

The Impact of Postoperative Complications on Long-term Quality of Life After Curative Colorectal Cancer Surgery

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Objective: To investigate the effect that complications have on patients' long-term quality of life (QoL) after curative colorectal cancer surgery.

Background: Colorectal cancer surgery is a high risk, with approximately 1 in 3 patients suffering a complication. The long-term consequences of postoperative complications are important but have poorly been documented.

Methods: The MRC-CLASICC trial (laparoscopic-assisted vs open surgery for colorectal cancer) included prospective evaluation of QoL using validated scoring questionnaires: EORTC QLQ-C30/CR38 and EQ5D. These were used to compare QoL at 3, 6, 18, and 36 months to baseline values for patients categorized into 2 groups: (i) those suffering any complication and (ii) those suffering any of 5 common complications (wound, chest, anastomotic leak, hemorrhage, and cardiac event).

Results: A total of 614 of 794 CLASICC patients were suitable for inclusion. Complications occurred in 215 (35.0%) patients, including: wound complications (61, 9.9%), chest infection (50, 8.1%), anastomotic leak (27, 4.4%), hemorrhage (14, 2.3%), and cardiac event (26, 4.2%). Significant long-term differences in QoL between patients with and without complications were found for Physical and Social Function, Role Functioning, and Body Image on EORTC QLQ-C30/QLQ-CR38 analysis and Mobility, Self-care, and Pain/Discomfort on EQ5D analysis. No significant differences were seen for emotional/cognitive functioning, global QoL, financial difficulties, or future perspectives. Risk factors of age, gender, ASA (American Society of Anesthesiologists) grade, and stoma moderated the impact of complications in the short- to medium-term QoL, but had less influence on long-term QoL.

Conclusions: Postoperative complications have adverse effects on long-term QoL, particularly for Physical, Role and Social Functioning, and Body Image, as well as for Mobility, Self-care, and Pain/Discomfort. These findings should inform future preoperative counseling and health care planning.

Keywords: colorectal cancer, complications, quality of life

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Colorectal cancer is one of the most common malignancies, with 334,000 new cases diagnosed in Europe and 1.24 million new cases diagnosed worldwide in 2008.¹ Surgery remains the only curative treatment, with approximately three-quarters of patients being subjected to operation.² Despite recent advances in surgical technique, including the introduction of laparoscopic surgery, there has

been little improvement in the overall complication rate, which remains at around 30%.^{3–5}

Although the impact of complications is obvious in terms of immediate patient recovery and short-term hospital outcomes, the longer-term consequences have been poorly documented. Health-related quality of life (QoL) assessments have been used as an outcome measure in surgical oncology for many years⁶ and play a valuable role in clinical decision making.⁷ Several studies have investigated QoL after colorectal cancer surgery, and in particular the influence of the laparoscopic approach.^{3,8–12} Most studies have reported short-term outcomes only and have failed to show any difference between laparoscopic and open surgery. One study reported that morbidity was an independent risk factor for lower early postoperative QoL in colorectal cancer patients,⁸ while another showed that major complications were a risk factor for worse long-term physical functioning after rectal cancer resection.⁹ However, no thorough examination of QoL in relation to surgical complications has been undertaken in a large, prospectively followed cohort.

The MRC-CLASICC trial (UK MRC-CLASICC; ISRCTN 74883561) was a large, prospective, multicenter, randomized controlled trial comparing laparoscopic-assisted with conventional open surgery for colorectal cancer. A total of 794 patients were recruited between 1996 and 2002 (268 open and 526 laparoscopic). The primary endpoints were overall survival, disease-free survival, and local recurrence. Short-term outcomes, including patient-reported QoL, were reported in 2005³ with long-term follow-up reported in 2013.¹³ Data were collected regarding complications, and no significant differences were observed between the laparoscopic-assisted and open arms at 30 days postoperatively (laparoscopic assisted = 33%, open = 32%).³ Risk factors for 30-day morbidity included intraoperative conversion to open surgery, age, sex, T-stage, ASA (American Society of Anesthesiologists) grade, and the presence of liver metastases. Quality-of-life data were also collected, with follow-up over 36 months, and showed the expected changes in global, functional, and symptom scales after surgery, with normalization by 3 months postoperative.³ No significant differences were seen between the 2 arms with the exception of worse sexual and erectile function in males undergoing laparoscopic-assisted rectal cancer resection.¹⁴ No previous attempt has been made to correlate the occurrence of complications with patient QoL in the short- and long-term.

This study aimed to investigate the effect of 30-day postoperative complications on long-term QoL, taking previously identified risk factors into consideration.

PATIENTS AND METHODS

Patients

All patients (Table 1) recruited to the MRC CLASICC trial described earlier were considered for inclusion in the current study. Patients were recruited from 27 UK centers and 32 surgeons, and details of the trial design and outcomes have been previously reported.^{3,11,13} Data were collected regarding complications experienced intraoperatively, as well as postoperatively. Patients with noncurative cancer resections, liver metastases, or peritoneal disease at surgery

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This study uses a patient cohort from a prospective, multicenter, randomized clinical trial (MRC-CLASICC) to assess the effects of postoperative complications after curative surgery for colorectal cancer on long-term patient quality of life.

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TABLE 1. Complications Experienced

	N*	Percentage of All Patients (N = 614)	Percentage of Subset With ≥ 1 Complications (N = 215)
No complication	399	65.0	—
Wound-related complication	61	9.9	28.4
Chest infection	50	8.1	23.3
Anastomotic leak	27	4.4	12.6
Cardiac event	26	4.2	12.1
Bladder dysfunction	22	3.6	10.2
Urinary tract infection	21	3.4	9.8
Small bowel obstruction	17	2.8	7.9
Abscess	16	2.6	7.4
Hemorrhage	14	2.3	6.5
Protracted ileus	12	2.0	5.6
Sepsis—not otherwise classified	11	1.8	5.1
Renal failure	6	1.0	2.8
Stoma complications	5	0.8	2.3
Deep vein thrombosis	4	0.7	1.9
Cerebrovascular accident	4	0.7	1.9
Diarrhoea	4	0.7	1.9
Pressure sore	4	0.7	1.9
Gastrointestinal hemorrhage	4	0.7	1.9
Peripheral vascular complication	4	0.7	1.9
Pulmonary embolus	2	0.3	0.9
Sexual dysfunction	1	0.2	0.5

*Counts do not add up to total patient number as patients may have experienced more than 1 complication category.

were excluded from analyses to reflect the population of patients undergoing curative resection only. Patients with missing data on 30-day postoperative complications were also excluded.

30-Day Postoperative Complications

Thirty-day postoperative complications were summarized into 21 categories from a list of 212 recorded complications. Patients with complications that did not fall into one of these categories were classed as having zero complications for the purpose of this analysis. Formal analyses considered the effects on QoL of experiencing (i) any complication and (ii) any of 5 common complications.

Quality-of-Life Measures

QoL was assessed using the European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire Cancer Core-30 (EORTC QLQ C-30)¹⁵ and Colorectal-38 (EORTC QLQ CR-38),¹⁶ EuroQol's EQ-5D QoL instruments,¹⁷ and health resources questionnaires. With the exception of health resources questionnaires, these questionnaires were administered at baseline, 2 weeks, 3 months, 6 months, 18 months, and 36 months postrandomization. QoL time frames were specified as short-term (3 months), medium term (6 months), and long-term (≥ 18 months). The effects on QoL at the 2-week point were not considered in the present analysis, as any 30-day complication may not have been experienced by this time.

The EORTC QLQ C-30 measures aspects of QoL particularly relevant to cancer patients. EORTC QLQ CR-38 measures additional aspects of QoL particularly relevant to colorectal cancer. The

prespecified subscales of interest for this analysis related to patients' practical lifestyle and were as follows: Physical, Emotional, Cognitive, Role and Social Functioning, as well as Financial Difficulties and Global Quality of Life from the QLQ C-30, and Body Image, Future Perspective, and Sexual Functioning from the QLQ CR-38. The scores on the scales in C-30 and CR-38 range from 0 to 100, with higher scores indicating higher level of functioning, except for Financial Difficulties where higher score indicates increased difficulty.

EQ-5D is a standardized measure of health status developed by the EuroQol Group to provide a simple, generic measure of health for clinical and economic appraisal.¹⁸ EQ-5D consists of 2 sections: EQ-5D descriptive system and EQ visual analog scale. The former comprises 5 dimensions of Mobility, Self-care, Usual activities, Pain/Discomfort, and Anxiety/Depression. Each dimension has 3 levels: no problem (category 1), some/moderate problems (category 2), and extreme/severe problems (category 3). The EQ visual analog scale records the respondent's self-rated health on a vertical, visual analog scale where the end-points are labeled "Best imaginable" and "Worst imaginable" health state.

Data from the Health Resources questionnaire were also not considered for this analysis, because this was not assessed preoperatively and a considerable amount of data were missing. Frequencies of completed questionnaires were recorded for patients who did and did not experience 30-day complications.

Statistical Methods

The effect of experiencing 30-day complications on QoL was assessed using multilevel mixed effects modelling (where appropriate) to calculate QoL estimates at each time point. For each of the prespecified subscales of the QLQ-C30 and QLQ-CR38, individual mixed effects models were defined with the subscale score in question at each time point as the dependent variable, adjusted for baseline score, presence of a 30-day complication, time point and complication by time point interaction. Patient-specific random effects were assumed across time points. Where convergence issues arose, fixed effects modelling was used.

For the prespecified EQ-5D subscales, logistic regression was performed adjusting for the same variables as the EORTC measures, to consider the effect of complications on experiencing at least some problems on each of the scales (ie, the categories of some/moderate and severe/extreme problems were combined). Mixed effects modelling was not used due to issues of convergence.

Multivariate analyses were also performed to assess whether QoL results were mediated by the prespecified risk factors gender, ASA grade, presence of stoma, and age. Previous (unpublished) research by our group, using the same CLASSIC data set, identified gender, ASA grade, and age as significant risk factors associated with 30-day complications. In addition, presence of stoma was included as a risk factor thought to be associated with both 30-day complications and QoL. As there is no difference in 30-day complications³ or QoL^{3,11} between patients randomized to laparoscopic-assisted and open surgery, the surgical technique was not incorporated as a risk factor.

Statistical testing was performed at the 5% significance level. No adjustments were made for multiple testing because of the exploratory nature of the study.

The QLQC30 and QLQCR38 questionnaires were scored according to EORTC guidelines,^{15,16} and similarly the EQ5D using the EuroQol's guidelines.¹⁷ The aforesaid analyses were performed assessing the impact of experiencing (i) any complication and (ii) any 1 of 5 common complications. Results of both of these assessments are presented, with focus on the impact on longer-term quality life (≥ 18 months). All statistical analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC).

RESULTS

Patients

Figure 1 displays a CONSORT diagram of the flow of patients throughout the study. Of the 794 patients recruited to the MRC CLASICC trial, 153 had liver metastases or peritoneal disease at surgery or underwent noncurative resections and a further 27 had missing data regarding complications within 30 days. These patients were therefore excluded from the analyses. This resulted in a final data set of 614 patients (201 open and 413 laparoscopic). Table 2 displays the patient characteristics at baseline according to whether or not any 30-day complications were experienced. Median age at baseline was 71 years (range 25–94), with a male to female ratio of 336:278 (54.7%:45.3%). Distribution of ASA grade was as follows: I—235 (38.3%), II—291 (47.4%), III—68 (11.1%). A total of 306 patients (49.8%) had cancers that were located in the colon and 308 (50.2%) had cancers in the rectum. A stoma was created in 207 (33.7%) patients. An imbalance was noted in ASA grade, gender, and presence of stoma between those patients who did and did not suffer any complication. No statistical testing was performed on the baseline characteristics because the research focuses on the impact of complications on QoL, rather than impact of risk factors on complications. Additional statistical testing on the baseline characteristics between these groups was therefore deemed unnecessary. Rather these factors were incorporated in multivariate analyses, allowing assessment of their impact on the relationship between QoL and complications.

30-Day Postoperative Complications

Of the total 614 patients, 215 (35.0%) experienced at least 1 complication, and of these 215 patients, the median number of complications encountered was 1 (range 1–5). The majority of patients (148, 68.8%) experienced exactly 1 complication and 45 (20.9%) experienced 2 complications. The remaining 22 patients (10.3%) had 3 to 5 complications. Twenty-two patients died within the first 30-days after operation; however, unless these patients specifically

experienced a complication before death, these patients were classed as not experiencing a complication. A greater proportion of males (135/336, 40.2%) than females (80/278, 28.8%) experienced a complication. As expected, rectal cancer surgery was associated with a higher rate of complications (127/308, 41.2%) compared with colonic cancer surgery (88/306, 28.8%), and complications were more frequent with increasing ASA grade. A higher stoma rate was observed in those experiencing a complication and probably reflects the greater proportion of patients undergoing rectal resection.

All of the individual complications are represented in Table 1. The most common complications among the 215 patients were wound related ($n = 61$, 28.4%), chest infections ($n = 50$, 23.3%), anastomotic leak ($n = 27$, 12.6%), cardiac event ($n = 26$, 12.1%), and bladder dysfunction ($n = 22$, 10.2%), with the overall rate of these complications being 9.9%, 8.1%, 4.4%, 4.2%, and 3.6%, respectively. The remaining 16 complications were less common, each occurring for fewer than 10% of the patients with complications (between 1 and 21 patients).

To enable meaningful analysis, given the small number of patients experiencing individual complications, selected complications were combined into a subset of 5 to reflect the most frequent and those of particular clinical interest. Wound-related complication, chest infection, anastomotic leak, cardiac event, and hemorrhage were all included as frequently occurring and clinically relevant complications. Gastrointestinal hemorrhage and urinary tract infections were deemed sufficiently self-limiting to be unlikely to have an impact on long-term QoL and were not included in the subset. Abscesses occurred in 7.4% of patients. However, this term was felt to be overly vague, and probably included patients with “anastomotic leak” and so was not included in the subset analysis.

Compliance With QoL Assessments

Of 614 patients, 462 (75.2%) completed QoL questionnaires at baseline, with similar completion rates between those patients experiencing complications and those not. Comparing baseline

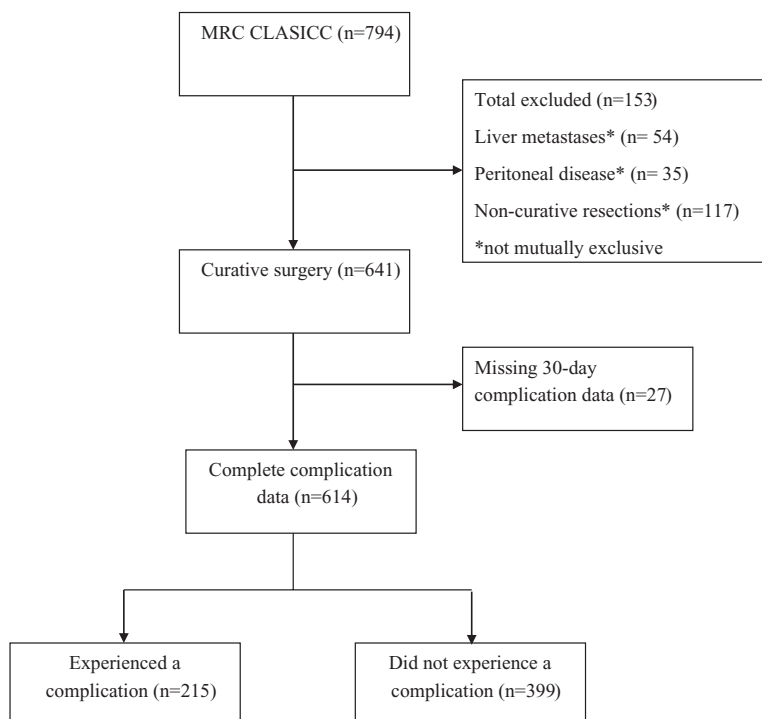


FIGURE 1. CONSORT diagram.

TABLE 2. Baseline Patient Characteristics

	Experience Any 30-d Complications?		Total, N (%)
	Yes, N (%)	No, N (%)	
Total, N	215	399	614
Age, yrs			
Median (range)	73 (31, 94)	70 (25, 94)	71 (25, 94)
Sex			
Male	135 (62.8)	201 (50.4)	336 (54.7)
Female	80 (37.2)	198 (49.6)	278 (45.3)
Tumour site at randomization			
Colon	88 (40.9)	218 (54.6)	306 (49.8)
Rectum	127 (59.1)	181 (45.4)	308 (50.2)
pT stage			
T0	0 (0.0)	1 (0.3)	1 (0.2)
T1	16 (7.4)	20 (5.0)	36 (5.9)
T2	48 (22.3)	48 (12.0)	96 (15.6)
T3	108 (50.2)	235 (58.9)	343 (55.9)
T4	17 (7.9)	48 (12.0)	65 (10.6)
Missing	26 (12.1)	47 (11.8)	73 (11.9)
pN stage			
N0	119 (55.3)	215 (53.9)	334 (54.4)
N1	47 (21.9)	85 (21.3)	132 (21.5)
N2	22 (10.2)	50 (12.5)	72 (11.7)
N3	2 (0.9)	2 (0.5)	4 (0.7)
Missing	25 (11.6)	47 (11.8)	72 (11.7)
ASA grade			
I	68 (31.6)	167 (41.9)	235 (38.3)
II	103 (47.9)	188 (47.1)	291 (47.4)
III	35 (16.2)	33 (8.3)	68 (11.1)
Missing	9 (4.2)	11 (2.8)	20 (3.3)
Stoma			
Yes	91 (42.3)	116 (29.1)	207 (33.7)
No	115 (53.5)	272 (68.2)	387 (63.0)
Missing	9 (4.2)	11 (2.8)	20 (3.3)

characteristics between those patients who did and who did not complete a baseline QoL questionnaire, slightly higher proportions of patients who did not return a questionnaire underwent a conversion (15.4% vs 21.7%), had higher T-stage (T-stage 3: 53.7% vs 62.5%) and higher ASA grade (ASA grade III: 9.5% vs 15.8%). This might imply that patients not completing baseline questionnaires were of a poorer prognostic group. There were 74 patients (12.1%) who did not complete QoL questionnaires at the time of randomization to the CLASICC trial. Of those patients who completed questionnaires, compliance to baseline was 85.6% (462/540), reflecting the compliance rates previously reported.³ Considering only those patients who completed QoL questionnaires, patients experiencing complications were less likely to return follow-up questionnaires than those who did not. After 3 months, 74.7% of participants who were alive and had a 30-day complication returned their questionnaires compared with 86.3% of those who did not, and this gap widened by 36 months to 57.7% compared with 78.9% respectively. These differences in compliance between the 2 groups may suggest that QoL data were missing not at random. For example, data for patients experiencing a complication may be missing due to the fact that these patients have worse, or even better, QoL than patients not experiencing a complication, and have therefore not completed a questionnaire. It may be acceptable in this setting to assume that the reason for this is due to worse QoL. We did not, however, collect reasons for noncompletion of questionnaires and because this research is exploratory in nature, the impact of missing data has not been incorporated into the analysis.

Any 30-Day Complication and QOL

Univariate analysis of the QLQ-C30 and QLQ-CR38 subscales showed that mean scores over time were consistently lower for patients experiencing 30-day complications (Fig. 2)(Fig. 3). This difference was significant only for Body Image and Social Functioning at longer-term time points, with significant impact beginning at 3 months. With multivariate analysis, adjusting for potential risk factors, similar results were observed, although the immediate differences observed for Body Image and Social Functioning at 3 months were no longer significant.

Differences in long-term QoL scores for Body Image and Social Functioning ranged from 7.0 points to 9.0 points. These differences in Social Functioning reflect medium clinically relevant differences in QoL.¹⁹

Considering the EQ-5D, few patients experienced severe problems on any of the scales, and categories for “some” and “severe” problems were therefore combined. Patients with 30-day complications were more likely to experience at least some problems relative to patients without a complication. This effect was significant for Mobility, Self Care, and Pain/Discomfort in the long-term, under univariate analyses, with the effects on mobility being immediate. Adjustment for risk factors had no influence on the results.

On multivariate analysis, the odds ratio for the effect of complications on EQ-5D subscales ranged from 1.93 (pain/discomfort, 18 months) to 3.61 (self-care, 18 months); that is, patients experiencing complications were between 2 and almost 4 times more likely to experience at least some long-term problems with mobility, self-care, and pain or discomfort.

Five Common Complications and QoL

Univariate analysis using the QLQ-C30 and QLQ-CR38 scales showed that patients who experienced any of the 5 selected 30-day complications had generally poorer scores than those patients who experienced any complications or no complications at all (Fig. 2). Significant long-term differences were seen for Role Functioning and Body Image, again with the impact on Body Image being immediate and lasting. Differences noted were between 7.2 and 14.2 scale points in magnitude, reflecting small to medium clinically relevant differences in Role Functioning.¹⁹ Adjusting for risk factors via multivariate analysis revealed that the significant effects of these complications on QoL were reduced to only the 36 months time point for Role Functioning; however, differences in Body Image remained, with significant impact from 6 months onwards.

Significant differences were also observed at the 36-month time point only for Physical and Social Functioning. It should be noted, however, that there were fewer patients who have experienced any of the 5 common complications, and additionally QoL questionnaire compliance was much lower for patients experiencing any complications. The interpretation of significant results at the 36-month time point should therefore be made with caution.

The EQ-5D results (Fig. 3) for selected complications were very similar to those observed when considering any complication. In the univariate analyses, patients with 1 or more of the selected complications were significantly more likely to have some or severe long-term problems with Mobility, Self-Care and Pain/Discomfort. This was unaffected by adjustment for risk factors in multivariate analyses. The effect of experiencing any of the 5 selected complications ranged from an increased odds of 2.12 for Pain/Discomfort to 4.77 for Self-Care; that is, the impact of experiencing any of the 5 selected complications is slightly larger than the impact of experiencing any complication.

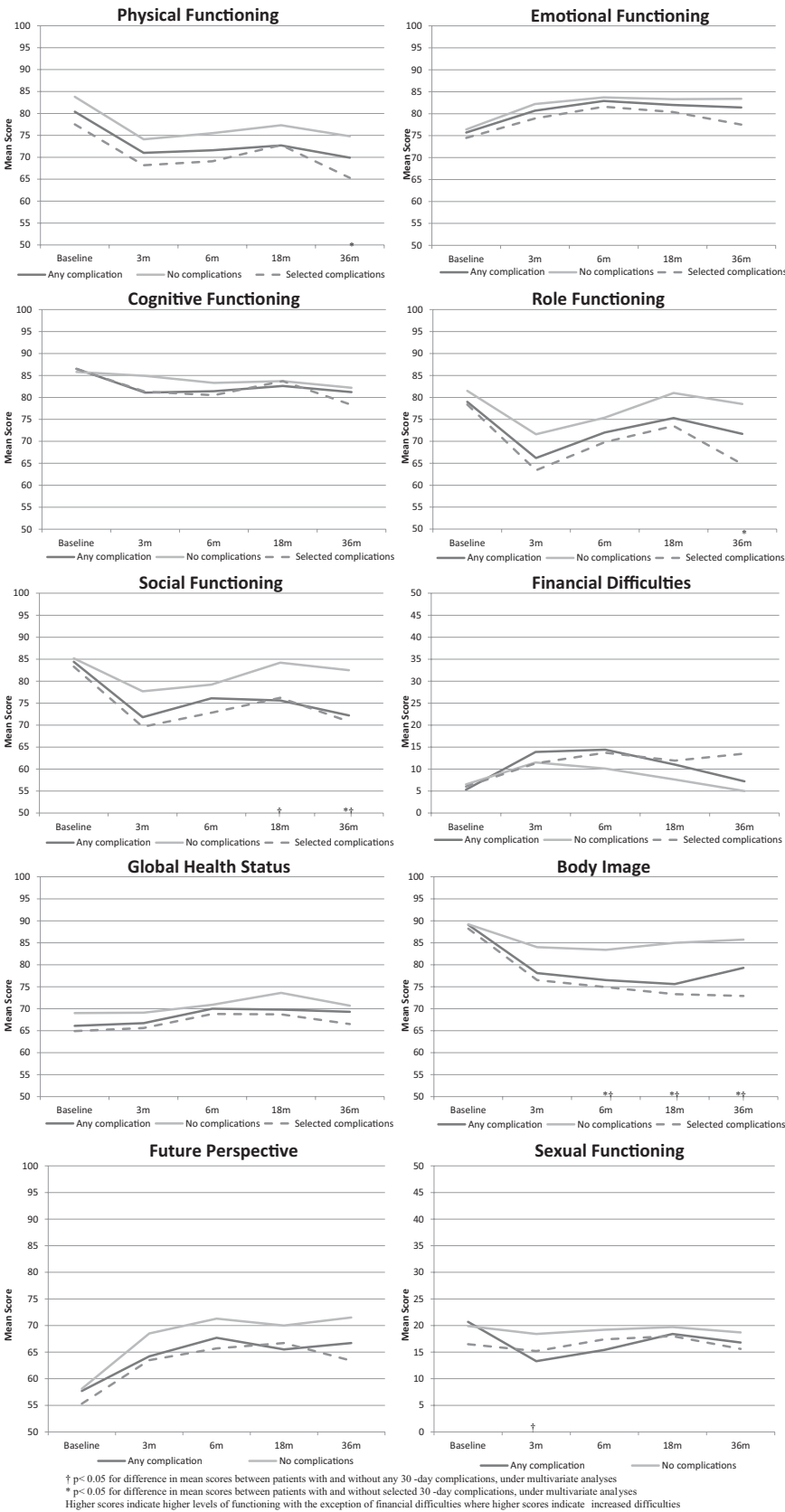


FIGURE 2. EORTC QLQ-C30 and CR-38. Higher scores indicate higher levels of functioning with the exception of financial difficulties where higher scores indicate increased difficulties. * $P < 0.05$ for difference in mean scores between patients with and without selected 30-day complications, under multivariate analyses. † $P < 0.05$ for difference in mean scores between patients with and without any 30-day complications, under multivariate analyses.

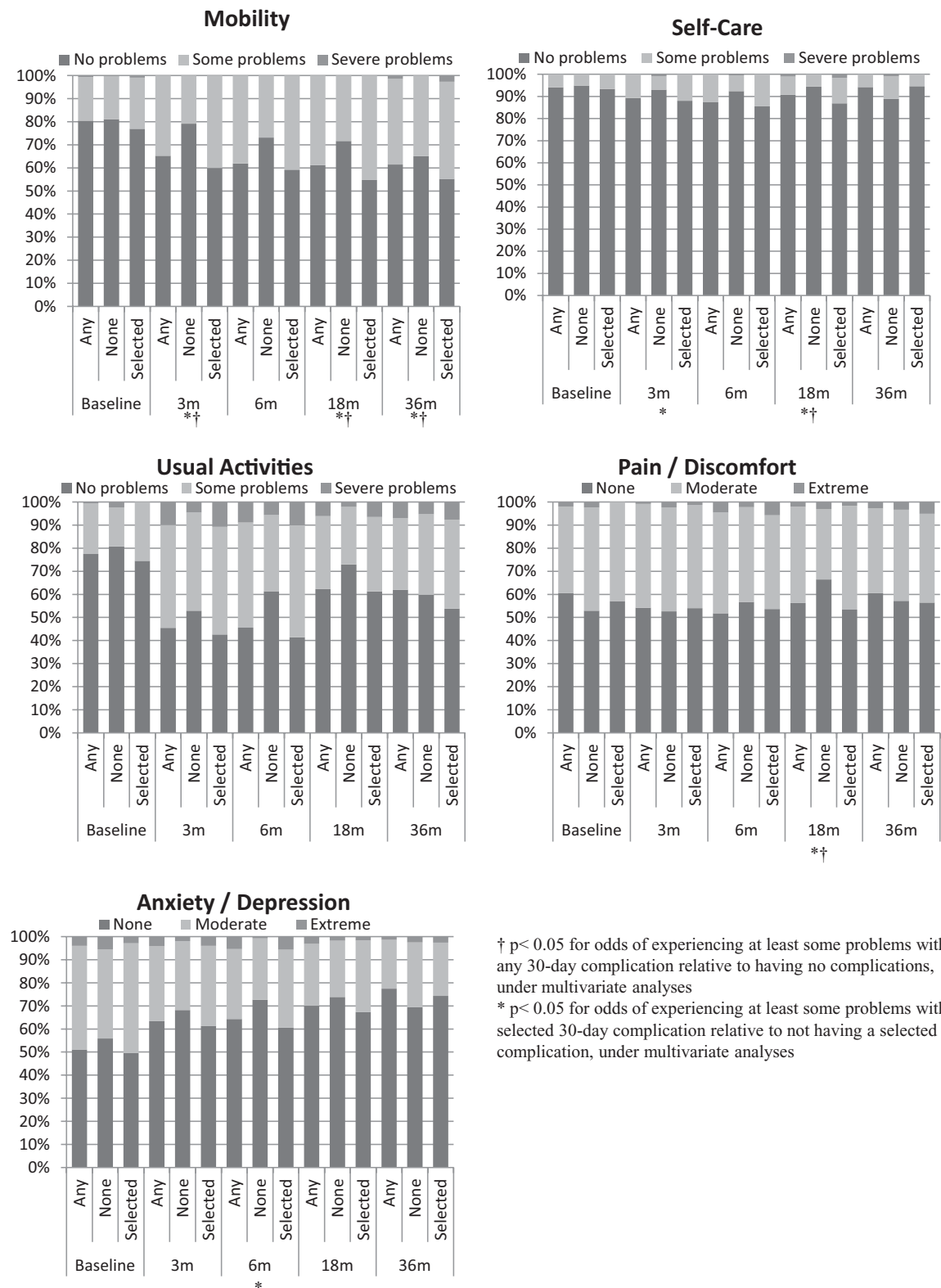


FIGURE 3. EQ-5D. * $P < 0.05$ for odds of experiencing at least some problems with selected 30-day complication relative to not having a selected complication, under multivariate analyses. † $P < 0.05$ for odds of experiencing at least some problems with any 30-day complication relative to having no complications, under multivariate analyses.

DISCUSSION

This study looked at the impact of postoperative complications on long-term QoL after curative colorectal cancer surgery. The overall complication rate of 35% was similar to that reported in other large colorectal cancer studies,^{4,5,20,21} highlighting the high-risk nature of the surgery. Too frequently, clinicians are preoccupied with the oncological aspects of cancer surgery, with insufficient consideration given to the longer-term functional outcomes of their interventions. The results of this study therefore go some way to addressing the deficit in data concerning the longer-term non-cancer outcomes.

QoL scores were generally worse across all subscales and at all time points for patients who developed any complication. Similar worsening was also noted for the 5 common complications. The aspects of QoL most affected were Physical Functioning, Role Functioning, Social Functioning, and Body Image (EORTC assessment) and Pain/Discomfort, Self-care, and Mobility (EQ-5D assessment). In contrast, complications did not seem to have a significant impact on the higher mental functions of Emotional or Cognitive capacity, nor any significant impact on Financial, Global Health Status or Future Perspectives. Caution, however, is urged when drawing conclusions from disproportionate sample sizes in longer-term follow-up.

Multivariate analysis showed that the potential risk factors (gender, ASA, age, and presence of stoma) had a mediatory effect on QoL only in the short-term when patients suffered from “any complications” and in the short- to medium term for patients who suffered any of the “5 common complications.” Sexual functioning seemed to be unaffected by risk factors including stoma. The effects of complications on long-term QoL scores were less affected by the risk factors (age, gender, ASA grade, and stoma), which did not appear to have an overt influence on the longer-term consequences of suffering a complication.

Patients who suffered a physical complication of surgery appear to have suffered deterioration in physical function, rather than any deterioration in higher cognitive function. Although patients who suffered a complication experienced more Anxiety/Depression, this was only evident during the first 18 months and decreased with further follow-up.

Compliance with QoL assessments was lower in those patients who suffered a complication than in those who did not. It is possible that this may reflect an inability or reluctance in patients experiencing complications to return questionnaires. Were this the case, the observed difference in QoL between the 2 groups would have been more pronounced.

There have been few previous studies that have evaluated QoL after colorectal surgery,^{8,9,12,18,22} with the majority showing a worsening in QoL.^{8,12,18,22} Only 1 previous study has attempted to assess the impact that complications have on long-term QoL.²³ This used the same assessment tools (EORTC QLQ-C30 and QLQ-CR38) used in our study and concluded that severe postoperative complications adversely affected long-term QoL. The presence of a stoma was also found to improve Global Health Status, which probably reflects the adverse effects of rectal resection on postoperative bowel function in a rectal cancer population. However, this study has several limitations: it was retrospective, restricted to rectal cancer, involved a smaller number of patients (170), had a higher complication rate (overall—48%, severe—27%), and a single time-point assessment of QoL taken at an average of 36 months after surgery. In addition, although the Clavien-Dindo system²⁴ was used to classify complications, no consideration was given to specific complications of colorectal surgery, such as anastomotic leak, bladder and sexual dysfunction, postoperative ileus, etc.

The current study is the first to prospectively explore the impact of postoperative complications after colorectal cancer surgery on long-term QoL. The authors acknowledge that the study does have

some limitations, which were largely unavoidable. Although the completion of questionnaires at baseline was relatively high (86%), this decreased over the follow-up period and was particularly noticeable among those patients who suffered a complication. At 36 months, only 58% of patients with complications responded compared with 79% of those without complications, which might have caused a spurious effect at this time point. A similar imbalance in numbers was seen between those patients who experienced any of the “5 common complications” versus those who experienced no complication. We recognize the inherent flaws in conducting an analysis of selected complications but feel this was justified in terms of extracting as much clinically useful information for the practicing surgeon. We did not use a standardized classification system, such as the Clavien-Dindo system,²⁴ for categorizing complications. Although a useful assessment tool, in the context of this study, the Clavien-Dindo system suffers from a lack of information on specific complications related to colorectal surgery.

This study is important for several reasons. A better understanding about the long-term effects that complications have on QoL will help to improve preoperative patient counselling and, in the event of a complication, will inform resource planning for rehabilitation. Too often the functional outcomes of surgical interventions are not evident to the surgeon, as the consequences become apparent after hospital discharge. Rather, it is often the community care providers who bear the long-term burden of surgical complications. This study has highlighted the potential impact of complications on physical function, including mobility and self-care. These aspects of patient recovery are currently poorly addressed and it is possible that resource specifically allocated to physical rehabilitation (physiotherapy, occupational therapy) for those suffering complications may have a beneficial effect for both patient and society. Equally, the psychological consequences of complications, which impact on social and role function and body image, might be better catered for, similar to that provided for patients who have sustained a period of intensive care treatment.²⁵ Interestingly, complications seem to have little effect on patients' financial and future considerations, which might reflect the predominantly elderly age distribution of colorectal cancer sufferers. This has implications for medicolegal practice and in particular the assessment of quantum.

In the future, the development of a standardized colorectal-specific complications classification would be helpful and more detailed studies are needed to assess the health and socioeconomic effects of decreased long-term QoL resulting from postoperative complications.

In conclusion, 30-day postoperative complications after colorectal cancer surgery have adverse effects on long-term QoL. This seems to be worse for Physical role, social functioning, body image, mobility, self-care, and pain/discomfort. There is only little apparent effect on higher mental functioning or financial status.

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