Bangladesh Medical Res Counc Bull 2024; 50: 74-80 DOI: 10.3329/bmrcb.v50i2.71414

RESEARCH PAPER

Short-term Evaluation of Bowel Dysfunction after Anterior Resection for Carcinoma Rectum

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Abstract

Background: Colorectal cancer (CRC) is the third commonest diagnosed cancer and the second leading cause of cancer-related mortality. Though anterior resection with total mesorectal excision (TME) is the gold standard for the treatment of non-disseminated rectal or distal sigmoid cancer, but almost all patients have experienced some degree of bowel dysfunctions.

Objective: To evaluate short-term bowel dysfunction after anterior resection by LARS score.

Methods: This prospective observational study was carried out in the Department of Surgical Oncology, National Institute of Cancer Research & Hospital (NICRH), Mohakhali, Dhaka. The study was undertaken with the patients who already underwent AR for carcinoma rectum. Data collection was started from January 2020 to March 2021 and the 35 case was collected from OPD and indoor of NICRH maintaining inclusion and exclusion criteria at 3rd month and 6th month. Statistical analysis was done according to the objective of the study by using Statistical Package for Social Science software version 27.0 for windows.

Results: Out of 35 eligible patients, the majority of 21 (60.0%) patients were male. The mean age was found 45.83±11.92 years. Regarding tumor distance from the anal verge, 8(22.86%) patients' tumors were found at the high rectum, 22(62.86%) at mid rectum (8-11 cm) and 5(14.29%) at low rectum. Bowel dysfunction was observed in 94% of cases; out of them, 37% had major dysfunction at 6th month. The mean LARS score was found 28.6±7.2 at 3rd month and 25.7±6.8 at 6th month. The difference was statistically significant ($p \leq 0.05$) between the two groups. Bowel dysfunction, i.e., Incontinence, clustering, urgency and frequency were documented at 6th month 74.29%, 77.14%, 71.43% and 82.86% respectively and were not statistically significant ($p > 0.05$) between at 3rd and 6th months. At 6th month, bowel dysfunctions were higher in ultra-low anterior resection than high anterior resection.

Conclusion: The high prevalence of ARS emphasizes the importance of evaluating bowel dysfunction for rectal cancer treatment in future research and counseling the patient in hospital and daily clinical practice.

Key words: Carcinoma Rectum, Bowel Dysfunction, Anterior Resection, Anterior Resection Syndrome

Introduction:

Colorectal cancer (CRC) is the third most common diagnosed cancer and the second highest cause of cancer-related mortality. The World Health Organization (WHO) GLOBOCAN 2020 database estimates 1,931,590 (10%) new CRC cases and 935,173 (9.4%) CRC-related deaths in 2020. The number of new cases of carcinoma rectum (C19-C20) worldwide is 7,32,210, with an incidence rate of 7.6/100000 and 3,39,022 fatalities. In Bangladesh, there are 2463 new cases.[1] The male-female sex ratio in South Asia is 9.8 and 5.6 per 100,000 people, respectively.[2]

The gold standard for treating non-disseminated rectal or distal sigmoid cancer is anterior resection (AR) with resection margins as short as 2 cm are sufficient for oncologic safety .[3,4] The widespread use of Total Mesorectal Excision (TME) and perioperative multimodal

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therapy has considerably improved the oncological outcomes of rectal cancer in recent decades.[3]

The quality of life after such a sphincter-saving treatment should surely be superior to that following abdominoperineal excision with a permanent colostomy (17) but it frequently results in bowel dysfunction, which sometimes lowering quality of life. This bowel dysfunctions occurs due to a complex mechanism of neorectum, nerve injury, anorectal sensory and reflex mechanisms (RAIR), pelvic muscle injury, loss of anal tone and other factors.[9] For many years, the focus has been on maintaining urinary and, more specifically, male sexual function. However, in recent anterior resection, nerve preservation has been studied in more depth to avoid bowel dysfunction.[10-16] This Bowel dysfunctions complex has been summarized under the term anterior resection syndrome (ARS) which is characterized by a high frequency of bowel movements, clustering, incomplete bowel evacuation, incontinence for flatus and stool and urgency.[18] ARS was identified in 64% of patients, with 41% having significant severity.[19] It was also predicted that 50-90% of individuals who underwent low anterior resection experienced some level of intestinal impairment after surgery.[20] Another study found substantial low anterior resection syndrome (LARS) in 46% of patients after a median follow-up of 14.6 years.[21] The severity of ARS following rectal cancer surgery is strongly linked to lower quality of life (QoL).[22,23]

It is also reported that patients with high rectal resection might have functional abdominal complaints [24,25] There are a number of scoring tools for measuring ARS, including the Wexner score, St. Marks score, FSFI scores, MSKCC-BFI score, and LARS score. Given the intricacy of other scoring systems, the LARS score is now preferred for first-line ARS evaluation[26] This internationally validated LARS score is a simple five-question tool that was developed in Denmark in 2012 and validated for an English translation in 2014. The LARS score produces numerical values ranging from 0 to 42. Scores of 0-20 are considered as “no LARS,” 21–29 as “minor LARS,” and 30-42 as “major LARS” (27).

Age of the patients, sex, the extent of rectal excision (TME/PME), the height of the anastomosis, neoadjuvant therapy, diverting stoma, post-operative complications are important predictive factors for gastrointestinal functional results[28,18] The occurrence of functional abdominal complaints and the effect on QoL has not been investigated extensively for rectal cancer. As a result, function after AR has been inconsistently assessed and insufficiently documented in both research and the daily clinical setting, resulting in a large variation in reported frequency and severity of symptoms.

Increasing knowledge about Anterior Resection Syndrome (ARS) among specialists may implement in systemic screening tools. Better preparation about the possible burden of ARS symptoms, active attitude towards discussing the impact of symptoms and to reinforce social support if possible. The findings of this study might be helpful to provide evidence-based information to the physician as well as patient groups for bowel dysfunction and treatment planning.

Materials and Methods

This observational study was undertaken in the department of Surgical Oncology, National Institute of Cancer Research & Hospital (NICRH), Mohakhali, Dhaka with the patients who already underwent AR for carcinoma rectum from January 2020 to March 2021. Our objective was to evaluate pattern of bowel dysfunction after anterior resection by LARS score and to determine the severity of symptoms among the type of operation. Subjects were collected from OPD and indoor of NICRH and metastatic diseases were excluded from our study. The purpose and procedure of the study was discussed with the patient. All clinical information was recorded from patient’s case record. Curative AR for rectal cancer usually performed according to the principle of TME/PME by open or laparoscopic method, and a straight (end-to-end) anastomosis done routinely using a stapling device. A diverting ileostomy was constructed where indicated and generally reversed 3 to 6 months after primary surgery. Data was collected on 3rd month and 6th month after definitive surgery (without covering ileostomy) or after ileostomy reversal. Written consent was taken from those who agreed to participate in this study. On receipt of the informed written consent, data were collected from the patients on variables of interest using the structured design interview, history, clinical examination and LARS score sheet by the principal investigator. Age, sex, type of surgery, extent of operative procedure: TME / PME and reversal of covering ileostomy were the independent variable. Evacuation difficulties (clustering), incontinence of flatus and / or feces, urgency, frequency of bowel movement were our outcome variables.

All data was collected using a structured questionnaire and LARS score sheet. Statistical analysis was done according to the objective of the study by using IBM SPSS (Statistical Package for Social Science) software version 27.0 for windows and graphs by MS Excel 2010. Continuous data was expressed as mean ± standard deviation (SD). The analysis was done by using independent sample t test for continuous variables and chi-square test for categorical variables. All reported *p*-values were two sided and value less than 0.05 taken significant and confidence interval at 95% level.

LARS score questionnaire

The aim of this questionnaire is to assess your bowel function. Please tick only one box for each question. It may be difficult to select only one answer, as we know that for some patients' symptoms vary from day to day. We would kindly ask you to choose one answer which best describes your daily life. If you have recently had an infection affecting your bowel function, please do not take this into account and focus on answering questions to reflect your usual daily bowel function.

Q. 1: Do you ever have occasions when you cannot control your flatus (wind)?

- No, never 0
- Yes, less than once per week 4
- Yes, at least once per week 7

Q. 2: Do you ever have any accidental leakage of liquid stool?

- No, never 0
- Yes, less than once per week 3
- Yes, at least once per week 3

Q. 3: How often do you open your bowels?

- More than 7 times per day (24 hours) 4
- 4 - 7 times per day (24 hours) 2
- 1 - 3 times per day (24 hours) 0
- Less than once per day (24 hours) 5

Q. 4: Do you ever have to open your bowels again within one hour of the last bowel opening?

- No, never 0
- Yes, less than once per week 9
- Yes, at least once per week 11

Q. 5: Do you ever have such a strong urge to open your bowels that you have to rush to the toilet?

- No, never 0
- Yes, less than once per week 11
- Yes, at least once per week 16

The allocated points per question are indicated in the right-hand column, the score from each of the five answers is added together to give a final score between 0-- 42.

Interpretation: 0-- 20 = No LARS 21-- 29 = Minor LARS 30—42 = Major LARS

Result

In a cohort of 35 cases undergoing anterior resection within a defined time frame, meticulous attention was given to the approval and exclusion criteria. This research stands out as a comprehensive and multifaceted exploration, presenting fundamental insights into various aspects of the surgical procedures and postoperative outcomes.

A notable observation is that approximately one-third of the patients (31.43%) were in the age range of 41-50 years, with the mean age being 45.83±11.92 years and a broad age distribution ranging from 23 to 67 years. The gender distribution revealed a majority of male patients (60.0%), while 40% were female. (Table-I)

It was observed that tumors were found in 22.86% of cases at the high rectum, 62.86% at the mid rectum (8-11 cm), and 14.29% at the low rectum. In our study 68.57% of cases were underwent for low anterior resection, 17.14% cases for high anterior resection, and 14.29% cases for ultra-low anterior resection. (Table – I)

In this study, incontinence, clustering, urgency and frequency at 6th month were following as 26(61.90%), 27(64.29%), 25(59.52%), and 29(69.05%), respectively. This result was not statistically significant (p>0.05) from 3rd month (Table II).

Table III shows that mean LARS score was found 28.6±7.2 (Range- 4-42) in 3rd month and 25.7±6.8 (Range- 2-39) in 6th month. The difference was statistically significant (p <0.05) between two groups.

At 6th month, different age group did not show any statistically significant (p <0.05) result for ARS. In case of high anterior resection group, 2 (100.0%) patients were in no LARS, 3 (15.0%) in minor LARS and 1(7.7%) in major LARS group. Five (38.5%) patients were found of Ultra-low anterior resection in major LARS but not found in no LARS and minor LARS groups. In low anterior resection group 0 (0.00%) patients was found in no LARS group, 17 (85%) were in minor LARS and 7(53.8%) in major LARS group. The difference was statistically significant (p <0.05). (Table – IV)

Table I: Baseline characteristics of the study population (n=35)

	Number of patients	Percentage
Age (years)		
≤30	5	14.29
31-40	7	20.00
41-50	11	31.43
51-60	7	20.00
>60	5	14.29
Mean ±SD	45.83(±11.92)	Range 23-67 years
Sex		
Male	21	60.0
Female	14	40.0
Tumor distance from anal verge		
Low (d”7 cm)	5	14.29
Mid (8-11 cm)	22	62.86
High (>11 cm)	8	22.86
Type of anterior resection		
High anterior resection	6	17.14
Low anterior resection	24	68.57
Ultra-low anterior resection	5	14.29
Mesorectal excision		
TME	27	77.14
PME	8	22.86
Stoma closure		
>24 weeks	23	65.71
≤24 weeks	08	22.86
No	04	11.43

Note. LARS: Low Anterior Resection Syndrome; TME: Total Mesorectal Excision; PME: Partial Mesorectal Excision;

Table II: Anterior resection syndrome in different follow up (n=35)

Anterior resection syndrome	At 3rd months(n=43)		At 6th months (n=43)		*p* -value
	n	%	n	%	
Incontinence	29	82.86	26	74.29	0.382^{ns}
Clustering	27	77.14	27	77.14	1.0 ^{ns}
Urgency	26	74.29	25	71.43	0.788^{ns}
Frequency	31	88.57	29	82.86	0.495^{ns}

(Multiple responses considered); ns= not significant
p -value reached chi square test

Table III: LARS score in different follow up (n=35)

LARS score	LARS	At 3rd months(n=43)		At 6th months (n=43)		*p* -value
		n	%	n	%	
No LARS (0-20).	No syndrome	2	5.71	2	5.71	
Minor LARS (21-29)	Minor	15	42.86	20	57.14	
Major LARS (30-42)	Major	18	51.43	13	37.14	
Mean ± SD		28.6 ± 7.2		25.7 ± 6.8		0.001^{s}
Range (min-max)		4.0 - 42.0		2.0 - 39.0		

s= significant; *p* -value reached paired t-test
Note. LARS: Low Anterior Resection Syndrome

Table IV: Type of resection with LARS score at 6th months (n=35)

	LARS at 6th months					
	No (0-20)(n=3)		Minor (21-29)(n=24)		Major (30-42)(n=16)	
	n	%	n	%	n	%
Type of anterior resection						
High anterior resection	2	100.0	3	15.0	1	7.7
Low anterior resection	0	0.0	17	85.0	7	53.8
Ultra-low anterior resection	0	0.0	0	0.0	5	38.5
Mesorectal excision						
TME	0	0.0	16	80.0	11	84.6
PME	2	100.0	4	20.0	2	15.4

Note. LARS: Low Anterior Resection Syndrome; TME: Total Mesorectal Excision; PME: Partial Mesorectal Excision

TME procedures also demonstrated noteworthy associations with LARS outcomes. After TME, 80% had minor LARS and 84.6% had major LARS, with no patients in the no LARS group, and this difference was statistically significant ($p < 0.05$). (Table – IV)

It is our limitation that initial bowel dysfunction due to position of cancer just after surgery were not included in our study. It may affect the results. Association with other factors that may also affect the result like neoadjuvant chemoradiation, Prognostic stage, TNM category, Stoma closure were not included in our study as we had small number of study population.

Discussion

The present study aimed to investigate the patterns of bowel dysfunction after anterior resection in patients with rectal cancer. The findings shed light on the prevalence and severity of various forms of bowel dysfunction, as well as surgical procedure that may contribute.

In terms of patient demographics, one-third of the patients fell within the 41-50 age range, which may suggest that this age group is particularly susceptible to rectal cancer. The male-to-female ratio was approximately 3:2, consistent with previous studies. [30]

As the tumour were more in mid and lower rectum, patients underwent for TME and more the LARS was found. This distribution differs from the findings of other study, who observed a higher proportion of tumors in the upper rectum.[31] The discrepancy may be attributed to delayed visits to specialists, resulting in the disease being more advanced at the time of diagnosis.

Regarding surgical procedures, after 6th month, in the case of LAR, and ULAR group, LARS results were more. A recent study (19) observed that LARS was more significant in low anterior resection 20(93.5%) and in ultra-low anterior resection 19 (86%). This observation is similar to our study.

Almost all patients (94%) experiencing some degree of bowel dysfunction in our study. Major dysfunction was observed in 37% of patients, while 57% experienced minor dysfunction. These rates align with the observations made by Pieniowski[32] and Van Heinsbergen,[33] indicating a high burden of bowel dysfunction following anterior resection. The mean LARS score at the 6th month was significantly lower than at the 3rd month, suggesting some improvement over time.

Tables II, and III provide a comprehensive overview of the postoperative outcomes and complications, highlighting factors such as incontinence, clustering, urgency, frequency, and the LARS score at the 3rd and 6th months post-surgery. Notably, the mean LARS score demonstrated a statistically significant difference between the two time points. In comparison with other study, the most frequently occurring symptoms were urgency (35%), incontinence of flatus or liquid (51% and 19%), and clustering (58%).[22] This dissimilarity may be explained by our patients presented with more advanced stage, CCRT was given to almost all patients and more radical surgery was done.

In conclusion, our study provides valuable insights into the patterns of bowel dysfunction following anterior resection for rectal cancer. The high prevalence of bowel dysfunction, including incontinence, clustering,

urgency, and frequency, underscores the long-term impact on patients' quality of life. Factors such as tumor location, surgical approach, neoadjuvant therapy, timing of stoma closure, and disease may influence the development and severity of bowel dysfunction. Future research, including large scale multicenter studies, is warranted to further explore these factors and identify strategies to minimize bowel dysfunction and improve patient outcomes after anterior resection. Frequency and incontinence were found more which need to be considered for counseling before surgery. The high prevalence of ARS emphasizes the importance of evaluating bowel dysfunction for rectal cancer treatment in future research and counseling the patient in hospital and daily clinical practice.

Acknowledgement

The authors thanks to all co-authors and the department of surgical oncology, NICRH. Special thanks to Bangladesh Medical Research Council (BMRC) for kind co-operation with financial funding.

Conflict of interest: The Author have no conflicts of interest

Funding: Self funded

Ethical Clearance: National Cancer Research Institute & Hospital (NICRH), Mohakhali, Dhaka

Submit Date: 02 February, 2024

Final Revision Received: 27 June, 2024

Accepted: 25 June, 2024

Publication: 01 August, 2024

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