



Research Article

Many Patients Will Experience Stool and Bowel Movement-Related Symptoms After Treatment for Colorectal and Anal Cancer-A Descriptive Study

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Citation: Oggesen BT, et al. Many Patients Will Experience Stool and Bowel Movement-Related Symptoms After Treatment for Colorectal and Anal Cancer-A Descriptive Study. J Surg Res Prac. 2024;5(1):1-7.

<https://doi.org/10.46889/JSRP.2024.5104>

Received Date: 16-02-2024

Accepted Date: 12-03-2024

Published Date: 19-03-2024



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Abstract

Purpose: Stool-related late complications have a major impact on patients' quality of life. The objective of this study was to investigate stool and bowel movements as late complications to colorectal and anal cancer treatment.

Methods: We performed a prospective cohort study from a single center using patient reported outcome measurements. We included patients who had surgery for colorectal and anal cancer from October 2019 to January 2022. This was supplemented by a subgroup of patients with late complications after chemo-radiation therapy for anal cancer. The study population comprised 293 patients. The main outcome included descriptive data on stool and bowel movement related complications. We used the Low Anterior Resection Symptom score (LARS), St Mark's incontinence score, Bristol stool form scale, Patient Assessment of Constipation Symptoms Score (PAC-SYM), colostomy impact factor and self-rated health on a visual analog scale as measurement tools.

Results: The low anterior resection symptom score was median 36 (range 24-41) in patients with rectum cancer, for patients with anal cancer it was 39 (4-41), for patients with a right or left sided hemicolectomy it was 26 (4-41) and 25 (0-41), respectively.

Conclusion: Patients who had surgery for rectum cancer had in 90% of the cases major Low Anterior Resection Syndrome (LARS). Patients who underwent surgery for colon cancer would in about one third of the cases experience stool or bowel movement impairments. Patients with anal cancer who had chemo-radiation therapy experienced a very high degree of stool and bowel movement impairment.

Keywords: Low Anterior Resection Syndrome; Cancer; Patient Assessment; Colorectal and Anal Cancer

What does this paper add to the literature?

We present prospective data on the incidence of stool and bowel-related symptoms in a large cohort of 293 patients who had treatment for colorectal and anal cancer. This is important knowledge that contributes to the increasing focus on prevention and treatment of late complications of cancer surgery.

Introduction

Late complications after treatment for colorectal and anal cancer are to some degree inevitable due to the rather aggressive treatment modalities both with surgery and chemo-radiation therapy. Late complications can be seen within the first months and up to years after treatment [1-3]. The five-year survival rates are more than 65% for all three cancer types due to many years of research and development of treatment [4-7]. Since the five-year survival rate is so favorable, the prevalence of persons living

with a current or previous diagnosis of colorectal and anal cancer is rising. Survivorship care plans for colorectal and anal cancer are mainly focused on the detection of a new cancer or cancer recurrence, thus missing the importance of rehabilitation and postoperative quality of life [2].

Late complications after colorectal and anal cancer are numerous and diverse, as the functional bowel problems are very common and two recent published reviews found that up to 50% of the patients experienced bowel symptoms after colorectal and anal cancer treatment [1,8,9]. The common symptoms are abdominal pain and bloating, diarrhea, constipation, fecal incontinence, nocturnal emptying and outlet obstruction [9]. In addition to this, treatment for colorectal and anal cancer can cause chronic late complications, which might have implications for the patients adjusting to survivorship and involves difficulties coping with return to daily life [10,11].

The primary aim of this study was to add knowledge about rates of the incidence of stool and bowel movement problems after treatment for colorectal and anal cancer using Low Anterior Resection Symptom score (LARS), St Mark's incontinence score, Bristol stool form scale, Patient Assessment of Constipation Symptoms Score (PAC-SYM), colostomy impact factor and self-rated health as measurement tools.

Methods

We have performed a descriptive prospective cohort study from a single center and data are reported according to the strengthening the Reporting of observational Studies in Epidemiology statement (STROBE) [12]. All participants in this cohort are patients from Herlev University Hospital in Denmark, where 350 colorectal and anal cancer resections are performed every year. There are 90 new cases of anal cancer per year who are primarily referred to the oncologists. All patients who undergo surgery for colorectal and anal cancer are invited to answer patient-reported outcome questionnaires about late complications. Furthermore, patients had the possibility to attend the late complication clinic in our surgical department [1]. This late complication clinic has existed since October 2020 and it offers basic and advanced treatments for late complications after colorectal and anal cancer treatment. In this study, we included patients systematically from October 2020, although patients with surgery from October 2019-September 2020 were also included. The patients are followed for three years after they have surgery with patient-reported outcome measurements every 3, 6, 12, 24 and 36 months after surgery. Before we sent out the patient-reported outcome questionnaires, we had it proofread by two patients. However, in this study, we only included the first answers to the questionnaires, hence some of the patients included before October 2020 had only follow up 6, 12, 24 and 36 months after surgery. A subgroup of patients was referred to the late complication clinic more years after surgery or chemotherapy and these patients had only one questionnaire (36 months).

The questionnaires were sent by "Research Electronic Data Capture" (REDCap), a secure electronic database or as a paper form for those who were not comfortable with electronic questionnaires [13]. The inclusion criteria were age over 18 years and receiving treatment for colorectal and anal cancer. The exclusion criteria were patients unable to fill in the questionnaires due to cognitive or language limitations. To describe stool and bowel symptoms we chose different scoring tools providing broad coverage of stool and bowel movement symptoms. We also asked about self-rated health and quality of life when living with a stoma. Interpretations of the scoring systems are presented in Table 1. Patient Assessment of Constipation Symptom (PAC-SYM) is an instrument developed to evaluate the outcome of treatment of constipation over time [14]. The score consists of four domains: the abdominal domain describes pain, bloating, discomfort and cramps of the abdomen; the rectal score describes painful bowel movements, burning and tearing at the rectum and generally it is only affected in patients with severe constipation; the stool domain describes if stool is hard, feeling of incomplete emptying and false alarm emptying; and the global score is the three domain scores multiplied into a global score [15]. We also use the Bristol stool form scale, which is a seven-point Likert scale and with help from pictures, the patient can describe their stool [16]. To describe the severity of stool incontinence we use the St Mark's incontinence score. It was initially developed to evaluate the severity of stool incontinence over time [17]. For patients having low anterior resection because of rectum cancer, a scoring system called the Low Anterior Resection Symptom score (LARS) has been developed. It describes the severity of bowel movement dysfunction [18]. However, these scoring systems were only assessed in patients who did not have a stoma. The patients with a stoma were asked about stoma-related quality of life using the colostomy impact score [19]. All patients were asked about their own perception of health, by using a visual analog scale to estimate patient's self-rated health. There is not any credible value for this rating, but in a general population in the US the median score was 85% (Table 1) [20].

Score	Interval for the Score	Interpretation of the Score
St Mark's incontinence score	0-24	0: perfect continent, 24: total incontinent
LARS	0-42	0-20: no LARS 21-29: minor LARS 30-42: major LARS
PAC-SYM Domains Abdominal Stool Rectal Global	0-4	0: no symptoms 1: mild symptoms 2: Moderate symptoms 3: Severe symptoms 4: very severe symptoms
Bristol stool form scale	1-7	1-2: indicates constipation 6-7: indicates diarrhea
Colostomy impact factor	0-39	0-9: minor impact 10-38: major impact
Self-rated health	0-100	0: Worst imaginable health state 100: best imaginable health state

Table 1: Measuring tools used and how they were interpreted. Data are shown as frequency (percentage) and median (range). LARS: Low Anterior Resection Symptom Score, PAC-SYM: Patient Assessment of Constipation Symptom.

Data processing was performed from REDCap and IBM® SPSS® statistics version 25 to recode variables of the scoring systems and interpret the results. Data are reported as median (range) and number (percentage) and statistical analyses to see differences between patient groups were done by Mann-Whitney U test and Kruskal Wallis test for non-normal distributed data and a t-test for normal distributed data. The Danish Data Protection Agency has granted permission for the implementation of the study and to store data (P-2020-134). The Regional Committee on Health Research Ethics has exempted the study from approval (Journal-NR: 20033634).

Results

We found 293 patients eligible for this study (Fig. 1). The largest proportion of the patients rejecting to participate was patients who had surgery for colon cancer.

Figure 1

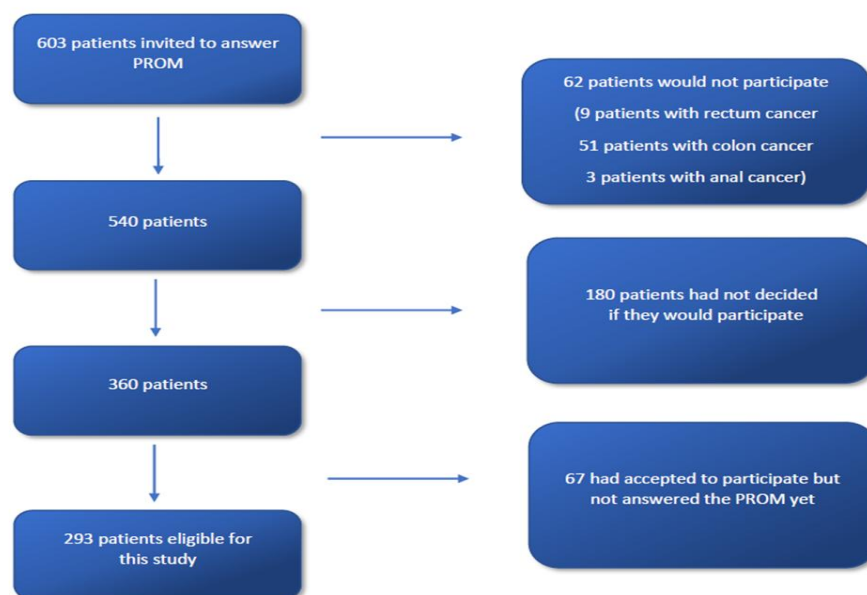


Figure 1: Flowchart of eligible and included patients. PROM: patient reported outcome measurements.

We divided the group of patients with colon cancer into three groups according to surgical site: right-sided hemicolectomy, left-sided hemicolectomy and subtotal colectomy. Demographic data are presented in Table 2. All patients should tick a field in the questionnaire whether they wanted contact to the late complication clinic. We found that about half of the cohort wanted to get in contact and receive help to treat any late complication. Of patients with rectal cancer, 47 patients (62%) wanted contact, for patients with colon cancer it was 95 patients (53%) and for patients with anal cancer it was 32 patients (74%). Most of the patients in this cohort answered the questionnaires within the first year after treatment. For patients treated for rectal cancer, it was 63 patients (84%) answering within the first year after treatment, for patients with colon cancer it was 169 patients (95%) and for patients with anal cancer it was only 10 patients (23%) and most of them answered after three years (Table 2).

	Rectum cancer (n=76)	Right hemicolectomy (n=93)	Left sided hemicolectomy (n=75)	Subtotal colectomy (n=10)	Anal cancer (n=43)
Female	42 (55)	55 (59%)	36 (48%)	5 (50%)	31 (72%)
Male	34 (45)	38 (41%)	39 (52%)	5 (50%)	12 (28%)
Age (median, range)	68 (49-85)	76 (46-92)	72 (34-89)	68 (54-81)	68 (41-83)
BMI (median, range)	25 (16-42)	25 (17-45)	25 (15-39)	24 (19-29)	24 (17-34)
Patients with stoma	45 (59)	5 (5%)	18 (24%)	5 (50%)	9 (21%)
ASA 1	12 (16)	6 (7%)	7 (9%)	1 (9%)	7 (16%)
ASA 2	49 (65)	51 (55%)	52 (69%)	8 (73%)	28 (65%)
ASA 3	15 (20)	35 (38%)	16 (21%)	2 (18%)	7 (16%)
ASA 4	0	1 (1%)	0	0	1 (2%)
Laparoscopic/robotic surgery	63 (83)	81 (87%)	64 (85%)	7 (70%)	-
Open surgery	11 (14)	12 (13%)	11 (15%)	3 (30%)	10 (23%)
TAMIS	2 (3)	-	-	-	-
Preoperative chemotherapy	19 (25)	10 (11%)	16 (21%)	1 (10%)	37 (86%)
Preoperative radiation therapy	25 (33)	0	1 (1%)	0	42 (98%)
T0	10 (13%)	3 (3%)	0	0	0
T1	12 (16%)	6 (7 %)	7 (9%)	4 (40%)	12 (28%)
T2	22 (29%)	22 (24%)	9 (12%)	1 (10%)	16 (37%)
T3	27 (36%)	49 (53%)	47 (63%)	2 (20%)	5 (12%)
T4	11 (15%)	13 (14%)	12 (16%)	3 (30%)	10 (23%)

Table 2: Demographics of patients included. TAMIS: Trans Anal Minimally Invasive Surgery, T: Tumor Stadium. Data are shown as frequency (percentage) and median (range).

The descriptive data of stool and bowel movements after treatment for colorectal and anal cancer are presented in Table 3. When looking at LARS in the group of patients with rectal cancer, they all had LARS and 28 patients (90%) had major LARS. Around one third of the patients with colon cancer had major LARS distributed as follows: 33 patients (39%) had major LARS after a right-sided hemicolectomy, nine patients (34%) had major LARS after a left-sided hemicolectomy and for the group of subtotal colectomies four patient (80%) had major LARS. Most patients with anal cancer had major LARS with a total of 30 patients (94%). We found significant differences of both LARS ($p = 0.005$) and the St Mark's incontinence score ($p = 0.005$) between patients with rectum cancer and anal cancer compared with patients with colon cancer. The Bristol stool form scale can be divided into patients with hard, normal and loose stool. We estimated this in each subgroup: in patients with rectal cancer it was eight patients (26%) who had loose stool and 1 patient (3%) had hard stool; for patients with a right-sided hemicolectomy 13 patients (15%) had loose stool and 8 patients (9%) had hard stool; for patients with a left-sided hemicolectomy 5 patients (8%) had loose stool and 7 patients (12%) had hard stool; for patients with subtotal colectomy 2 patients (40%) had loose stool and none of the patients had hard stool; and for patients with anal cancer 12 (35%) had loose stool and none had hard stool. There was no difference in the Bristol stool scale between right- and left-sided hemicolectomies ($p = 0.085$). Our data showed worse self-rated health between patients with rectum and anal cancer compared with patients with colon cancer ($p = 0.002$).

	Rectum cancer (n=76)	Colon cancer right side (n=93)	Colon cancer left side (n=75)	Subtotal colectomies and local resections of the colon (n=10)	Anal cancer (n=43)
St Marks incontinence score	12 (6-22)	2 (0-16)	3 (0-15)	6 (4-10)	17 (2-24)
LARS	36 (24-41)	26 (4-41)	25 (0-41)	37 (14-41)	39 (4-41)
PAC-SYM abdominal	0.63 (0-3.75)	0.25 (0-3)	0.5 (0-2.25)	0.38 (0-2)	1.25 (0-3.75)
PAC-SYM rectum	0.67 (0-3.67)	0 (0-2.0)	0 (0-2.33)	0.33 (0-0.67)	1.67 (0-4)
PAC-SYM stool	1.60 (0-3.40)	0.4 (0-3.40)	0.8 (0-2.6)	1.2 (0.4-1.6)	1.8 (0-3.40)
PAC-SYM global	1.21 (0-2.92)	0.33 (0-2.58)	0.58 (0-2.08)	0.75 (0.33-1.25)	1.46 (0-3.17)
Bristol stool form scale	4 (1-7)	4 (1-7)	4 (1-7)	5 (4-6)	4 (3-7)
Stoma impact factor	21 (8-19)	15 (3-18)	10 (2-34)	14 (6-23)	14 (8-14)
Self-rated health	67 (20-100)	76 (0-100)	76 (16-100)	73 (30-90)	67 (20-100)

Table 3: Symptom scores of the patients included. Values are given as median (range). LARS: Low Anterior Resection Symptom score, PAC-SYM: Patient Assessment of Constipation Symptom (abdominal, rectal, stool and global refer to the four domains covered in this score).

Discussion

Patients with rectal cancer had massive problems with 90% having major LARS. They had high scores on the St. Mark's incontinence score and one third of the patients had loose stool according to the Bristol stool form scale. Patients with colon cancer, regardless of whether they had a right-sided, left-sided or subtotal colectomy, were in risk of having stool or bowel movement related complications. One third of patients, who underwent right-sided or left-sided hemicolectomy, had major LARS. Almost all patients treated for anal cancer had major LARS, they had high scores on St. Mark's incontinence score and the Patient Assessment of Constipation Symptom (PAC-SYM) score was affected on every domain.

To reduce selection bias, we included all patients after surgery for colorectal and anal cancer and we informed the patients that we both needed answers from those who did not have any symptoms and those with symptoms. Furthermore, we emphasized to the patients that their contributions were of importance to science. There are, however, some limitations for this study. We divided the patients into subgroups and some of the groups had rather small numbers of patients, therefore, we only looked at the descriptive data. We lack data on the correlations between some of the scores and correlation between some of the scores and the demographics of the patients. Thus, it would be relevant to look at the association between Bristol stool form scale, LARS and the correlation between tumor height and surgical approaches in patients with rectal cancer and the outcome on both Bristol stool form scale and LARS, hopefully to contribute to a better understanding of the pathophysiology of bowel dysfunction after colorectal cancer surgery. This will be analyzed when we have more patients in our database. We also lacked information of why some patients would not participate. Most of the patients with anal cancer were referred to the late complication clinic because they had symptoms after chemo-radiation therapy and this group of patients represents the ones with the most severe stool and bowel movement symptoms and these data are therefore presented with a presumed degree of selection bias.

Although all patients with colorectal and anal cancer undergoing surgery were invited, about 10% rejected to participate or were excluded due to exclusion criteria. We are not sure whether this group of patients (10%) had less or worse symptoms. A large group of patients with rectal cancer (90%) had major LARS. This is quite higher than reported in a recently published review where it was 44% having major LARS, however, these outcomes were after one year of surgery, there was a high degree of heterogeneity and the range varied from 10 to 72% having major LARS [3]. We do not know why our cohort presented with this high score of LARS, but it could be that these patients are seen mostly within the first year and even within the first three months after surgery and none of the patients had other consultations in the routine outpatient follow-up about medication and treatment of low anterior resection syndrome. There might be some colonic adaptation that can reduce the symptoms over time, so inclusion of patients early after surgery will most probably increase the number with major symptoms [8]. Our results for the left and right sided hemicolectomies show that one third of the patients suffer from stool and bowel movement problems. This incidence is slightly higher compared with a review from 2020 that found 20% or less of the right-sided hemicolectomies having increased frequency of bowel movements and nocturnal bowel movements [2]. We utilized the LARS score even in patients who

underwent colon resections, although the scoring system was initially developed for patients who had a low anterior resection performed. We chose to do so because, in our opinion, it is the best available scoring system to describe bowel dysfunction by indicating of whether there are no problems, mild problems or severe problems. Other scoring tools, such as the St. Mark's Incontinence Score, determine whether the patient experiences any relief of symptoms over a period, but the score itself does not indicate the degree to which the symptoms affect the patient. The colostomy impact factor score was median above 10 in every group indicating that living with a stoma affects the patients' quality of life. This correlates with a systematic review where all 14 included studies showed that living with a stoma had reduced quality of life [21]. Both patients with rectum and anal cancer had a lower self-rated health compared with patients with colon cancer. This difference could reflect that these patients also were most affected on stool and bowel movement symptoms.

It is not clear what predicts stool and bowel movement late complications after colorectal cancer surgery. In the future it will be interesting to investigate correlations of the type of resection, length of the specimen removed and outcome in stool and bowel movement. Many patients suffer from stool and bowel movements complications after colorectal and anal cancer treatment and it is important to investigate how and when we can best help these patients. This study report data from a cohort of patients in a Western country undergoing standard cancer treatment and these data can be generalized to other similar countries. We recommend that centers treating patients for colorectal and anal cancer should have a procedure for routine screening and follow-up for stool and bowel movement late complications.

Conclusion

Patients who underwent surgery for rectal cancer had a high burden of stool and bowel movements symptoms with 90% reporting major LARS. Patients with a right- or left-sided hemicolectomy were comparable in their symptom burden and one third of the patients experienced affection of stool or bowel movements. Patients with anal cancer can in general experience severe stool and bowel movement late complications.

Conflict of Interests

The authors have no conflict of interest to declare.

Trial Registration and Ethical Approval

The Danish Data Protection Agency has granted permission for the implementation of the study and to store data (P-2020-134). The Regional Committee on Health Research Ethics has exempted the study from approval (Journal-nr: 20033634).

Acknowledgement

We would like to acknowledge the valuable support and help by Anne Kjærgaard Danielsen, who died during the research process. We hope we did you proud.

Authors' Contribution

Study concept and design: BTO, JR.

Data analysis and interpretation: BTO.

Drafting the article: BTO.

Critical revision: JR, BTO.

Final approval: BTO, JR.

Patient Consent Statement

Patients who contributed to this scientific work all signed informed consent to participate.

Permission to Reproduce Material from Other Sources

The datasets generated and analyzed during this current study are not available for publicly due to the Danish law of data protection.

Funding Declaration

No funding was used in this study.

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