare the mortality rate within the emergency and elective groups, with and without an intensive care setting. In our series, emergency operations performed in the pre-ICU period carried a mortality rate of 100%, as compared to those performed following the establishment of the ICU (12.5%;  $p < 0.001$ ). Conversely, the

mortality rate in the elective operations did not differ significantly between these two periods of time. Since the patients in the emergency groups, both before and during the ICU period, had a similar clinical profile (ASA score and surgical diagnosis), and were operated by the same surgical team, we may attribute the difference in the mortality between these two periods of time to the routine postoperative care in the ICU. The low mortality rates in the elective group may be due to better preoperative preparation and lower rate of severe septic complications.

Elderly patients with a colorectal pathology should be operated on elective basis whenever possible, and every effort must be made to avoid emergency operations. However, if an elderly patient requires an urgent operation, a postoperative care in an ICU is recommended. Conversely, an elderly patient operated electively may be treated in the surgical ward following surgery. The retrospective nature of this study, as well as, the small number of patients included in the emergency group, present major drawbacks of this work and further evaluation may be needed.

### Streszczenie

**Wstęp.** Podeszły wiek często wiąże się z rozwojem poważnych schorzeń i niekorzystnym stanem zdrowia, co skutkuje wyższymi współczynnikami zachorowalności i umieralności.

Celem badania było porównanie współczynników zachorowalności i umieralności pooperacyjnej pacjentów w wieku 80 lat i starszych, poddanych najczęstszym operacjom okrężnicy i odbytnicy, leczonych lub nieleczonych na oddziale intensywnej terapii.

**Materiały i metody.** Badanie miało charakter retrospektywny i obejmowało lata 1991–1996. Wykorzystano dokumentację medyczną 87 pacjentów w wieku 80 lat lub starszych (średnia wieku: 83,7 lat) poddanych zabiegom okrężnicy i odbytnicy. Na podstawie klasyfikacji Amerykańskiego Towarzystwa Anestezjologicznego (ASA) dokonano przedoperacyjnej oceny stanu fizykalnego pacjentów. Odnotowano wszystkie powikłania opieki medycznej i chirurgicznej, uwzględniając zgony śródoperacyjne. Porównano także współczynniki zachorowalności i śmiertelności pacjentów poddanych operacjom w trybie planowym i nagłym, leczonych lub nieleczonych pooperacyjnie na oddziale intensywnej terapii.

**Wyniki.** W badaniu uwzględniono 71 zabiegów planowych i 16 przeprowadzonych w trybie nagłym. Ośmiu operacji w trybie nagłym i 47 planowych przeprowadzono przed utworzeniem w ośrodku badawczym oddziału intensywnej terapii. Średnia długość pobytu w szpitalu wyniosła 10,5 dnia. Współczynniki zachorowalności w grupie chorych poddanych zabiegom planowym i zabiegom w trybie nagłym wyniosły odpowiednio 28% i 31%. Współczynnik umieralności całkowitej wyniósł 13,8% (4,2% w grupie poddanej zabiegom planowym i 56,3% w grupie poddanej zabiegom w trybie nagłym). Współczynniki umieralności w grupie poddanej operacjom w trybie nagłym przed utworzeniem oddziału intensywnej terapii i po utworzeniu wyniosły odpowiednio 12,5% i 100%, ( $p < 0,001$ ). Rutynowa opieka pooperacyjna na oddziale intensywnej terapii nie miała wpływu na wyniki w grupie poddanej zabiegom planowym ( $p = 1$ ).

**Wnioski.** O ile zachorowalność, śmiertelność oraz długość pobytu w szpitalu starszych pacjentów poddanych planowym operacjom okrężnicy i odbytnicy są możliwe do przyjęcia, o tyle współczynniki śmiertelności wśród chorych przyjętych w trybie nagłym mogą być znacznie podwyższone. Zapewnienie opieki pooperacyjnej w oddziale intensywnej terapii zmniejsza współczynnik umieralności wśród pacjentów poddanych zabiegom w trybie nagłym; nie ma natomiast wpływu na wyniki w grupie poddanej zabiegom planowym.

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**słowa kluczowe:** operacje okrężnicy i odbytnicy, osoby starsze, oddział intensywnej terapii, umieralność

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