



# The Prevalence and Outcomes of Colorectal Cancer Surgery in the Very Elderly

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## Abstract

**Introduction:** Sixty percent of all colorectal cancer patients in the UK undergo major surgery. Of these, 22% of patients are aged 80 years or older. Historically there has been a tendency to exclude very old patients from entering clinical trials (not just those within surgery), making evidence based clinical decision making more challenging [3]. It is difficult, therefore, to accurately guide this group of patients who have been assessed as fit for surgery. This is the first study to assess the outcomes for all older patients with colorectal cancer, regardless of whether they underwent surgical intervention or not.

**Methods:** Clinical case notes and electronic patients records were retrospectively reviewed for all patients admitted to North Bristol NHS Trust over a five-year period (January 2009 to February 2014). Patients presenting with a new diagnosis of colorectal cancer were identified. All patients aged 85 years and over were included in the study. Patients were stratified by clinical management strategy i.e. operative or non-operative management of their colorectal cancer. Primary outcome measure was overall survival.

**Results:** There were 199 patients included in the study, 50.8% (101) were male. Median age of all patients was 88 years (range 85-97 years) and 47% of all patients underwent surgery. More than half (57%) underwent right-sided resections (including hepatic flexure). Overall mean survival for non acute presentations of colorectal cancer were longer in both the operative group and non operative groups ( $p = 0.007$  and  $p = 0.03$  respectively). There was no difference between mean survival in patients presenting as acute surgical emergencies irrespective of operative or non-operative management ( $p = 0.31$ ).

**Conclusion:** A third of patients with colorectal cancer present as an acute surgical emergency. For this group of patients prognosis is poor and there does not appear to be a survival benefit in undergoing surgical resection.

## Introduction

Currently 60% of all colorectal cancer patients in the UK undergo major surgery [1]. Of these, 22% of patients are aged 80 years or older [2]. Not all older patients undergo surgery and as patient age increases, the numbers of those undergoing surgical resection declines. Less than 40% of patients aged over 85 years were offered surgical resection in 2013 (11.5% of all diagnoses of colorectal cancer in the UK). However, of those patients aged 85 years and older who did undergo surgery, 42% were alive at 2 years [1] postoperatively.

Older patients are chronically underrepresented in colorectal surgical studies [3,4]. Furthermore, the majority of available current evidence is focussed upon those who undergo surgical intervention. There is much less evidence pertaining to the non-operative management of older surgical patients with colorectal cancer. No studies, to our knowledge, have reviewed outcomes of the very elderly who are managed non-operatively [5]. As such, whilst data are available and accessible as to the risks, complications and potential outcomes of surgical intervention (such as validated online risk calculators e.g. [www.riskcalculator.facs.org](http://www.riskcalculator.facs.org)), it is much more difficult to counsel patients through the decision to proceed with non-operative management in terms of complications, outcomes and prognosis.

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**Table 1:** Patient demographic and operative characteristics.

	Mode of presentation	Total number (n=199)	Mean age(years)	% Female	Overall survival
Operation	Non-Acute	72(36%)	89	52%	47(65%)
	Acute	21(11%)	88	56%	11(52%)
No Operation	Non-Acute	56(28%)	89	61%	18(32%)
	Acute	50(25%)	89	53%	10(20%)

**Table 2:** Anatomical distribution of colorectal cancers.

Anatomical Site	Number	Percentage
Right	82	41%
Transverse colon	18	9%
Left	56	28.5%
Rectum	40	20%
Anal	1	0.5%
Metachronous	2	1%

There are much improved pharmacotherapy for the management of chronic medical conditions affecting older surgical patients and generally a greater awareness of an ever increasing ageing population and resulting challenges faced in managing these high risk patients. Traditionally, patients over the age of 80 years undergoing segmental colonic resection have been less likely to receive adjuvant therapies or additional surgery (for recurrence or metastatic disease) following their diagnosis of colorectal cancer when compared to patients under the age of 80 years [6,7]. However, studies have supported that even very frail older people can be offered tailored colorectal chemotherapy regimens safely [8]. It is therefore important to estimate survival in all older people with colorectal cancer irrespective of the intention for operative or non-operative management to aid in clinical decision making and counselling patients.

This study aimed to characterise the range of treatment options offered and mortality in a very elderly population presenting with colorectal cancer irrespective of operative or non-operative management.

## Methods

Clinical case notes and electronic patients records were retrospectively reviewed for all patients admitted to North Bristol NHS Trust over a five-year period (January 2009 to February 2014). North Bristol NHS Trust is a large NHS Trust in the South West of England. This study examined information currently collected as part of routine care. As such, the study was deemed to be service evaluation and did not require ethical approval.

Patients presenting with a new diagnosis of colorectal cancer were identified. All patients aged 85 years and over were included in the study. These included patients presenting as an emergency, and those referred from primary and secondary care. Patient demographics, type of presentation (acute or non-acute) and tumour site (right sided, left sided, rectal) were all recorded. Patients were stratified by clinical management strategy i.e. operative or non-operative management of their colorectal cancer. Factors contributing to clinical decision making for operative and non-operative management were also recorded e.g. patient choice, inoperable disease, and overall fitness for surgery.

Primary outcome measure was overall survival. Secondary outcome measures were post operative complications and length of

hospital stay (recorded as whole-day integers, with any part of a day rounded upward).

Statistical analysis was carried out using SPSS version 22. Continuous data are summarised as mean and median values and categorical data as frequencies with percentages. Comparisons were performed using chi squared testing and independent t tests.

## Results

A total of 199 patients were included in the study. 50.8% (101) of patients were male. Median age of all patients was 88 years (range 85-97 years). More than half of all patients (53%) included in the study were managed non-operatively. There was greater frequency of new colorectal cancer diagnoses referred by primary and secondary care services on a non-acute basis (64%) than as an acute surgical emergency. Patients who underwent surgery (acute or non acute) were younger than those who did not have operative intervention (mean age 87.8 years vs. 89.3 years,  $p = 0.002$ ).

No gender differences were demonstrated between the groups and patients mode of presentation are shown in Table 1.

The majority of tumours (41%) were right sided (including hepatic flexure). Two patients presented with metachronous cancers. Anatomical distributions of colorectal cancers in this patient cohort are shown in Table 2.

The median follow up was 783 days (range 126–1985 days) for all patients.

### Operative intervention

Ninety-three patients were managed operatively (47%). More than half (57%) of all patients undergoing operative intervention underwent right-sided resections (including hepatic flexure). The majority of these patients were female (60%). One fifth of patients underwent surgery for rectal tumours (anterior resection, total mesorectal excision, Hartmann's procedure or abdominoperineal resection). Interestingly, the majority of these patients were male (70%). Two patients had a subtotal colectomy and ileostomy. Both these patients presented with metachronous colorectal cancers. Relatively few patients over the age of 85 years had a defunctioning stoma performed as a palliative procedure (9%). These results are shown in Table 3.

Of all patients who underwent operative intervention and did not survive, time to event (death) was much longer for those patients who presented non-acutely than those presenting as acute surgical emergencies (449 days, range 22-1507 versus 138 days, range 2-380,  $p = 0.007$ ).

### Non-operative management

A total of one hundred and six patients were managed non-operatively. Acute and non-acute modes of clinical presentation were relatively equally represented in this group (47% vs. 53% respectively). Overall, mean survival in the emergency group (30%) was worse than

**Table 3:** Distribution of types of cancer surgery/intervention.

	No. of patients	Mean age (years)	% Female
<b>Operation Segmental resection;</b>			
Right sided	53	90	30%
Left sided	9	87	44%
Anterior resection / TME Hartmanns	20	88	30%
Abdomino-perineal resection	1	87	0%
Subtotal colectomy and ileostomy	2	86	50%
<b>Palliative procedure;</b>			
Radiotherapy	7	88	43%
Endoscopic Stenting	18	88	39%
Defunctioning Stoma	8	88	0%
<b>Non-operative</b>			
Patient declined treatment	11	90	9(75%)
Inoperable/unfit for surgery/too risky	66	89	43(63%)
Endoscopic resection	4	88	3(75%)

**Table 4:** Clavien-Dindo classification of complications.

Clavien Dindo Classification	Number of patients (%)
I	23 (45%)
II	11 (21%)
IIIa	4 (7%)
IIIb	6 (12%)
Iva	3 (6%)
IVb	1 (2%)
V	4 (7%)

I: No Need for Treatment; II: Pharmacological Treatment; III: Requiring Surgical or Endoscopic or Radiological Treatment (IIIa – Not Under GA, IIIb – Under GA); IV: Life Threatening Complication (Iva – Single Organ Dysfunction, IVb – Multi Organ Dysfunction); V: Death of a Patient

those presenting through the elective setting (251 days vs. 561 days,  $p \leq 0.001$ ).

Reasons for, and factors contributing to non-operative intervention in the management of these older patients included; patient choice, patients deemed to unfit for surgery, advanced stage disease (inoperable), other treatment modalities more appropriate (endoscopic stenting or palliative radiotherapy). Endoscopic resection was carried out in four patients presenting non-acutely with early colorectal cancers and endoscopic stenting performed in 16.9% of patients, all who presented acutely with symptoms of large bowel obstruction.

There was significant difference in the overall mean survival of patients managed non-operatively depending on mode of clinical presentation. Patients presenting non-acutely had a much longer mean survival time (348 days, range 16-1576) than those presenting as acute surgical emergencies (180 days, range 3-557)  $p = 0.03$ .

#### Outcomes of acute surgical presentation

Thirty five per cent of patients over the age of 85 years with colorectal cancer presented as an acute surgical emergency (56% female). The average of age of the patients was 88.8 years. Only 9% of all acute presentations underwent colonoscopy whereas 92% underwent an abdominal CT scan. 96% of all acute presentations were discussed at a multidisciplinary meeting (pre or post acute management). There

was a clinically significant difference in mean survival time in patients who did or did not undergo surgical intervention, but this did not reach statistical significance (335 days vs. 180 days,  $p = 0.38$ ). This is potentially due to sample size.

#### Outcomes of non-acute surgical presentation

Data was available for 69 out of the 72 patients who presented non-acutely and underwent operative intervention for their colorectal cancer. Mean length of stay was 10 days (range 2-35 days). Three patients did not survive the immediate post-operative period (mortality 4%). Complications were reported in 65% of patients. 40% of these were attributable to infection (wound, chest, UTI, anastomotic leak or abdominal collection). 24% of complications were attributable to post-operative ileus. Clavien Dindo classification of complications is shown in Table 4.

## Discussion

This study assessed outcomes after operative and non-operative intervention for colorectal cancer surgery in the very old. The study found that just over a third of all very old patients present as an emergency. Overall, 53% of very old patients did not undergo operative intervention for their bowel cancer, a figure higher than previously reported. Outcomes were worse for very old patients who presented acutely with a colorectal cancer. However, in all those patients that presented acutely with colorectal cancer, their time to death was similar irrespective of whether they underwent surgical intervention or not.

This is the first study to assess the outcomes for all older patients with colorectal cancer regardless of whether they underwent surgical intervention or not. Little evidence is available in the current literature comparing treatment options and management strategies for this complex group of heterogeneous and high-risk patients. Historically there has been a tendency to exclude very old patients from entering clinical trials (not just those within surgery), making evidence based clinical decision making more challenging [3]. The majority of randomised controlled trials evaluating efficacy of chemotherapy and surgery as treatment for colorectal cancer do not include patients over the age of 75 years. It is difficult, therefore, to accurately guide this group of patients who have been assessed as fit for surgery.

Individualising treatment approaches for colorectal cancer patients presenting non-acutely affords the expertise and input of the multidisciplinary team. In some patients chemoradiotherapy may be of benefit. Recent NBOCAP data suggested that in the UK 40% of all colorectal cancer patients do not undergo major surgery and 22% of these patients are aged 80 years or older (NBOCAP 13) [9]. Previous studies have reported that elderly patients would be interested in aggressive chemotherapy regimens and the morbidity associated with such treatment is the same for all ages [10]. The MRC Focus 2 trial also showed that even frail older people were suitable for chemotherapy for metastatic colorectal cancer [8]. Pilot data from the FOLFIRI trial suggests that those with metastatic disease may obtain benefit from chemotherapy in terms of survival and therefore oncology input is also warranted. Advanced disease in this age group therefore should be no barrier to treatment and recruitment into trials.

However, for those patients presenting as acute surgical emergencies, often with physiological derangement, clinical decision making is challenging and treatment options limited. There is little available evidence upon which to base a surgical opinion of when to operate and when not to operate. The latter of which is invariably more difficult. Surgical intervention for obstructing colonic tumours (segmental resection or proximal defunctioning stoma) has been the mainstay of treatment. However, colonic stenting, which was previously seen as a 'bridge' to surgery, is becoming increasingly readily available for the definitive management of obstructing colonic tumours. A quarter of all acute presentations in our study population underwent colonic stenting. Our results demonstrated that patients who present acutely and undergo surgery do not survive longer than those not offered surgical resection. Sample size was small and there are likely to be confounding factors contributing to this, such as fitness for surgery and a potential survival advantage seen with a longer follow up period. It is possible that patients in this age group do not live long enough to see the survival benefit of segmental resection.

Approximately one third of our older patients underwent elective colorectal cancer surgery. Their immediate post-operative mortality was 4%. This figure is similar to previously reported all age mortality rates [11]. Length of stay and complication rate in this patient cohort was higher than previously reported for all ages of patients undergoing enhanced recovery surgery similar to other studies of older surgical patients. Pawa et al. [12] in 2011 reported an increased length of stay, 30 day mortality and re-admission rate in octogenarians undergoing elective colorectal surgery. The mean age of patient in this series was 83 years. There is some evidence to support improved outcomes for elective patients with pre-operative optimisation in conjunction with geriatricians [13].

For the remaining two thirds of patients who are not deemed fit enough for surgical intervention a clearer evidence based pathway needs to be developed. For those presenting as an emergency there does not appear to be a survival benefit in undergoing surgery and this information needs careful discussion with each patient. The poor prognosis following emergency presentation is well recognised in younger population but this important finding in the oldest old needs highlighting.

Our study is limited by a small sample size and single site data collection. However, all non-acute surgical decision making occurred in the context of a multi-disciplinary team, including surgeons, pathologists, oncologists, radiologists and colorectal cancer specialist nurses. We were not able to accurately establish the

fitness of our cohort, using an established scoring system such as the American Society of Anaesthesia (ASA) grading. Therefore we were not able to appropriately stratify our population leaving us to focus on a heterogeneous population of different biological age. Our results, however, are in keeping with previous estimations of older people undergoing colorectal surgery.

It is also worth noting that we found an increased incidence of right sided colonic tumours (41%) compared to current published rates of 25% (Cancer statistics, CRUK). This finding is in keeping with results previously published. Hardiman et al. [6] reported, in a large analysis (n=10 433) of 80 year old people with colorectal cancer that 60% had tumours proximal to the splenic flexure, compared to 48% in people aged under 80 years (p< 0.001). This finding has two implications. Firstly, right sided resectional surgery is technically less challenging and therefore quicker, which has anaesthetic and post-operative implications for the frail older person. Secondly, this could imply different aetiology and pathophysiology in the older person and this finding warrants further molecular and clinical.

The proportion of older patients with a diagnosis of colorectal cancer will increase in the future. Currently in the UK there are 3 million people over 80 years of age (Mid-2013 Population Estimates UK Office for National Statistics, 2014). The number of people over 85 years of age in the UK is predicted to double in the next twenty years and nearly treble in the next thirty. Our study demonstrates that a third of patients in this older age group were considered fit enough to undergo surgical intervention for colorectal cancer. This fits with previous studies who have reported that 31% of men and 25% of women aged 85 are in very good or good general health (What does the 2011 Census tell us about the "oldest old" living in England & Wales? Office for National Statistics. 2013). Previous research has sought to establish outcomes for the third of patients who are fit enough for surgery. Whilst it is encouraging to learn that older people can undergo such interventions as successfully as their younger counterparts, it is a relatively small part of the overall picture. It may be that the two thirds of people who are not offered surgery may gain positive benefit from other, non-surgical interventions such as endoscopic resection/stenting or treatment with chemotherapeutic agents. In an era of advancing surgical techniques and therapies, clinicians should be striving to push the boundaries. There is a need for large high quality, well-designed randomised clinical trials to improve the evidence based upon which to make decisions for this important group of patients with colorectal cancer.

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