Is Radical Bowel Cancer Resection Under Local Anaesthesia and Sedation Feasible?

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Abstract Some patients with bowel cancer have significant comorbidities, making them unfit for major surgery under general anaesthesia. However, treatment without surgery offers no possibility of cure, and furthermore, symptom control may be poor. We investigated the possibility of performing these resections under local anaesthesia in patients with a slim body habitus in a cohort of patients rejected for general anaesthesia. Eight patients (4 M, 4 F) aged 77–89 were included in this study. All had significant comorbidities and were deemed unfit for general anaesthesia by the consultant anaesthetist in charge of pre assessing high-risk patients. All patients had undergone a thorough assessment, which included P-POSSUM scoring. The recruited patients underwent a careful and fully informed consenting process, leading to standard cancer resections. These resections occurred between 2005 and 2012, under combined local anaesthesia and sedation. The operations undertaken were four right hemicolectomies (for caecal cancer), two Hartmann's procedures (for sigmoid cancer), one Hartmann's procedure with en bloc small bowel resection (for sigmoid cancer invading small bowel) and one transverse colectomy (for mid transverse colon cancer). Seven patients survived radical surgery without complications, although one died from an unrelated cause 8 months after surgery. One of these surviving patients subsequently underwent CABG and further bowel surgery under GA 2 years later for a metachronous sigmoid cancer. There was one postoperative death due to cardiogenic shock on the third postoperative day. Radical cancer resections under local anaesthesia are feasible in suitably selected high-risk patients with acceptable mortality and comparable medium- to long-term results.

Keywords Bowel cancer · Resection · Local anaesthesia · Sedation

Introduction

Colorectal cancer is the third most common malignancy in the UK, with surgery being the main form of treatment. The UK National Bowel Cancer Audit in 2010 estimated that some form of surgical procedure was performed in 75 % of cases, but a radical resection was undertaken in only 60 % of patients [1].

With the continued rise in life expectancy, more people are being diagnosed with bowel cancer in later life, not uncommonly at a time when they have multiple comorbidities. Many are thus considered unfit for general or regional anaesthesia and radical surgery. Patients considered unfit for surgery may end up with poor symptom control, which adversely affects the quality of their remaining life [2].

This small case series explores the possibility of offering surgical resection under local anaesthesia and sedation in a group of carefully selected patients.

Patients and Methods

Patients

Eight patients (Table 1) were recruited between 2005 and 2012. The study group included four females and four males, with significant comorbidities, who were turned down for general anaesthesia. Their median age was 86 (77–89). All patients were discussed at the colorectal Multi Disciplinary Meeting and operated upon by the senior author (DM) at our institution. Patients received had full counselling and gave informed consent prior to the surgery.

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Table 1 Summary of patients' characteristics

Age	Sex	ASA	P-POSSUM predicted mortality (%)	Comorbidities
89	M	3	29.7	Coronary bypass surgeryCardiac failure
87	M	3	41.2	Cerebrovascular EventAtrial FibrillationAortic Valve Replacement
86	F	3	22.1	Cerebrovascular EventIschaemic Heart Disease
84	M	4	58.04	Coronary Bypass SurgeryCardiac Failure
80	M	3	32.9	Diabetes MellitusChronic Obstructive Airway DiseaseIschaemic Heart Disease
82	M	3	Notes missing	Ischaemic Heart Disease
77	F	4	33.3	Coronary Bypass SurgeryDiabetes MellitusPulmonary Hypertension
77	M	4	39	End-stage renal failure, cardiac failure

Inclusion Criteria

1. Classification as unfit in a consultant anaesthetist delivered *high-risk* pre assessment clinic for surgical patients. These patients were deemed unfit for major surgery under general or regional anaesthesia due to their comorbidities based on clinical assessment and P-POSSUM scoring (Fig. 1).
2. Patients with slim body habitus (BMI <25).
3. Preoperative staging showing a localized tumour not invading other organs.

A. Technique of Local Anaesthesia with Sedation for Cancer Resections

Patients were given a full and detailed explanation of what the operation entailed and the drugs to be used (local anaesthetic, additional intravenous analgesics, sedatives or anticholinergics) during the consent process. Patients were warned about the possibility of intermittent discomfort during the procedure, which would be followed by injection of more local anaesthetic. The need to limit the local anaesthetic to within the maximum safe dosage according to the patients' bodyweight was also explained.

Fig. 1 Example of correspondence from consultant anaesthetist following pre operative assessment

Sedation was administered by the anaesthetist using a target-controlled intravenous infusion of propofol with standard non-invasive monitoring, as recommended by the Association of Anaesthetists of Great Britain and Ireland [3]. The patients all maintained their own airway, and additional oxygen was administered by a Hudson mask. Capnography was employed to assist the detection of airway obstruction. Local anaesthesia was administered by the operating surgeon in a stepwise fashion during the procedure. A combination of long- and short-acting local anaesthetics (0.5 % levo-bupivacaine [Chirocaine®, Abbott] and lignocaine 1 % with 1:200,000 adrenaline) was used for all patients. The local anaesthetic was initially injected along the line of incision (rather than a field block) in the subcutaneous fat only. The incision was then deepened to the rectus sheath, more local anaesthetic infiltrated in the rectus sheath and peritoneum, and the peritoneal cavity subsequently entered.

An anaesthetist was always present to administer sedation using standard non-invasive intra-operative monitoring. None of the patients required the insertion of a laryngeal mask airway or an endo-tracheal tube.

B. Surgical Technique

Standard cancer resections via transverse abdominal incisions were performed in seven patients and a lower midline incision in one patient. Colonic mobilization was carried out with diathermy or LigaSure impact®, thus reducing the operative time. These resections encompassed standard loco regional clearance, with high ligation of the major vessels. Two-layer side-to-side anastomoses were performed, an inner stapled anastomosis with a 75-mm linear stapler and a handsewn continuous outer layer with 2-0 Vicryl. Incisions were closed using a standard mass closure technique.

Results

Comorbidities

The predominant comorbidities in this group of patients were cardiac in nature. Six out of eight had significant ischaemic heart disease including three who had previous coronary artery bypass grafting with continuing angina and one patient who had aortic valve replacement with ongoing angina. One patient had end-stage renal failure and another had significant chronic obstructive airway disease, which precluded general anaesthesia. Left ventricular ejection fractions ranged from 15 to 50 % in the five patients who had a preoperative echocardiogram.

Tumour Site and Surgery

As part of their preoperative investigations, all patients had a staging CT scan of the chest, abdomen and pelvis as well as

colonic imaging, either in the form of a colonoscopy or a barium enema. Only one patient had evidence of liver metastases, the others being free from distant spread. Four out of eight patients had right-sided tumours, of which three were caecal tumours and one an ascending colonic cancer (Table 2) and underwent right hemicolectomy. Three other patients had sigmoid tumours, one of which had invaded adjacent small bowel, resulting in an ileosigmoid fistula. These three patients underwent Hartmann's procedures with one including an en bloc resection of the involved small bowel. The eighth patient underwent transverse colectomy for a transverse colon tumour. None of the patients underwent adjuvant therapy (Table 3).

Histology and Resection Margins

Four patients had Dukes C cancers, three patients had Dukes B cancers and one had a 4-cm-sized highly dysplastic polyp with no evidence of invasive cancer. EMR was deemed to be unsuitable for this polyp by a consultant gastroenterologist, as it would not rise with saline. The seven cancers were adenocarcinomas, five of which were poorly differentiated while two patients had a moderately differentiated adenocarcinoma. The mean lymph node yield was 12.

Outcome

Seven patients survived the postoperative period without complications (12.5 %, 90-day mortality rate). The length of stay varied from 7 to 10 days. There was one death secondary to cardiogenic shock on the third postoperative day. This was the highest risk patient with a 15 % ventricular ejection fraction and the only patient in this series who had undergone an en bloc resection.

One patient, who had been initially rejected by the regional cardiac unit for a coronary bypass, subsequently underwent coronary artery bypass grafting for severe ischaemic heart disease. Two years later, the patient underwent an anterior resection under general anaesthesia for a metachronous sigmoid cancer.

One patient died from unrelated causes 8 months after surgery. Six patients are still in regular follow-up for colon cancer. The median follow-up for these patients was 48 months (range 12–96 months).

In summary, there was only one 90-day mortality in this series of eight patients.

Discussion and Conclusions

A primary search of Medline and Embase over 10 years including non-English articles was performed and suggested that very little has been published on this topic. There have however been reports of loop stoma formation as well as reversal under spinal anaesthesia in patients not fit for a general anaesthetic.

Table 2 Tumour site, procedure and outcome

Site of tumour	Procedure	Number	Length of stay (days)
Transverse colon	Transverse colectomy	1	10
Caecum, ascending colon	Right hemicolectomy	4	7 ^a
Sigmoid	Hartmann's	2	8
Sigmoid invading ileum	En bloc Hartmann's	1	3 (mortality)

^a Median length of stay

The feasibility of reversal of loop ileostomies under local anaesthesia with a satisfactory outcome has been demonstrated by Haagmans et al. [4] in a study of high-risk patients with multiple comorbidities. A similar study confirmed the feasibility of closure of loop colostomies under local anaesthesia [5]. There were no identifiable reports of colonic resections under local anaesthesia in the literature, although spinal anaesthesia has been used for colonic resections in a larger number of high-risk patients [6].

The most important criteria in considering whether to attempt these resections under local anaesthesia is the physical build of the patient and whether the tumour is invading adjacent structures. Tumour invasion into adjacent organs prolongs surgery and makes these resections more difficult. Ideal candidates should have small tumours confined to the bowel wall and slim body habitus, and in this series, all patients had a BMI <25. Despite this, the procedures still carry significant risk, mainly due to the underlying comorbidities. The only 90-day mortality in the series occurred in a patient with an ejection fraction of 15 % who underwent an en bloc Hartmann's and small bowel resection for malignant ileosigmoid fistula. This patient had one of the exclusion criteria and was extensively counselled prior to surgery. The patient fully recognized the high risk but was insistent on surgical intervention as his ongoing symptoms impacted significantly on his quality of life.

The local anaesthesia technique needs to be carefully considered. Levo-bupivacaine 0.5 % is long acting and confers greater cardiovascular stability than bupivacaine. In addition, the stepwise infiltration of the local anaesthetic in layers in the

line of the incision rather than as a field block served to minimize the dose of local anaesthetic used, thereby allowing a decent-sized incision. We also found small, intermittent doses of intravenous short-acting opioid analgesia (Fentanyl), to be helpful in providing additional analgesia in three of our patients. The use of transversus abdominis plane blocks placed under ultrasound guidance has emerged as a popular technique in our hospital over the last 4 years and may also be an alternative adjunct to this technique. As yet, we have not employed TAP blocks as the sole method of anaesthesia due to the variable efficacy and restrictions in the dosage of local anaesthetic that can be administered.

Discussing the technique with patients in detail before scheduling surgery is vital since it is essential that patients understand that they may experience brief episodes of discomfort during the operation.

We used transverse incisions in order to minimize postoperative chest complications. For the left-sided resections, transverse incisions in the LIF were used with further infiltration of local anaesthetic along the stoma site. There is evidence that postoperative pain is decreased with transverse incisions [7]. Such incisions are also recommended as part of enhanced recovery programmes.

We believe that this is the first publication to look at the use of local anaesthesia combined with sedation to perform radical colonic cancer resections in a subset of patients who would otherwise have been turned down for surgery. Adoption of the above techniques enabled surgery to be completed safely and with good oncological outcomes.

Bowel cancer, if left unresected, may result in dismal symptom control. We have shown that a careful local anaesthetic technique can help very high-risk patients to undergo a curative operation, avoiding the potential complications of bowel obstruction, tumour perforation, bleeding and distant spread of disease, thus giving them a reasonable quality of life. We believe that this approach should be given consideration where patients might otherwise be deemed as too risky. The potential success of our approach is illustrated by one patient in this series who was initially declined by the regional cardiac centre but had a radical curative right hemicolectomy under local anaesthetic. She subsequently underwent a successful coronary bypass grafting and was indeed fit enough for an open anterior resection 2 years later when she developed a metachronous tumour.

Table 3 TNM, AJCC, Dukes staging and lymph node yield

TNM	AJCC	Dukes	Lymph nodes
T3N1M0	3B	C	1/17
T3N0M0	2A	B	0/8
T4N1M1	4	C	2/12
T4N1M0	3B	C	1/14
T3N1M0	3B	C	1/12
T4N0MX	2B	B	0/11
T4N1MX	3B	C	2/12
T3N1M0	3B	C	1/12

In summary, radical cancer resections under local anaesthesia in suitably selected high-risk patients seem to be feasible, with acceptable mortality and long-term results.

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