Outcome of colorectal cancer resection in octogenarians

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Introduction. Octogenarians constitute a rapidly growing segment of patients undergoing colorectal cancer resection, but their outcomes remain understudied and under-reported. Our aims were to analyse outcomes of octogenarian patients undergoing curative colorectal resections compared with a similar cohort 2 decades younger.

Methods. Data from a prospectively collected database of consecutive patients undergoing colorectal resection between 2004 and 2006 were analysed. Primary endpoints were 30-day mortality and morbidity. The secondary endpoint was long-term survival.

Results. Eighty-one consecutive patients aged >80 years and 61 patients aged 60 - 70 years undergoing elective and emergency resections were identified. In the octogenarian group, 75.3% of resections were elective compared with 78.0% in the younger cohort (p=0.9), with pelvic procedures accounting for 34.6% and 44.3%, respectively (p=0.34). The elderly had a significantly higher median CR-Possum (performance status) score than the younger cohort (18.0 v. 14.0; p=0.001). Permanent stoma rates were similar (22% for octogenarians v. 27% for younger patients; p=0.8), as was pathological stage (p=0.24). There was 1 death within 30 days after resection in each group. Median survival in the octogenarian cohort was 73 months compared with 74 months in the younger cohort, and 5-year survival rates were 53.1% and 66.0%, respectively (p=0.2, Mantel-Cox). CR-Possum score did not affect overall survival (p=0.711, Mantel-Cox), but a higher score correlated with more postoperative complications in both groups.

Conclusions. Octogenarians have poor performance status, but can undergo resection with acceptable mortality and morbidity. Overall survival in the two age groups studied was similar, with poor performance status being associated with higher postoperative complications but no long-term difference in survival.

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Colorectal cancer is predominantly a disease of the elderly. It is the second most common cancer in the UK and the third most common cause of cancer-related death.[1] Surgical resection, either for cure or palliation, remains the mainstay of treatment.[1,2] Long-term survival is related to the extent of disease at diagnosis. Emergency surgery confers a worse outcome in terms of both postoperative mortality and long-term survival.[1,3-6]

Octogenarians form a rapidly growing segment of the UK population, and as colorectal cancer is a disease that increases in incidence with age, it poses a serious disease burden.[2] Figures from the Department of Health indicate that the population aged over 85 years has tripled in the past decade from 600 000 to 1.5 million in 2009, with projected figures for 2034 being over 3.5 million. Surgeons will therefore need to deal with the multifaceted management of an elderly patient population with symptomatic colorectal cancer.[3-5,7,8] The advent of laparoscopic surgery, enhanced recovery, innovative anaesthetic procedures and aggressive intensive care have made surgery less hazardous and have improved outcomes after major cancer resections.[9] Unfortunately elderly patients have other significant co-morbidities, such as cardiovascular and pulmonary disease, that increase their postoperative morbidity and mortality.[9,10]

Outcomes of colorectal resections in the elderly vary greatly in the literature, with some centres identifying age as an independent risk factor for postoperative mortality and morbidity compared with the younger population[11-13] and others indicating that it is not.[6] Studies directly comparing mortality and morbidity with younger patients are scant in the literature.[1,14,15] Furthermore, a delay in diagnosis and lack of screening in the elderly have also resulted in worse prognosis. Interestingly, those in favour of offering aggressive therapy to the elderly argue that their cancer-related mortality is similar to the younger population,[5,7,16] and death in elderly patients is often related to other causes such as medical conditions, with the cancer progressing slowly.[1] Data from the UK are limited, with comparative studies showing significant differences in terms of overall 5-year survival, 30-day mortality and postoperative morbidity.[13,15] In 2000 the Colorectal Cancer Collaborative Group produced a systematic review[2] concluding that the relationship between age and outcome was complex and confounded by differences in stage, site and pre-existing co-morbidities. Similar findings were demonstrated in Scottish cancer registry data,[17] which concluded that although early mortality in colorectal cancer occurred mainly in the elderly, age was not an independent contributor, and medical

co-morbidities and lifestyle factors played a key part in affecting outcome.

Hardiman *et al.* in the USA studied outcomes of over 10 000 patients, of whom octogenarians made up 30%.[18] They highlighted a disparity in the treatment modalities offered to the elderly patients; significantly fewer numbers received chemotherapy, and they had a low surgical lymph node yield. Similar data from Smith *et al.*[1] suggested that surgery in the elderly is often tailored to a less aggressive treatment regimen owing to their higher mortality and morbidity. Dimick *et al.* published data from a US nationwide inpatient sample of over 20 000 patients undergoing colorectal resection, showing that high-volume centres achieved better outcomes for octogenarians.[19] The Colorectal Cancer Collaborative Group systematic review[2] did not take improved intensive care and enhanced recovery into account, nor did it consider laparoscopic surgery in terms of outcomes; moreover, the data are not homogeneous owing to ethical and geographical diversity. There are limited if any data from the UK pertaining to 5-year survival in octogenarians undergoing colorectal cancer resection.

We aimed to analyse our experience of treating octogenarians with colorectal cancer at our institution and to compare them with a cohort 2 decades younger operated on during the same time period. Primary endpoints were 30-day mortality and morbidity and the secondary endpoint was long-term survival.

Methods

Data from a prospectively collected database of consecutive patients undergoing colorectal resection between 2004 and 2006 were analysed. Two groups of patients were included: those aged >80 years (octogenarian group), and a cohort aged 60 - 70 years (younger group). The indications for surgery were the same in both groups, with patients not undergoing curative resection being excluded from the study.

Data were collected on a standardised proforma for each patient and included gender, age, location and characteristics of the tumour, TNM classification (Dukes stage), type of operation, duration of hospital stay, intensive care support, co-morbidity, complications, disease-free survival and overall survival. To access the impact of performance status on postoperative morbidity and mortality, the specific colorectal physiological and operative severity scores of all patients (CR-Possum) were also collected.[20]

All statistical analyses were performed using Statview version 5.01 (SAS Institute Inc.). The Mann-Whitney *U*-test was used to establish significance between the non-parametric variables, and the chi-square test to determine significance in dichotomous variables. Continuous data sets were analysed using Student's *t*-test to determine significant differences between them. Overall survival curves were constructed using the Kaplan-Meier method and compared using the log-rank test.

Results

A total of 122 octogenarians with colorectal cancer and 84 patients in the younger age group were referred to the Colorectal Unit at the Countess of Chester Hospital, Cheshire, UK during the study period, and 81 (66.4%) and 61 (72.6%), respectively, underwent curative resection (p=0.36, chi-square test). The median age for the octogenarian group was 83 years (range 80 - 91 years) and that for the younger group 65 years. Equal proportions of both groups (octogenarian 75.3%, younger group 78.0%) underwent elective resections (p=0.34, chi-square test), approximately a quarter of the patients being operated on as an emergency. The distribution of symptoms in the two groups was similar, with alteration in bowel habits and rectal bleeding occurring in over 25% of patients. Anaemia was more prevalent in the octogenarian group (32.8%) compared with the younger group (18.0%) (p=0.6, chi-square test), which was in keeping with the greater number of right-sided colonic tumours in the older group. Patient characteristics and features of the tumours are summarised in Table 1.

The octogenarian group presented with significant co-morbidity pre-operatively (Fig. 1) compared with the younger cohort. Specifically, they had significantly more cardiovascular disease (p=0.04, chi-square test), and some of them had more than one co-morbidity (n=11, 13.6%). To evaluate the physiological status of the patients in both groups and its impact on overall survival further, CR-Possum scores were collated for each patient. As expected, the octogenarian group had a higher median score (18.0) than the younger group (14.0) (p=0.0001, Student's *t*-test).

Types of procedures performed (Fig. 2) were similar. More right-sided operations were done in the octogenarian group compared with the younger cohort, but this was not significant (p=0.2, chi-square test).

Table 1. Characteristics of patients aged >80 years and 60 - 70 years undergoing colorectal resection

	Age group		
	>80 years	**60 - 70 years**	***p*-value**
Number of patients	81	61	
Median age (years)	83	65	
Elective versus emergency (%)	75.3 v. 24.7	78.0 v. 22.0	0.9 (chi-square test)
Symptoms, *n* (%)			
Altered bowel habits	37 (45.7)	30 (49.2)	0.67
Rectal bleeding	27 (33.3)	31 (50.8)	0.2
Rectal discharge	5 (6.2)	5 (8.2)	0.64
Weight loss	10 (12.3)	8 (13.1)	0.89
Tenesmus	5 (6.2)	5 (8.2)	0.64
Anaemia, *n* (%)	20 (32.8)	11 (18.0)	0.4
Histological classification, *n* (%)			0.24 (chi-square test)
Dukes A	15 (18.6)	8 (13.1)	
Dukes B	37 (45.7)	22 (36.1)	
Dukes C1	24 (29.6)	25 (41.0)	
Dukes C2	5 (6.2)	6 (9.8)	

Operations for rectal cancer were done in 27 patients (33.3%) in the octogenarian group and in 27 (42.3%) in the younger group (p=0.58, chi-square test). Details of the rectal operations are shown in Fig. 2. Fewer ultra-low Hartmann's procedures were undertaken in the younger group, as expected (n=2 compared with n=10; p=0.055, chi-square test), but this did not attain statistical significance. Moreover the permanent stoma rate was similar in both groups (octogenarian group 27.2%, younger group 22.4%; p=0.2, chi-square test). This was a result of the greater number of abdominoperineal resections in the younger group.

There was no significant difference in postoperative histological findings between the two groups, with Dukes B and C tumours forming the bulk of the staging. On average, octogenarian patients stayed in hospital 4 days longer than their younger counterparts, with a median duration of stay of 14 days (range 4 - 68 days) as opposed to 10 days for the younger group (range 3 - 54 days), which was significantly different (p=0.01, paired t-test). Octogenarian patients who developed a postoperative complication had a significantly longer hospital stay (21 days) compared with the younger group (14 days) (p=0.03, paired t-test).

The two groups differed significantly with regard to postoperative complications, 21 (25.9%) of the elderly patients suffering some sort of postoperative complication compared with 7 (11.5%) of the younger cohort (p=0.031, chi-square test) (Fig. 3).

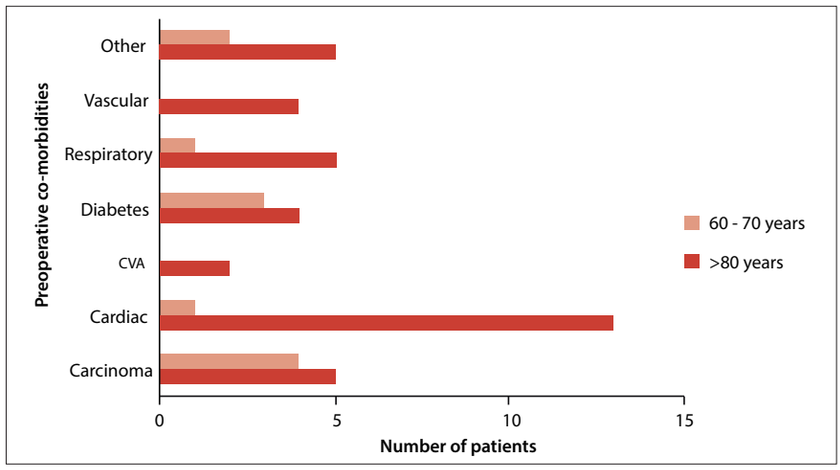

Fig. 1. Absolute number of co-morbidities in patients aged >80 years and 60 - 70 years undergoing colorectal resection (CVA = cerebrovascular accident).

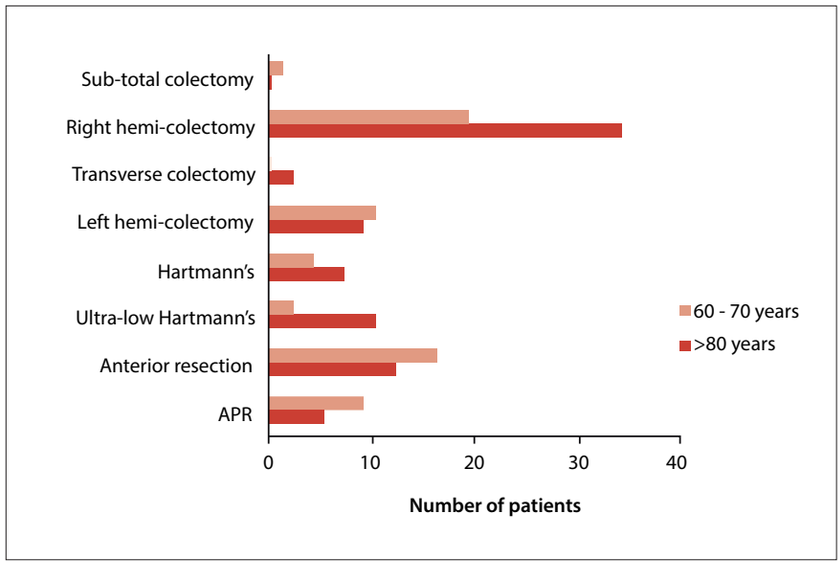

Fig. 2. Number and types of surgical procedures undertaken in patients aged >80 years and 60 - 70 years undergoing colorectal resection (APR = abdominoperineal resection).

The elderly were more than twice as likely to suffer from pneumonia, myocardial infarction and arrhythmia, along with minor complications such as urinary tract infection and electrolyte disturbances; however, none of these attained statistical significance when individually compared. Rates of surgical complications, i.e. anastomotic leakage and wound infections, were similar in the two groups.

The in-hospital mortality rate was 1.2% in the octogenarian group (1 patient, who died of a postoperative myocardial infarction) and 0% in the younger group. The overall 5-year survival rate (Fig. 4) was 66.0% for the younger patients compared with 53.1% for the octogenarians (p=0.2, Mantel-Cox), with median survival of 74 months and 73 months, respectively. Overall survival was not affected by the CR-Possum scores of the patients (p=0.711, Mantel-Cox), with a higher score not conferring worse survival. The CR-Possum score did, however, influence the rate of postoperative complications in both groups, and a higher score was significantly associated with postoperative myocardial infarction (p=0.012, Mann-Whitney U-test), atrial fibrillation (p=0.011, Mann-Whitney U-test) and pneumonia (p=0.015, Mann-Whitney U-test).

Discussion

The elderly subgroup of the UK population is steadily rising in numbers, making it vital to evaluate outcomes of these patients for structuring future care and resource allocation in the National Health Service. The literature on elderly patients with colorectal cancers reports heterogeneous results with regard to presentation, treatment and outcomes after surgery. As mentioned above, some authors have concluded that mortality and morbidity are higher in older patients undergoing colorectal cancer resection;[19] however, this age group should not be denied surgery, as favourable outcomes can be achieved.[1,4] When old age is viewed as an independent predictor the literature is sparse and conflicting, with only a handful of studies indicating it to be an independent predictor of short-term and long-term mortality after surgery in patients with colorectal cancer.[21] Tan *et al.*, on the other hand, have shown that age is not an independent predictor of mortality and morbidity in elderly patients undergoing resection for colorectal

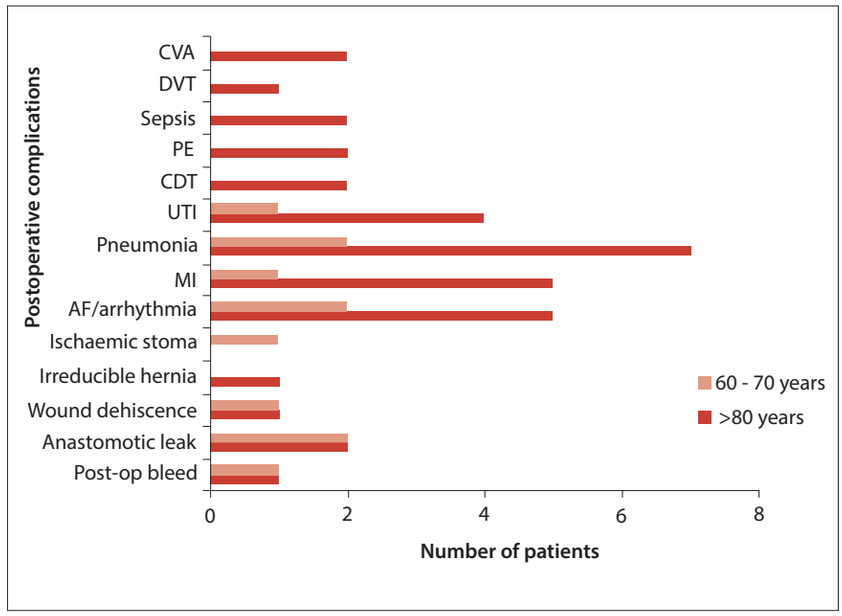

Fig. 3. Absolute number of postoperative complications in patients aged >80 years and 60 - 70 years undergoing colorectal resection (CVA = cerebrovascular accident; DVT = deep-vein thrombosis; PE = pulmonary embolism; CDT = Clostridium difficile*; UTI = urinary tract infection; MI = myocardial infarction; AF = atrial fibrillation).*

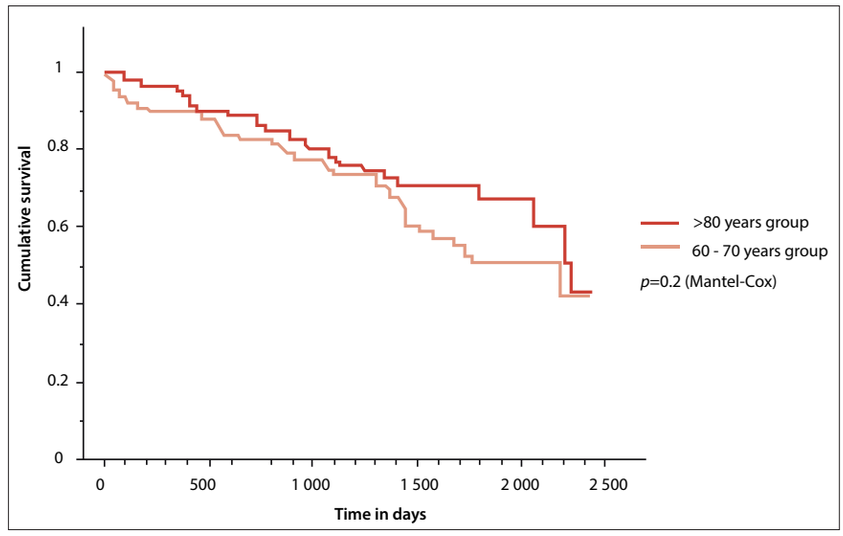

Fig. 4. Kaplan-Meier survival curves for patients aged >80 years and 60 - 70 years undergoing colorectal resection.

cancer; rather, existing co-morbidities and American Society of Anesthesiologists (ASA) grade are the only independent predictors.[6]

Our findings are comparable to the Colorectal Cancer Collaborative Group's systematic review and other studies, which found that elderly patients undergoing colorectal cancer resection had an overall significantly greater number of co-morbidities.[2,6] However, in contrast to these studies, we found a nearly equal proportion of emergency operations in our octogenarian and younger cohorts (24.7% v. 22.0%), which was not comparable to the systematic review findings of 29% and 11%, respectively.[2] This discrepancy may be due to improved critical care facilities and the widespread use of imaging modalities such as computed tomography scanning, which enable early detection of emergency colorectal cancer presentations.

Laparoscopic resection for colorectal cancer has emerged as a safe and acceptable modality and has gained widespread acceptance.[9,22,23] In this series the rate of laparoscopic resection was low, as it was in its infancy at our centre, so these procedures were excluded from the study. The literature suggests that compared with conventional procedures, laparoscopic colorectal surgery has similar if not better outcomes in elderly patients.[3,23] When compared with the younger group, our octogenarian patients had a greater number of postoperative complications. These were primarily medical in nature, such as cardiopulmonary complications, as opposed to directly associated with the surgery, such as surgical site infections and anastomotic leaks. A similar trend with regard to complications was also reflected in patients with poorer performance status, the bulk of whom were in the octogenarian cohort. The higher prevalence of co-morbidities in the older group is evidenced by their higher median CR-Possum score. However, it is important to note that irrespective of which group they belonged to, patients in our series with poorer performance status were more likely to have postoperative complications. This finding is in keeping with the current literature.[20]

Despite having more postoperative complications than the younger cohort, our octogenarian patients had no significant difference in median survival, which was 73 months compared with 74 months in the younger group. Moreover, the overall 5-year survival rate was 53.1% for the octogenarians compared with 66.0% for the younger cohort. These rates are better than most figures reported in the literature, which range from 24% to 51%.[3,4,7,9,12] Our figures are comparable to those of the Swiss, who have published 5-year survival rates of 61.5%[14] for patients aged over 70 years and 67% for octogenarians undergoing elective resection.[10]

Our study has limitations. As our database included only patients having surgery, we were unable to compare their overall mortality with age-matched controls who were not operated on. Finally, patient-relevant outcomes, such as discharge disposition, activities of daily living and quality of life, were not recorded.

In conclusion, although octogenarian patients have more pre-operative co-morbidities and short-term complications, our study showed no significant difference in overall survival compared with younger patients with the same disease. Careful selection of patients on the basis of

performance status is essential, as this will result n cancer-specific outcomes comparable to younger patients. Age alone should not be a reason to withhold surgery in the elderly, unless their clinical condition and physiological parameters do not allow for major resection.

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