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Assessment of Functional Outcome after Ultra-Low Anterior Resection as a Surgical Treatment of Low Rectal Carcinoma

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Abstract | **Original Research Article**

Background: In the treatment of distal rectal cancer, abdominoperineal resection (APR) has long been the only surgical option. However, the evolution of better surgical techniques, better understanding of locoregional tumor spreading, and the introduction of preoperative chemoradiotherapy have led to more sphincter-saving surgery. Since the day of the first description of this surgical procedure, various institutions have published their experience with this technique. ***Objective*:** The objective of the study was to assess the functional outcome after ultralow anterior resection as a surgical treatment of low rectal carcinoma. ***Method*:** An observational study was conducted from April 2018 to September 2019 among 17 patients with low rectal carcinoma who underwent ultralow anterior resection with or without chemo-radiotherapy. The study was carried out in the Department of Colorectal Surgery, Bangabandhu Sheikh Mujib Medical University. Functional outcomes were measured at the 3rd, 6th, and 12th months of stoma closure by low anterior resection syndrome score, Wexner's incontinence score, and Global health status and Functional scales of the European Organization for Treatment and Research of Cancer questionnaire. ***Results*:** LARS impact gradually decreases over time after stoma closure, from 3rd month to 6th month ($p<0.001$) and 12th month ($p<0.001$). The number of patients (88.2%) with Major LARS in the 3rd month decreases to 64.7% in the 6th month and 47.1% in the 12th month. A significant number of patients (41.2%) at the end of the 12th month had no LARS. The severity of incontinence also significantly decreases on follow-up ($p<0.05$, at 6th and 12th month). 23.5% of patients in the 3rd month had severe incontinence which improved and was evident only among 5.9% in the 6th month and none in the 12th month. Significant improvement was observed both in the 6th month and 12th month compared to the 3rd month in Global Health Status (58.11±9.51, 62.12±9.71, 69.27±10.61 respectively, $p<0.001$) and all items of Functioning Scales ($p<0.001$) except Cognitive Functioning (82.48±7.39, 83.51±7.32, 83.45±7.25, respectively, $p>0.05$). ***Conclusion:*** Both bowel function and quality of life improved significantly over time. However, very few patients became absolutely free of symptoms at end of the 12th month. Thus, it can be derived that ultralow anterior resection has significantly improved functional outcomes at least in terms of severity if not symptoms free.

Keywords: Rectal carcinoma, ultralow anterior resection, Intersphincteric resection, Low anterior resection syndrome score, Wexner's score, Global health status, Functioning scales.

1. INTRODUCTION

Carcinoma rectum is a challenging problem throughout the world. Colorectal cancer is the third leading cause of cancer-related deaths in men and women in the world and the second most common cause of cancer deaths when men and women are

combined in the USA. Although the overall death rate has continued to drop, the death expected about 511020 (8.4% of all types of cancer by 2019. Deaths from colorectal cancer had increased by 1% per year from 2007 to 2016 in younger than aged people [1] in the USA. Most colorectal cancers are adenocarcinomas and usually occur sporadically (75-85%) [2, 3]. However, a hereditary susceptibility to CRCs is not rare (5-10%). In addition, the use of non-steroidal anti-inflammatory drugs, hormone replacement therapy, statins, and oral contraceptives have been associated with an increased risk of CRC. Inflammatory bowel diseases, diabetes, or colorectal polyps are pre-existing conditions, resulting in a higher risk of developing colorectal cancer. Surgery has always been the most important aspect of the treatment of rectal cancer. The traditional surgical approach to tumors located in the distal one-third of the rectum is the abdominoperineal resection technique first reported by Miles in the early 20th century [4]. This procedure proved its effectiveness in obtaining high survival and low recurrence rates, although many patients suffered from the psychological and social limitations associated with the inevitable permanent colostomy. The development of better surgical techniques such as the low and ultra-low anterior resection, the total mesorectal excision, combined with the development of better anastomotic techniques, and the possibility to construct a neorectum after excision of the rectum led to a greater focus on sphincter-preserving surgery. A better understanding of loco-regional tumor spreading and the evolution of preoperative chemoradiotherapy were other important factors in this evolution. Carcinoma involving the lower part of the rectum is now successfully managed by sphincter-saving surgery with less morbidity and uneventful recovery [5]. In 1994 [6]. described the intersphincteric resection technique. ISR known as the intersphincteric space is a surgical technique that extends the rectal resection into the space between the internal and external sphincter. It is performed by a synchronous abdominoperineal approach with TME and excision of the entire or part of the internal sphincter, followed by a handsewn coloanal anastomosis [7]. This procedure makes it possible to treat rectal tumors within 5 cm of the sphincter complex without the need for a permanent colostomy, which is an unavoidable consequence of the APR procedure. However, this procedure is not without risk. Since the internal anal sphincter is responsible for resting anal continence; excision of the internal anal sphincter can compromise the sphincter function and result in anal incontinence [8]. Bowel function is a major issue after a sphincter preserving surgery for low rectal carcinoma. Bowel dysfunction occurs in 30-70% of patients after Low anterior resection and may reach up to 90% in some series [9-11]. The dysfunction varies in its symptoms and severity and it manifests as urgency, incontinence, and fragmented defecation, with bowel movements that are repeated, and incomplete for difficulty. The set of the symptoms constitutes, what is known as lower anterior resection syndrome. In order to be successful in treating rectal cancer, a good oncologic outcome is the first priority. Equally important is the achievement of an acceptable functional outcome. By preserving fecal continence, an important goal of sphincter-preserving surgery is to reach the acceptable quality of life levels. Many publications demonstrated the safety and efficacy of this procedure for the treatment of low rectal carcinoma and the published results reported improvement in continence level and quality of life among those patients.

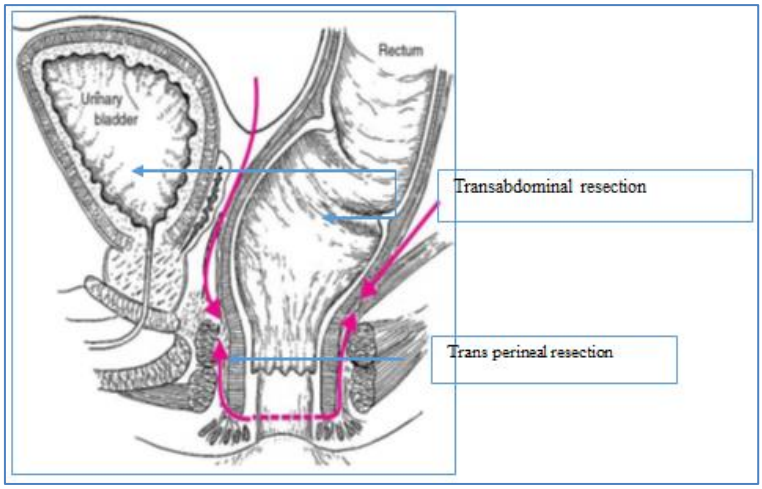

Fig-I: Steps of ISR procedure

Figure I Showed that the ISR procedure was done in two stages (in the same setting): the rectal dissection via a transabdominal and the intersphincteric resection via a transperineal approach.

OBJECTIVES

General Objective

To assess the functional outcome after ultralow anterior resection as a surgical treatment of low rectal carcinoma.

Specific Objectives

- Comparison of low anterior resection syndrome (LARS)
- Wexner's incontinence score
- Global health status (QoL)
- EORTC QLQ-C30 on follow-up.

2. MATERIAL AND METHODS

This study was commenced at the Department of Colorectal Surgery, Bangabandhu Sheikh Mujib Medical University from April 2018 to September 2019 among 17 patients with low rectal carcinoma who underwent ultralow anterior resection with hand-sewn coloanal anastomosis by intersphincteric resection techniques with or without chemo-radiotherapy. Ethical clearance for the study was taken from the Institutional Review Board of BSMMU prior to the commencement of this study. Patients were followed up for 12 months after gut restoration to see the functional outcome of the surgery. Baseline characteristics were recorded at enrollment in a pre-designed data collection sheet. Functional outcome was recorded by questionnaires at different specified intervals during follow-up. Bowel functional evaluation was assessed by Low anterior resection syndrome score and Wexner's incontinence scale. Global health status and functional scale items were used for the evaluation of the quality of life, components of the European Organization of Research and Treatment of Cancer quality of life questionnaire version 3.0. The summarized data were presented in the form of tables and graphs. Wilcoxon signed-rank and paired Student t-tests were performed to compare LARS score, Wexner score, and QoL score over 3rd and 12th month follow up when applicable. a p-value of less than 0.05 (5%) was considered to be statistically significant. Data were processed and analyzed by SPSS version 24.0.

3. RESULTS

Table 1 showed the mean age at presentation was 43.59±10.41. The minimum and maximum age of the patient at presentation was 27 years and 59 years respectively. The majority of the patient was aged below 50 years (10, 58.8%).

Table-1: Distribution of patients by their age (N=17)

Participant group	n	%
<50 yrs.	10	58.8
>50 yrs.	7	41.2
Mean± SD (Min-Max)	43.59±10.41 (27-59)	
Male	10	53.0
Female	7	47.0

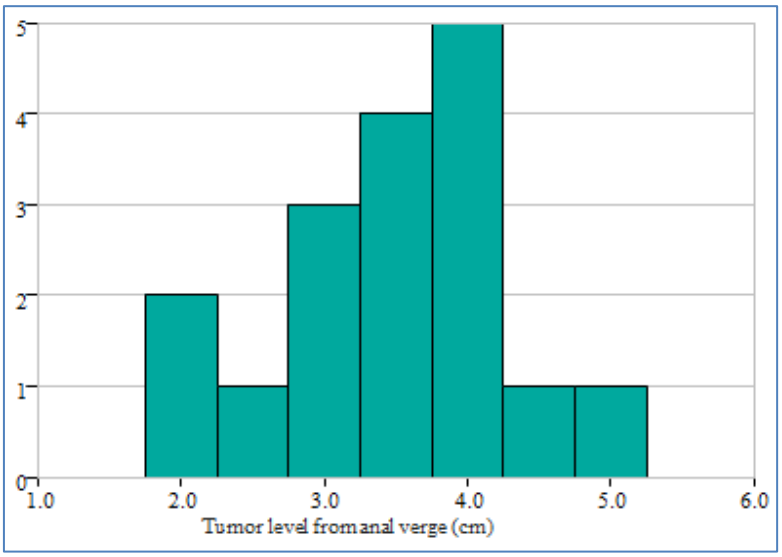

Fig-II: Bar diagram showing the distribution of cases by tumor level from the anal verge (N=17)

Figure 1I shows the majority of participants (5) had tumors located at 4cm from the anal verge. Followed by, the tumor was located at 3.5cm in 4 participants, 3cm in 3 participants, 2cm in 2 participants, 2.5 cm in 1 participant, 4.5cm in 1 participant, and 5 cm in 1 participant. The mean distance from the anal verge was 3.47±0.81.

Table 2 showed that the majority (47.1%) of patients had T3 disease and among which regional lymph node involvement was observed in 5 patients (T3N1Mx-23.5% and T3N2bMx-5.9%). T2 disease was evident in 7(41.2%) patients, of which 6 (35.3%) had no regional lymph node involvement.

Table-2: Distribution of participants by TNM stage (N=17)

TNM Stage	n	%
T1N0Mx	1	5.9
T2N0Mx	6	35.3
T2N1Mx	1	5.9
T3N0Mx	4	23.5
T3N1Mx	4	23.5
T3N2bMx	1	5.9

Table 3 showed the majority of the patients (41.2%) had moderately differentiated carcinoma rectum followed by well-differentiated carcinoma rectum was seen among 6 (35.3%) patients. The rest of the patients had poorly differentiated and undifferentiated, 11.8% each, carcinoma rectum.

Table-3: Distribution of participants by histological grade (N=17)

TNM stage	n	%
Well-differentiated	6	35.3
Moderately differentiated	7	41.2
Poorly differentiated	2	11.8
Undifferentiated	2	11.8

Table 4 showed that 7(41.2%) participants had undergone surgery only while 2(11.8%) participants had received neo-adjuvant chemo-radiotherapy only along with surgical treatment. 3(17.6%) participants had received adjuvant chemo-radiotherapy after surgical treatment while 5(29.6%) participants had received both neoadjuvant and adjuvant chemo-radiotherapy along with surgery.

Table-4: Distribution of participants by treatment modalities (N=17)

Treatment modality	n	%
Surgery only	7	41.2
Neo-adjuvant chemo-radiotherapy	2	11.8
Adjuvant chemo-radiotherapy	3	17.6
Both neo-adjuvant and adjuvant chemo-radiotherapy	5	29.6

Ultralow anterior resection with hand-sewn coloanal anastomosis through intrasphincteric technique with covering ileostomy was done in all individuals. The anterior resection was done through the transabdominal route, either by open or laparoscopic approach in 41.7% and 58.8% of participants, respectively.

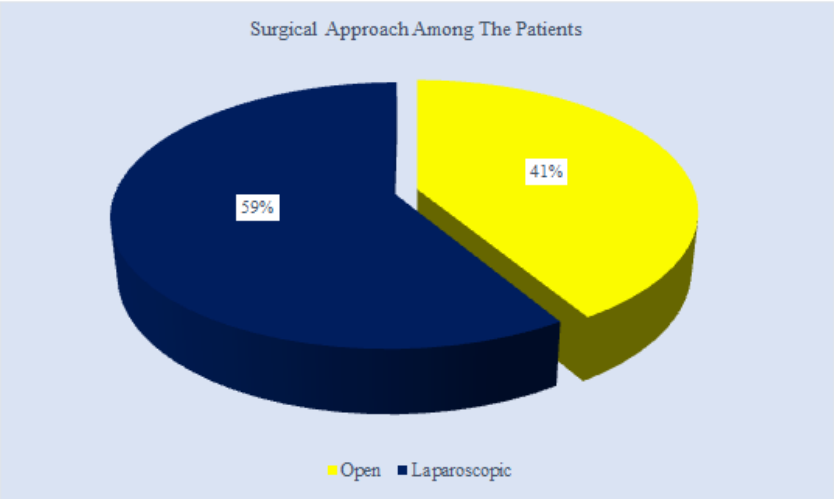

Fig-III: Surgical Approach among the Patients (N=17)

The low anterior resection syndrome (LARS) scoring system is a complex of symptoms consisting of incontinence for flatus and liquid stool, frequency, clustering, and urgency. The LARS score range (0-42) and is divided into 0 to 20 as “no LARS”, 21 to 29 as “minor LARS”, and 30 to 42 as “major LARS”.

Table 5 showed all patients had flatus incontinence even at end of the 12th of follow-up. However, the frequency of flatus incontinence decreases significantly over time. 76.5% of patients who had experienced at least once per week flatus incontinence at 3rd month follow up significantly ($p<0.05$) drops at 6th month (41.2%) and further at 12th month (17.6%) ($p<0.05$).

Table-5: Distribution of patients by flatus incontinence during follow up (N=17)

Flatus Incontinences (LARS Score)	FOLLOW UPs						p-Value
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
Never (Score = 0)	0	0.0	0	0.0	0	0.0	0.014^{s}*
Less than once per week (Score = 4)	4	23.5	10	58.8	14	82.4	$0.002^{s\#}$
At least once per week (Score = 7)	13	76.5	7	41.2	3	17.6	

Table 6 showed all patients at the 3rd-month follow-up of stoma closure had liquid stool incontinence (23.5% < once/week and 76.5% at least once/week). Among these, 1 patient at 6thmonth and 5 patients at 12th months became continent for liquid incontinence. Overall, no significant improvement was observed at 6thmonth ($p>0.05$), however, at12th-months the severity of symptoms decreased (52.9% had < once/week and 17.6% had at least once/week) significantly ($p<0.05$).

Table-6: Distribution of patients by liquid stool incontinence during follow up (N=17)

Liquid Stool Incontinence (LARS Score)	FOLLOW UPs						p-Value
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
Never (Score = 0)	0	0.0	1	5.8	5	29.5	0.317^{ns}*
Less than once per week (Score = 3)	4	23.5	8	47.1	9	52.9	$0.002^{s\#}$
At least once per week (Score = 3)	13	76.5	8	47.1	3	17.6	

Table 7 showed in the majority of the patients, the frequency of defecation decreases over time ($p<0.05$ at both the 3rd and 12th month) fortunately none of the patients had constipation (frequency<once/day) even at the 12th month. 15(88.2%) patients who had a frequency of >7/day3rd-monthonth decreases and was observable in 4(23.5%) patients at 6th month and 2(11.8%) patients at 12th month. 1(5.9%) at 6th month and 5(29.4%) patients had a frequency of 1-3 times/day.

Table-7: Distribution of patients by frequency during follow up (N=17)

Frequency (LARS Score)	FOLLOW UPs						*p-Value*
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
More than 7 times per day (Score = 4)	15	88.2	4	23.5	2	11.8	*0.001^{s}**
4 – 7 times per day (Score = 2)	2	11.8	12	70.6	10	58.8	*0.001$^{s\#}$*
1 – 3 times per day (Score = 0)	0	0.0	1	5.9	5	29.4	
Less than once per day (Score = 5)	0	0.0	0	0.0	0	0.0	

Table 8 showed, that at the end of the 3rd month, 17.6% had no clustering of stool, 70.6% had clustering <once/week and 11.8% had at least once/week clustering of stool. In the 6th month, no improvement was observed in the clustering of stool ($p>0.05$). However, by 12 months 35.3% of patients had no clustering, and the rest 64.7% had a clustering of stool less than once/week.

Table-8: Distribution of patients by clustering during follow up (N=17)

Clustering (LARS Score)	FOLLOW UPs						p-Value
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
Never (Score = 0)	3	17.6	3	17.6	6	35.3	1.00^{ns}*
Less than once per week (Score = 9)	12	70.6	12	70.6	11	64.7	$0.038^{s\#}$
At least once per week (Score = 11)	2	11.8	2	11.8	0	0.0	

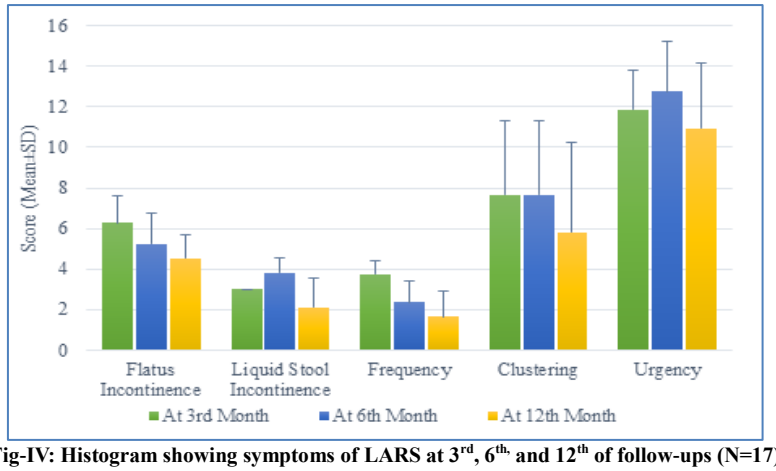

Fig-IV: Histogram showing symptoms of LARS at 3rd, 6th, and 12th of follow-ups (N=17)

Table 9 showed 64.7% of patients felt <once/week and 35.3% of patients felt at least once/week urgency for defecation in the 3rd month of follow-up (Table 10). 82.4% of patients had <once/day and 17.6% at least once/week urgency history at 6th month follow up. Only one patient in the 12th month had no urgency while 82.4% felt an urgency for defecation <once/week and 11.8% at least once/week. The pattern describes, no significant improvement of urgency in the 6th month (p>0.05) and borderline improvement in the 12th month (p=0.05).

Table-9: Distribution of patients by urgency during follow up (N=17)

Urgency (LARS Score)	FOLLOW UPs						p-Value
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
Never (Score = 0)	0	0.0	0	0.0	1	5.9	0.083^{ns}*
Less than once per week (Score = 11)	11	64.7	14	82.4	14	82.4	0.050$^{s\#}$
At least once per week (Score = 16)	6	35.3	3	17.6	2	11.8	

Table 10 describes the overall LARS score-based severity among participants at follow-ups. 88.2% of patients had Major LARS while the rest 11.8% had minor LARS at 3rd month. In the 6th month, 5.9% had no LARS, and 29.4% had minor LARS (p<0.001). The LARS was seen even less among patients in the 12th month (p<0.001). However, 41.2% of patients had no LARS, 11.8% had minor LARS and 47.1% of patients still had Major LARS at the 12th month.

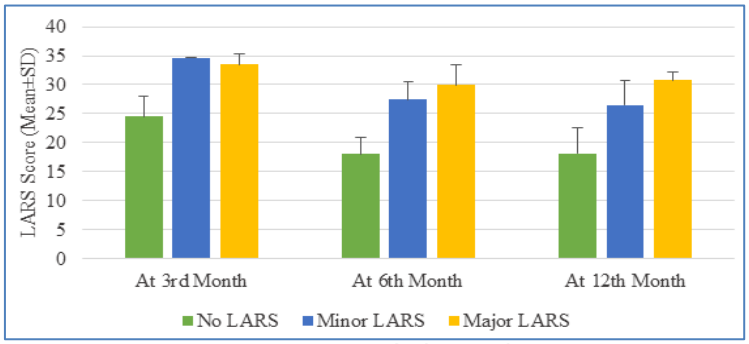

Fig-V: Histogram showing LARS Score at 3rd, 6th, and 12th month of follow up (N=17)

Table-10: Distribution of patients by urgency during follow up (N=17)

LARS Severity (LARS Score)	FOLLOW UPs						p-Value
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
No LARS (0 -20)	0	0.0	1	5.9	7	41.2	<0.001^{s}*
Minor LARS (21 - 29)	2	11.8	5	29.4	2	11.8	<0.001$^{s\#}$
Major LARS (30 - 42)	15	88.2	11	64.7	8	47.1	

Table 11 showed most of the patients in the 3rd month had moderate incontinence (76.5%) while 23.5% had severe incontinence but none were continent (Table 12). In the 6th month, severity decreases significantly (p<0.001) with 5.9% severe incontinent and 94.1% moderate incontinent patients. Further, in the 12th month, 11.8% of patients became continent, and the rest 88.2% had moderate incontinence. The overall severity of incontinence in patients decreases significantly (p<0.001).

Table-11: Distribution of patients by Wexner's score during follow up (N=17)

Wexner's Score	FOLLOW UPs						p-Value
	In 3rd Month		In 6th Month		In 12th Month		
	n	%	n	%	n	%	
Continent (0)	0	0.0	0	0.0	2	11.8	<0.001ns*
Moderate (1 -10)	13	76.5	16	94.1	15	88.2	<0.001s#
Severe (11 -20)	4	23.5	1	5.9	0	0.0	

Table 12 showed the Global Health Status/QoL and Functional Scales, components of the European Organization for Research and Treatment of Cancer QLQ-30 questionnaire (for carcinoma rectum) were used for the purpose to measure the functional outcome of patients at the 3rd, 6th, and 12th month of follow up following stoma closure (Table 13). Global health status significantly improves from 3rd to 6th month (58.11±9.51 to 62.12±9.71, p<0.001) and furthermore at 12th month (69.27±10.61, p<0.001). Similarly, significant improvement was observed in all the components of functional functioning (from 3rd to 6th month and from 3rd to 12th month, both p<0.001).

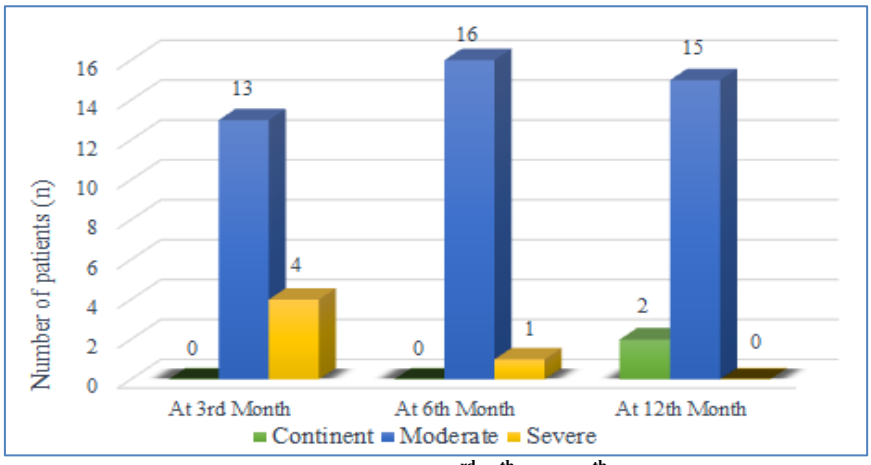

Fig-VI: Wexner's incontinence severity at 3rd, 6th, and 12th month follow up (N=17)

Table-12: Distribution of patients by urgency during follow up (N=17)

	FOLLOW UPs			p-Value
	In 3rd Month	In 6th Month	In 12th Month	
	Mean ± SD	Mean ± SD	Mean ± SD	
Global Health Status	58.11±9.51	62.12±9.71	69.27±10.61	<0.001s*
Functional Scales				<0.001s#
Physical Functioning	73.62±7.67	77.71±8.0	85.08±8.94	<0.001s* <0.001s#
Role Functioning	63.47±6.54	67.44±6.52	73.80±6.32	<0.001s* <0.001s#
Emotional Functioning	64.93±8.98	69.1±9.0	76.32±9.0	<0.001s* <0.001s#
Cognitive Functioning	82.48±7.39	83.51±7.32	83.45±7.25	0.754ns* 0.841ns#
Social Functioning	75.26±6.99	79.47±6.88	85.65±6.82	<0.001s* <0.001s#

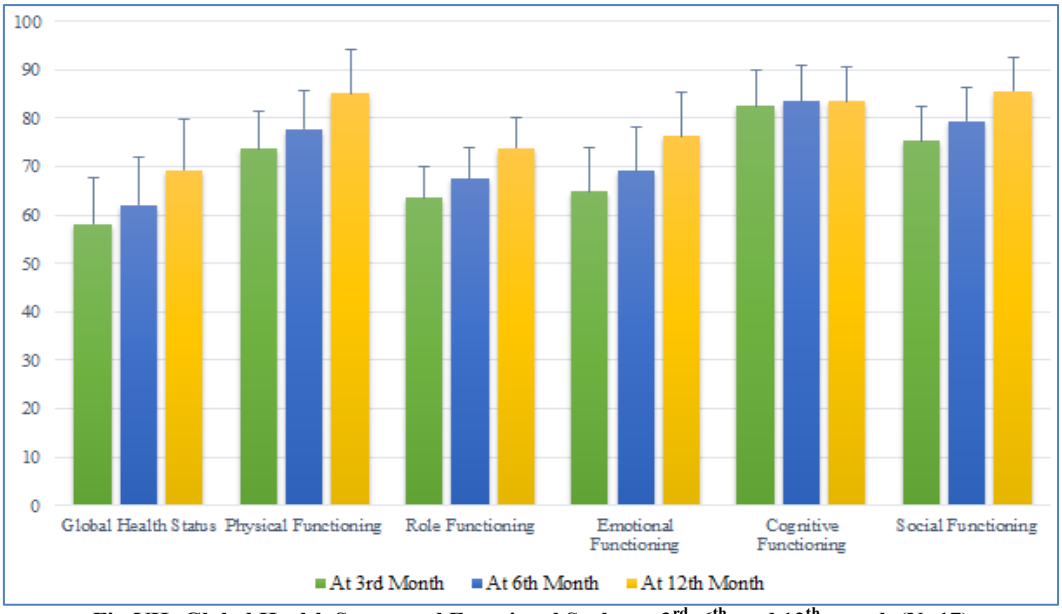

Fig-VII: Global Health Status and Functional Scales at 3rd, 6th, and 12th month (N=17)

4. DISCUSSION

This prospective observational study had been designed to observe the functional outcome of patients after gut restoration (primary surgery-ultralow anterior resection with hand-sewn coloanal anastomosis through intersphincteric resection technique with covering ileostomy, with or without chemo-radiotherapy). In this study, the mean age at presentation was 43.59±10.41. The majority of the patient was aged below 50 years (10, 58. 8%). In a study [12] the mean and range age of a similar set of patients as this study population was 51.1 (26-71) years. The age of these studies reflects the similarity with this study. In a study [13], 50.2% of males were present. In another study, the male-female ratio was 21:29 [14]. The majority of participants had tumors located at 4 cm or less from the anal verge and 6 patients had tumors located at 4 -5 cm from the anal verge found the median distance of the tumor from the anal verge was 2.6 cm. The level of tumor from the anal verge of this study was similar to these studies. In this study, the majority (47.1%) of patients had T3 disease and among them, regional lymph node involvement was observed in 5 patients (T3N1Mx 23.5% and T3N2bMx 5.9%). T2 disease was evident in 7(41.2%) patients, of which 6(35.3%) had no regional lymph node involvement. According to this study, most of the patients (41.2%) had moderately differentiated carcinoma rectum followed by well-differentiated carcinoma rectum was seen among 6(35.3%) patients. The rest of the patients had poorly differentiated and undifferentiated, 11.8% each, carcinoma rectum. In the present study, 41.2% of participants had undergone surgery only while 11.8% of participants had received neo-adjuvant chemo-radiotherapy only along with surgical treatment. 17.6% of participants had received adjuvant chemo-radiotherapy after surgical treatment while 29.6% of participants had received both neoadjuvant and adjuvant chemo-radiotherapy along with surgery. Ultralow anterior resection with hand-sewn coloanal anastomosis through intersphincteric technique with covering ileostomy was done in all individuals. The difference was noted as the choice of the technique for ULAR is the surgeon's preference and expertise in the field. The low anterior resection syndrome scoring system is a complex of symptoms consisting of incontinence for flatus and liquid stool, frequency, clustering, and urgency. The LARS score range (0-42) and is divided into 0 to 20 as "no LARS", 21 to 29 as "minor LARS", and 30 to 42 as "major LARS". Traditionally, the LARS scoring system has been used for the evaluation of the functional outcomes of patients. In our study, we also evaluated each incorporated symptom of the LARS score and final score outcome at different follow-up intervals. Flatus incontinence decreases an insignificant number of patients, both at the 6th and 12th months of follow-up in comparison to the 3rd month ($p<0.05$). But, none of the patients reached the flatus continent state even in the 12th month. 76.5% of patients who had experienced at least once per week flatus incontinence at 3rd month follow up drops at 6th month (41.2%) and further limited to 17.6% patients at 12th month. In a study, it was found flatus incontinence in 24% of patients in the 3rd month, 29% in the 6th month, 24% in the 12th month, and 25% of patients in the 24thmonth ($p>0.05$) [15]. All patients at 3rd month follow up of stoma closure had liquid stool incontinence. Overall, no significant improvement was observed in the 6th month ($p>0.05$), however, in the 12th-month severity of symptoms decreases significantly ($p<0.05$). All patients at the 3rd-month follow-up of stoma closure had liquid stool incontinence. Among these, 1 patient at 6th month and 5 patients at 12th month became continent for liquid stool. Overall, no significant improvement was observed in the 6th month ($p>0.05$), however, in the 12th-month severity of symptoms decreases significantly ($p<0.05$). In the majority of the patients,

the frequency of defecation decreases over time ($p<0.05$ at both the 3rd and 12th month) fortunately none of the patients had constipation even in the 12th month. 15(88.2%) patients who had a frequency of >7/day at 3rd-month decreases and was observable in 4(23.5%) at 6th month and 2(11.8%) at 12th month. 1(5.9%) at 6th month and 5(29.4%) patients had the frequency of 1-3 times/day. At the end of the 3rd month, 17.6% had no clustering of stool, 70.6% had clustering <once/week and 11.8% had at least once/week clustering of stool. In the 6th month, no improvement was observed in the clustering of stool ($p>0.05$). However, by 12 months 35.3% of patients had no clustering, and the rest 64.7% had a clustering of stool less than once/week though the results were similar to this study, the method of comparison was different. 82.4% of patients had <once/day and 17.6% at least once/week urgency history at 6th month follows up. The pattern describes, no significant improvement of urgency in the 6th month ($p>0.05$) and borderline improvement in the 12th month ($p=0.05$). Though the results were similar to this study, the method of comparison was different. In this study, 88.2% of patients had Major LARS while the rest 11.8% had minor LARS. In the 6th month, 5.9% had no LARS, and 29.4% had minor LARS ($p<0.001$). The LARS score was seen further less among patients in the 12th month ($p<0.001$). 41.2% of patients had no LARS, 11.8% had minor LARS and 47.1% of patients still had major LARS. Most of the patients in the 3rd month had moderate incontinence (76.5%) while 23.5% had severe incontinence but none were continent. In the 6th month, severity decreases significantly ($p<0.001$) with 5.9% severe incontinent and 94.1% moderate incontinent patients. Further, in the 12th month, 11.8% of patients became continent, and the rest 88.2% had moderate incontinence. The overall severity of incontinence in patients decreases significantly ($p<0.001$). Moderate incontinence was observed among 17.9% of patients in the 6^{th} month and 82.4% of patients in the 36th month. While none of the patients were continent at 3rd month while 5.8% of patients became continent at 36th month. The Global Health Status/QoL and Functional Scales, components of the European Organization for Research and Treatment of Cancer QLQ-30 questionnaire were used for the purpose to measure the functional outcome of patients at the 3rd, 6th, and 12th months of follow up following stoma closure. Global health status significantly improved from 3rd to 6th month (58.11 ± 9.51 to 62.12 ± 9.71, $p<0.001$) and furthermore at 12th month (69.27 ± 10.61, $p<0.001$). Similarly, significant improvement was observed in all the components of functional scales except cognitive functioning.

6. CONCLUSION AND RECOMMENDATIONS

Both bowel function and quality of life improved significantly over time. However, very few patients became absolutely free of symptoms at end of the 12th month. Thus, it can be delivered that ultralow anterior resection has significantly improved functional outcomes at least of the severity of LARS although not symptoms free. Therefore, patient selection for the ULAR should be based on the location, extent, and position of the tumor. Nevertheless, shared decision-making should be encouraged. With the reference to the outcome of the present study, it will help the patient to make a decision whether he/she wants to lead further life without soma along with the various degree of bowel dysfunction or with present stoma compromising the quality of life. Further studies as metacentric, population-based with the oncological outcome for a longer follow-up period is recommended.

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