Accelerated discharge within 72 hours of colorectal cancer resection using simple discharge criteria

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ABSTRACT

INTRODUCTION Short hospital stays and accelerated discharge within 72 hours following colorectal cancer resections have not been widely achieved. Series reporting on accelerated discharge involve heterogeneous patient populations and exclude important groups. Strict adherence to some discharge requirements may lead to delays in discharge. The aim of this study was to evaluate the safety and feasibility of accelerated discharge within 72 hours of all elective colorectal cancer resections using simple discharge criteria.

METHODS Elective colorectal cancer resections performed between August 2009 and December 2015 by a single surgeon were reviewed. Perioperative care was based on an enhanced recovery programme. A set of simplified discharge criteria were used. Outcomes including postoperative complications, readmissions and reoperations were compared between patients discharged within 72 hours and those with a longer postoperative stay.

RESULTS Overall, 256 colorectal cancer resections (90% laparoscopic) were performed. The mean patient age was 70.8 years. The median length of stay was 3 days. Fifty-eight per cent of all patients and sixty-three per cent of patients undergoing laparoscopic surgery were discharged within 72 hours. Accelerated discharge was not associated with adverse outcomes compared with delayed discharge. Patients discharged within 72 hours had significantly fewer postoperative complications, readmissions and reoperations. Open surgery and stoma formation were associated with discharge after 72 hours but not age, co-morbidities, neoadjuvant chemoradiation or surgical procedure.

CONCLUSIONS Accelerated discharge within 72 hours of elective colorectal resection for cancer is safely achievable for the majority of patients without compromising short-term outcomes.

KEYWORDS

Colorectal cancer – Colorectal surgery – Accelerated discharge – Length of stay

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Despite laparoscopic surgery and enhanced recovery programmes resulting in shorter hospital stays for patients undergoing colorectal resections,^{1–5} accelerated discharge within 72 hours for a significant proportion of patients has not been widely achieved. The primary concerns about accelerated discharge after colectomy are the possibility of worse short-term outcomes among patients discharged early and a lack of well defined, broadly agreed discharge criteria.⁴ Several studies have found higher readmission rates with accelerated discharge^{5–8} and higher readmission rates have also been demonstrated with planned postoperative hospital stays of 2 days compared with 3 days even within successful accelerated discharge programmes.⁹

Although there are reports of successful accelerated discharge within 72 hours after colectomy with no increase in readmissions or complications,^{10,11} these are in contrast to common practice, even for patients treated with laparoscopic surgery within enhanced recovery programmes, as evidenced by much longer median lengths of stay in large multicentre trials and in the UK's national bowel cancer

audit.^{12–16} In addition, most series reporting on accelerated discharge generally involve heterogeneous patient populations (such as cohorts comprising both patients with benign and with malignant colorectal disease or cohorts including patients who require colorectal resection as well as those who do not) or highly select patient groups undergoing only one type of resection.^{10,11,17–20} Furthermore, some studies exclude important patient groups such as patients with more locally advanced tumours, patients needing stomas or patients who have not had a primary anastomosis.^{11,18}

A lack of agreement on appropriate discharge requirements may contribute to hospital stays being longer than necessary. One systematic review found 70 different sets of criteria to determine readiness for discharge in the literature.⁴ Strict adherence to long lists of stringent standards can lead to unnecessary delays in discharging otherwise well patients, which has particular relevance to healthcare systems strained by bed shortages. Many criteria agreed by the vast majority of surgeons lack a supporting evidence base. Most surgeons concur, for example, that passing flatus

or faeces is a strict requirement prior to discharge⁴ but there may be other indications of a return of gastrointestinal function that would allow earlier discharge.

In our institution, a laparoscopic colorectal surgeon (JE) has been using an enhanced recovery programme and simple criteria to facilitate accelerated discharge. The aim of this study was to evaluate the safety and feasibility of early discharge within 72 hours of colorectal cancer resection using simple discharge requirements.

Methods

A retrospective review was undertaken of consecutive elective colorectal cancer resections performed by a single colorectal surgeon at our institution between August 2009 and December 2015. Both open and laparoscopic resections were included in the study. Patients were excluded if they did not have a colorectal resection operation or if they had an emergency resection. There were no other exclusion criteria.

All patients were discussed at a local colorectal multidisciplinary team meeting prior to having surgery. Patients undergoing left-sided resections received mechanical bowel preparation unless contraindicated. Perioperative care was based on a standard enhanced recovery protocol. This included preoperative counselling and oral carbohydrate loading, avoidance of prolonged periods of unnecessary fasting and goal directed intraoperative fluid management. Postoperative analgesia was decided at the discretion of the anaesthesiologist, acute pain team and patient. It could include spinal anaesthesia administered immediately prior to surgery, regional block or patient controlled analgesia. Epidural anaesthesia was generally avoided. Nasogastric tubes were removed before emergence from anaesthesia.

Patients were given oral fluids to drink immediately upon recovery from anaesthesia and before transfer to the ward. Patients tolerating oral fluids were given solid food either the evening of an operation performed in the morning, or the next morning if their operation was performed later in the day. Patients were encouraged to sit out of bed on the day of the operation and to mobilise from the first post-operative day. Urinary catheters were removed the morning following surgery in all patients with an uncomplicated recovery unless the patient had a pre-existing long-term catheter. In cases where a patient developed urinary retention requiring placement of a catheter, discharge was not be delayed if the discharge criteria were satisfied and arrangements were made to remove the catheter at a subsequent urology clinic.

Patients were considered suitable for discharge if they satisfied a set of simplified discharge requirements. These consisted of adequate pain control on oral analgesia, normal observations (or patient's baseline) of vital signs, ability to mobilise sufficiently to manage in their current home environment (usually assessed by a physiotherapist), tolerating solid food orally and no significant derangement of postoperative renal function or haemoglobin measured on the first postoperative day. Notably, if patients were tolerating a solid diet without vomiting, abdominal distension or pain, this

was considered indicative of a return of gastrointestinal function and the passage of flatus or faeces was not considered an essential criterion for discharge.

A nurse from a dedicated early discharge team contacted patients by telephone or visited their home the day after discharge. The patients could then be visited or phoned on subsequent days according to need as assessed by the nurse. All patients were routinely reviewed by a member of the surgical team in an outpatient clinic the week after surgery.

Data collected included basic demographics, Charlson comorbidity index, type of procedure, whether patients received neoadjuvant radiotherapy or chemoradiotherapy, staging from histopathological examination, 30-day mortality, postoperative complications (graded according to the Clavien–Dindo classification), length of postoperative hospital stay (including any subsequent stay due to readmission within 30 days), readmission within 30 days and return to theatre. Comparisons were made between patients discharged within 72 hours and those with a longer postoperative length of stay. Means were compared using analysis of variance or the Mann–Whitney U test where appropriate and categorical data were compared using the chi-squared test. A *p*-value of <0.05 was considered statistically significant.

Results

Overall, 256 elective colorectal resections for cancer were performed over the study period. Of these, 230 (90%) were completed laparoscopically. The mean patient age was 70.8 years and 57% were male. Fifty-four patients (21%) received neoadjuvant radiotherapy or chemoradiotherapy prior to surgery. Fifty-seven (23%) received a stoma, in almost all cases for temporary diversion after anterior resection. The mean operative time was 169 minutes. Sixty patients (25%) had locally advanced T4 tumours.

The median length of hospital stay for all patients was 3 days (range: 1–72 days). Fifty-eight per cent of all patients and sixty-three per cent of patients undergoing a laparoscopic resection were discharged within 72 hours of surgery.

Table 1 shows the characteristics of patients discharged within 72 hours compared with those discharged after 72 hours. There were no significant differences in mean age, co-morbidity scores or the proportion of patients who had neoadjuvant radiotherapy or chemoradiotherapy. Open surgery and receiving a stoma were associated with a primary hospital stay of longer than 72 hours on univariate analysis.

Multiple logistic regression analysis confirmed that open surgery and receiving a stoma were significantly associated with an increased chance of a hospital stay longer than 72 hours. However, type of resection and presence of a locally advanced tumour were not.

Patients discharged within 72 hours had significantly better short-term outcomes than those who had longer hospital stays. There were fewer significant postoperative complications, and the readmission and reoperation rates for this group were lower (Table 2).

Table 3 shows the reasons for readmission. Of the 4 patients discharged within 72 hours who were readmitted with an anastomotic leak, 2 were managed with transrectal

Table 1 Comparison of patient characteristics

	Time to discharge		Odds ratio (95% CI)	p-value
	<72 hrs (n=149)	>72 hrs (n=107)		
Mean age	70.4 yrs	71.3 yrs		0.55*
Mean Charlson score	2.8	2.8		0.71*
Neoadjuvant therapy	27 (18%)	27 (25%)	0.66 (0.36–1.20)	0.17**
Stoma	22 (15%)	35 (33%)	0.36 (0.19–0.65)	<0.001**
T4 tumour	28 (20%)	32 (31%)	0.58 (0.32–1.04)	0.06**
Laparoscopic surgery	144 (97%)	86 (80%)	0.14 (0.05–0.39)	<0.001**
Type of resection				0.02**
Right hemicolectomy	54 (36%)	41 (38%)		
Transverse colectomy	2 (1%)	2 (2%)		
Left hemicolectomy	14 (9%)	5 (5%)		
Sigmoid colectomy	20 (13%)	7 (7%)		
Hartmann's	4 (4%)	1 (1%)		
Anterior resection	49 (33%)	30 (28%)		
Abdominoperineal resection	8 (5%)	13 (12%)		
Subtotal colectomy	1 (1%)	5 (5%)		
Mean operative time	167 mins	172 mins		0.85†

CI = confidence interval
*ANOVA; **Chi-squared test; †Mann–Whitney U test

Table 2 Comparison of outcomes

	Time to discharge		Odds ratio (95% CI)	p-value
	<72 hrs (n=149)	>72 hrs (n=107)		
Complications ^a	12 (8%)	45 (42%)	0.12 (0.06–0.24)	<0.001*
Readmissions	18 (12%)	18 (17%)	0.68 (0.34–1.38)	0.28*
Reoperations	5 (3%)	19 (18%)	0.16 (0.05–0.43)	<0.001*
Mean total hospital stay	3.3 days	12.0 days		<0.001**

CI = confidence interval
^aClavien–Dindo grade ≥II
*Chi-squared test; **Mann–Whitney U test

drainage alone and did not require any subsequent procedures. One patient required a laparoscopic lavage and formation of a defunctioning ileostomy, and the remaining patient required a laparotomy and defunctioning ileostomy.

During the last 24 months of the study, 72% of patients were discharged within 72 hours and 57% of patients within 48 hours of surgery. The median hospital stay was 2 days.

Discussion

The adoption of enhanced recovery protocols and laparoscopic techniques has undoubtedly changed the perioperative care of patients undergoing surgery for colorectal

cancer.¹² Several randomised trials and meta-analyses have demonstrated that patients managed with enhanced recovery programmes have shorter hospital stays and may have fewer complications.^{1,2,15–15} Nevertheless, despite some reports of successful discharge within 72 hours of colorectal surgery,^{10,11,17,18,20} accelerated discharge for a significant proportion of patients does not appear to be routinely achieved in international practice. Results from large trials and an international registry consistently show median lengths of primary hospital stay of 5 days or more.^{12–15} The UK's national bowel cancer audit, which may best represent common practice in the UK, reports a median hospital stay of 7 days for colorectal cancer surgery, with most patients remaining in hospital longer than 5 days.¹⁶

Table 3 Reasons for readmission

Reason	Time to discharge	
	<72 hrs (n=149)	>72 hrs (n=107)
Abdominal collection/haematoma	0	2
Abdominal pain	1	2
Anastomotic leak	4	5
High output stoma	1	1
Ileus/bowel obstruction	4	0
Medical complication	5	2
Wound infection	2	2
Other	1	4

Most published series reporting successful discharge within 72 hours include heterogeneous groups of patients with a mix of benign and malignant disease undergoing a variety of procedures, some of which were not colorectal resections, or the series are limited to only one type of resection.^{10,11,17–20} These factors could significantly influence hospital stay. For example, the mean age in our sample was over 70 years compared with a significantly younger population in some other studies on accelerated discharge.^{10,17,20} Patients with a colorectal malignancy may also have undergone neoadjuvant treatments affecting their surgery and recovery, they may be more likely to require a stoma or they may be less physically robust than patients with benign disease. In addition, some studies exclude significant groups of patients (eg by only including patients undergoing laparoscopic surgery, excluding patients with more locally advanced tumours or those needing a stoma, or only examining early discharge after right hemicolectomy).^{10,11,18,20}

Our median length of postoperative stay of 3 days for a homogeneous group of patients undergoing all types of elective resection for colorectal cancer was achieved using simple discharge criteria. Fifty-eight per cent of patients overall and sixty-three per cent of patients undergoing laparoscopic resections were discharged within 72 hours. Furthermore, as the team's experience of this process increased, more patients were discharged early, with over 70% of patients in the final 2 years of the study discharged within 72 hours.

Reporting the experience of accelerated discharge specifically for patients undergoing resection for colorectal cancer without excluding significant groups of patients makes our data more similar to those from international registries and trials as well as the UK's national bowel cancer audit. Our results compare favourably with other publications on accelerated discharge. In a study by Lawrence *et al*, 50% of patients were discharged within 72 hours¹⁰ and Gash *et al* reported discharge within 72 hours for 46% in a cohort that only included patients undergoing laparoscopic surgery with a primary anastomosis.¹¹ Seventy per cent of Delaney's

patients were discharged within 72 hours of laparoscopic surgery but these included those with benign disease.²⁰

In our opinion, a pragmatic approach to determining a patient's suitability for discharge using simple criteria is essential to achieve accelerated discharge for most patients. There is a lack of consensus among surgeons regarding the most appropriate discharge requirements, reflecting the lack of an evidence base for stringent criteria, which could prolong hospital stay unnecessarily.^{4,21} In our experience, strictly adhering to some commonly accepted standards (eg awaiting the passage of stool or flatus) is unhelpful because tolerating an oral diet without abdominal pain or distension seems to satisfactorily signal the return of gastrointestinal function. This applies to other commonly employed criteria such as adherence to particular haematological or biochemical parameters.

Just as enhanced recovery programmes overcame the barriers put up by years of surgical 'dogma' surrounding perioperative care, similar barriers may need to be overcome with regard to discharge requirements and ambulatory management of patients following surgery. Achieving accelerated discharge is not only desirable for patients but could also have significant benefits for healthcare systems that are under strain from bed shortages and that too often face cancellations for elective surgery as a result.

The fear of missed complications resulting in worse outcomes and higher readmission rates has traditionally deterred surgeons from early discharge. However, in our study, patients discharged within 72 hours did not suffer adverse outcomes as a result. Complication, readmission and reoperation rates were much lower than for patients with longer hospital stays. Even those who were discharged early and needed readmission for the more serious complication of anastomotic leak fared relatively well, with two of the four patients managed with transrectal drainage without the need for further surgery. Our readmission rate of 14% is in keeping with those reported in the literature, which range up to 24%.^{22,23} Furthermore, several readmissions were for relatively minor problems and some of these could potentially be avoided with better access to the direct care team for advice or outpatient review.

More patients could benefit from accelerated discharge by improving processes such as stoma education, which can delay discharge in an otherwise well patient. Significantly more patients with a stoma stayed in hospital longer than 72 hours. If more education and training around stoma care takes place prior to surgery, some of these patients could be discharged earlier.

Our study is limited by its retrospective design and the associated risk of selection bias. Moreover, it involves a single surgeon's experience, which may not be generalisable. Patients also benefited from a team of early discharge nurses, who were able to perform telephone follow-up review or home visits for patients after discharge. However, these were mainly for reassurance or simple wound care and no patients received significant ambulatory treatment such as intravenous antibiotics or fluids at home.

Furthermore, our results were achieved in the typical setting of a district general hospital with a surgeon offering a primarily laparoscopic colorectal practice as per National Institute for Health and Care Excellence guidance in the UK.²⁴ The results should therefore be achievable in common practice elsewhere.

Conclusions

Accelerated discharge within 72 hours of elective colorectal resection for cancer is safely achievable for the majority of patients, who do not suffer any adverse outcomes as a result of early discharge. Accelerated discharge was not associated with any increased risk of complications, readmissions or reoperations. Future research should focus on the potential cost benefit to achieving early discharge for large proportions of patients. More patients could benefit from early discharge with improvements in processes such as access to outpatient advice and review for minor complications, and preoperative education and training for stoma care.

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