



Study of Changes in Quality of Life After Rectal Cancer Surgery Using FACT-C Questionnaire

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Abstract

Rectal cancer and its treatment significantly affect the quality of life (QOL) of the patients. Standard treatment for locally advanced rectal cancer is neoadjuvant radiation therapy followed by surgery and surgical options include sphincter-preserving surgeries (SPS) or abdominoperineal resection (APR). This study aims at determining the pattern of changes in quality of life of patients undergoing rectal cancer surgery using the FACT-C (Malayalam) questionnaire. The Malayalam translation of Functional Assessment of Cancer Therapy for Colorectal Cancer (FACT-C) questionnaire which was previously validated was used to assess the QOL in a prospective study of 102 rectal cancer patients who underwent surgery. QOL scores were recorded at four time points—preoperative, and postoperative at 1 month, 3 months, and 1 year after surgery. Means of QOL scores were compared using paired *t*-test. The overall FACT-C score and scores of all four QOL domains—physical, emotional, social, and functional well being domains—dropped significantly at 1 month after surgery. Most profound fall in scores was noticed with the physical well being (PWB) domain followed by the functional well being (FWB) domain. QOL scores did not differ between patients who underwent SPS and APR. QOL score recovery was faster in APR patients compared to patients who had SPS. No significant difference was noted in overall QOL scores or individual scores of each domain between different age groups, sex, type of procedure (laparoscopic or open), stage of disease, or adjuvant therapy. Faster improvement of QOL scores of social domain was noted in patients with age < 60 years. Female patients were shown to have faster improvement in most of the QOL scores after surgery, though not statistically significant. Rectal cancer surgery results in fall in quality of life scores of all domains and gradual improvement of scores is seen over 1 year. QOL recovery is faster in young patients but sex, stage of disease, type of surgery, and surgical approach are not found to significantly affect the pattern of QOL scores. Patients undergoing APR are shown to have early recovery of QOL scores at 3 months after surgery while the same is attained at the end of 1 year in patients undergoing anterior resection with temporary stoma.

Keywords Rectal cancer · Stoma · Abdominoperineal resection · Anterior resection · Sphincter-preserving surgery

Introduction

Surgical intervention is an important part of curative treatment of rectal cancer, and over the years, surgical techniques have advanced from open surgeries to minimally invasive

surgeries. The surgical management of rectal cancers significantly impacts the quality of life of patients. Individuals who undergo rectal cancer surgery may encounter challenges in adapting to their altered anatomy, managing the stoma, defecating, and participating in regular activities within the respective sociocultural context [1]. Furthermore, many psychological and social difficulties, along with sexual dysfunction, can influence the relationships between patients and their spouses, who often serve as primary caregivers.

In individuals who undergo abdominoperineal resection (APR), there is frequently a notable dislike for stomas, starting from the preoperative phase. Evidence indicates that having a stoma adversely affects body image and sexual function, while positively impacting gastrointestinal issues [2]. Low rectal

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tumors (within 5 cm of anal verge) were classically treated with APR but advances in neoadjuvant therapy and surgical expertise have resulted in increase in the patients undergoing sphincter preservation surgeries (SPS) for the same. Notably, even among specialized medical facilities, there exists considerable variation in the rates of sphincter preservation for low rectal tumors, indicating persistent uncertainty regarding the optimal candidates for sphincter preservation [3]. Bowel dysfunction that occurs after sphincter-preserving surgery can have a profound effect on quality of life (QOL) and can lead to permanent disability, especially in patients who undergo neoadjuvant therapy with a very low anastomosis after resection [3].

Various tools are available for assessing changes in quality of life (QOL), such as the EORTC QOL Questionnaire (EORTC QLQ C30, EORTC CR29) [4], FACT QOL Questionnaire, LARS (Low Anterior Resection Syndrome) Score [5], City of Hope Questionnaire [6], and Short Forms 36 [7]. The majority of studies assessing QOL after rectal cancer surgery have utilized the EORTC QLQ38 questionnaire. However, FACT-C questionnaire put forward by the FACIT (Functional Assessment of Chronic Illness Therapy) group is easier in documentation and has been employed in a few international studies. The FACT-C questionnaire is part of a collection of QOL questionnaires developed by FACIT and is considered one of the most clinically validated tools for assessing QOL in colorectal cancer patients [8]. In our institute, a translated version of the questionnaire in the Malayalam language has been previously validated [9]. Most research studies have primarily focussed on assessing the quality of life (QOL) among patients who either undergo SPS or undergo APR with a permanent stoma. There is a scarcity of studies that have directly investigated the comparative results of SPS and APR in relation to patient-reported outcomes. A systematic review incorporating nineteen such studies involving a total of 6453 patients concluded that a definitive conclusion regarding postoperative QOL and body image following SPS versus APR cannot be drawn [10]. The investigation of post-treatment function and QOL in patients with rectal cancer remains insufficiently explored [11].

The objective of this study was to look into functional outcomes in patients undergoing curative resection for rectal cancer and to assess the impact of these functional outcomes on QOL using FACT-C questionnaire. Identifying predictors and factors associated with poor QOL prior to surgery will enable patients to establish realistic expectations and potentially enhance their satisfaction with treatment outcomes.

Methods

Eligibility Criteria

The study included a cohort of patients diagnosed with clinical stage I–III rectal cancer in our institute between January

2018 and December 2022. All cases of locally advanced rectal cancer (clinically T3 or node positive) patients received neoadjuvant therapy in the form of either long-course or short-course radiation. Early rectal tumors (T1, T2, and node negative) were taken up for primary surgery. Our study recruited only those patients who had a stoma placed, either permanent or temporary, as part of their treatment. The patients were classified into two groups based on the initial surgery: sphincter-preserving surgery (SPS) or non-sphincter-preserving surgery (non-SPS). SPS procedures included anterior resection (AR) and low AR with coloanal anastomosis, while non-SPS procedures included abdominoperineal resection (APR) and total proctocolectomy with end ileostomy. All surgical procedures were performed by trained surgical oncologists specialized in colorectal cancer surgery either by open or laparoscopic surgery. The standard principles such as total mesorectal excision and autonomic nerve preservation were followed in all cases [12]. Stoma reversal was done in patients who had a diversion ileostomy at the end of their adjuvant treatment or after 6 weeks of surgery after confirming the anastomotic integrity with a colonoscopy and barium enema.

Interviews were conducted by a trained interviewer pre-operatively at least 2–3 weeks before the planned surgery and then at 1 and 3 months and 1 year after the completion of surgical therapy.

FACT-C Questionnaire

The latest version of this tool, version 4, consists of 36 items and includes 5 subscales. These subscales cover various domains related to quality of life (QOL). The four primary QOL domains are physical well being (PWB), social well being (SWB), emotional well being (EWB), and functional well being (FWB). Additionally, there is a specific domain addressing colorectal cancer-related concerns (CC-S). Each domain comprises multiple sub-questions that are answered using a 5-point Likert scale. Scoring the FACT-C involves summing up the item scores for each subscale. All function and symptom scores are transformed to a scale of 0 to 136 points. A higher functional score indicates a higher level of functioning (with an optimal score of 100), while a lower QOL score reflects increased severity of symptoms.

Statistical Analysis

Baseline clinical and demographic characteristics will be summarized using frequencies and percentages for categorical variables, and means and standard deviations for continuous variables, as appropriate. The main aim of the study was to assess the global quality of life (QOL) at 1 month, 3 months, and 1 year after surgery using the FACT-C questionnaire and to examine the patterns of QOL score changes

during the study period. Associations between QOL scores and clinical/demographic characteristics were evaluated using appropriate statistical methods such as Student's independent *t*-test or ANOVA. The statistical analysis was performed using SPSS version 29, and a *p* value less than 0.05 was considered statistically significant.

Results

A total of 102 patients who underwent rectal cancer surgery were included in the study. Prior to the surgery, quality of life (QOL) scores were recorded for all of these patients by filling the FACT-C questionnaire. At 1-month postoperative time point, evaluations were conducted for 99 patients except three patients who were excluded due to extended hospital stays resulting from postoperative complications. At the 3-month time point, 91 patients reported for QOL evaluation. At the end of 1 year, 85 patients were followed up for evaluation of QOL scores for the fourth time point as shown in Fig. 1. Among the 46 patients who had SPS, 35 individuals had undergone stoma reversal subsequent to treatment completion before the 1-year evaluation time point. Eleven patients who had SPS with diversion stoma did not undergo stoma reversal. Three patients had anastomotic dehiscence, 2 patients had poor anal tone, 1 patient had stenosis at the anastomotic site, 1 patient had a stroke after 2 months of surgery, 2 patients were deemed medically unfit for second procedure, and 2 patients were unwilling for stoma reversal.

The clinical and demographic characteristics of the study cohort ($n = 102$) are shown in Table 1. The majority

of patients were females (53 patients; 52%), with an average age of 58.6 years (27–76 years). The location of rectal tumors was predominantly in the distal 1/3rd of the rectum (65 patients), with a median distance of 7 cm from the anal verge. Clinical stage III was observed in 65% of the patients, and the majority (97 patients; 95%) had undergone neoadjuvant therapy prior to surgery. Among the patients, 95 received long-course neoadjuvant radiation, while 2 received short-course radiation. Of the total cohort, 56 individuals (55%) underwent non-sphincter-preserving surgery, specifically 54 had an abdominoperineal resection (APR) and 2 had a total proctocolectomy. The remaining 46 patients (45%) underwent sphincter-preserving surgery, predominantly low anterior resection (61%). All patients who underwent sphincter-preserving surgery in this study had temporary diverting ostomies, which were subsequently reversed at a median time of 6 months after the primary surgery. Eleven patients who underwent SPS had not undergone stoma reversal at the end of study period due to multiple reasons as mentioned above. Thirty-seven patients (38%) underwent laparoscopic procedure and 6 patients were converted to open procedure. Ten percent of the study population had a pathological complete response. Seventy-eight percent of the patients were given adjuvant chemotherapy following surgery.

QOL Measurements

Table 2 provides data on baseline preoperative, immediate postoperative (1 month), 3-month follow-up, and 1-year follow-up QOL scores for the study patients. Figures 2 and 3 illustrate the pattern of QOL score variation throughout the

Fig. 1 Responses during the study at various time points

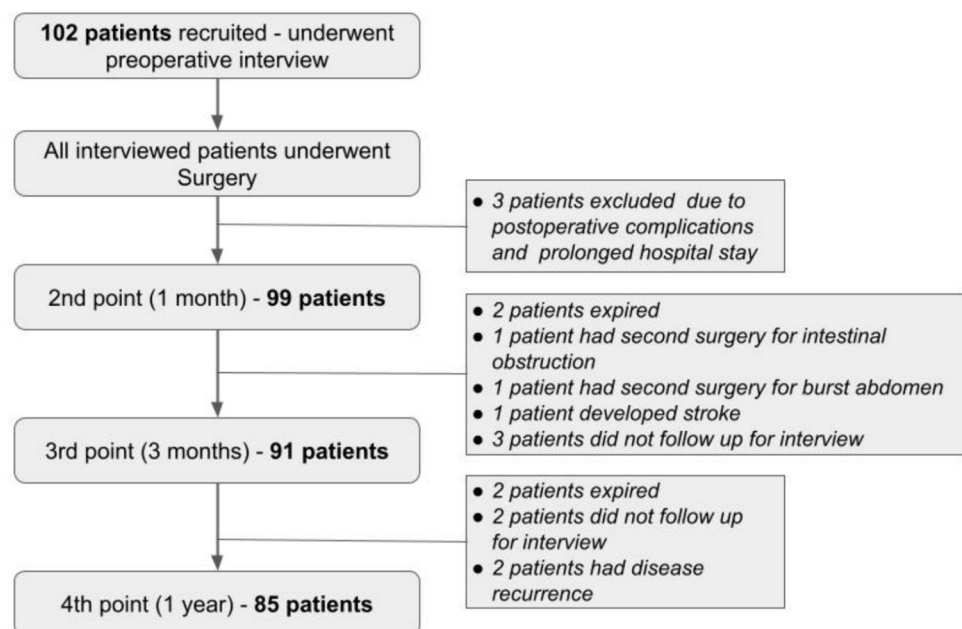


Table 1 Clinical and demographic characteristics of the study cohort

Variable	Group	Frequency	Percentage
Sex	Male	49	48.0%
	Female	53	52.0%
Age	Mean	58.6	
	< 60 years	57	55.9%
	> 60 years	45	44.1%
Site	Rectosigmoid	2	1.9%
	Upper 1/3rd	12	11.8%
	Middle 1/3rd	22	21.6%
	Lower 1/3rd	65	63.7%
	Polyposis	1	1.0%
Stage	Stage II	35	34.3%
	Stage III	67	65.7%
Treatment	Primary surgery	5	4.9%
	NACTRT followed by surgery	95	93.1%
	SCRT followed by surgery	2	2.0%
Approach	Open	65	63.7%
	Lap converted	6	5.9%
	Lap	31	30.4%
Surgery	AR	16	15.7%
	LAR	28	27.4%
	Ultra LAR	2	2.0%
	APR	54	52.9%
	Total proctocolectomy	2	2.0%
HPR	pCR	9	8.8%
	Non-pCR	93	91.2%
Adjuvant systemic therapy	Adjuvant chemotherapy	78	76.4%
	No chemotherapy	21	20.6%

NACTRT Neoadjuvant chemoradiotherapy, *SCRT* Short-course radiotherapy, *AR* Anterior resection, *LAR* Low anterior resection, *APR* Abdominoperineal resection, *pCR* Pathological complete response

study duration. There was a notable decline in QOL scores at 1 month and 3 months after surgery with a significant difference in QOL scores compared to the preoperative baseline values. Overall QOL scores (FACT-C scores) at the end of 1-year follow-up were significantly higher than the preoperative scores for the whole study population. Nevertheless, for a majority of patients, QOL improved and returned to levels

even higher than the preoperative baseline in most of the domains at the 1-year follow-up.

All QOL subscales, including physical, social, emotional, and functional aspects, showed a decline after surgery, with the most significant decrease observed in the PWB and FWB domains. Only the FWB domain showed persistent QOL drop at the end of 1 year. All other domains had better scores compared to the preoperative levels at the end of 1 year. This shows that the factors affecting functional well being of the patients, notably ability to work, enjoying fun moments, managing sleep, etc., take more time to get restored compared to other domains of QOL. Social well being domain, which describes the quality of life based on support and interactions with friends and family, remains the least affected domain.

The study observed no significant differences in the QOL trend between patients who underwent SPS and those who did not (APR) ($p = 0.29$) as shown in Fig. 4. In patients undergoing APR, QOL scores were found to return values comparable to preoperative baseline levels at the end of 3 months, early compared to the overall study population as well as patients who underwent SPS. In patients undergoing APR, a significant fall in QOL score was noted only at the 1-month follow-up point. No domains of QOL showed significant difference between patients who underwent SPS and non-SPS at all four time points.

The delayed QOL recovery in patients undergoing SPS can be explained by the increased incidence of LAR syndrome in these patients as well as difficulty in managing a temporary diverting ileostomy compared to a permanent stoma. A significant number of patients who underwent SPS (11 among 46 patients) did not undergo the planned stoma reversal due to multiple factors like poor anal tone, anastomotic dehiscence, stenosis at the anastomosis site, prolongation of adjuvant therapy, metabolic abnormalities due to ileostomy complicating postoperative recovery, and patients unwilling for a second surgery. This might have adversely affected the QOL recovery in patients undergoing SPS. When QOL scores of patients who underwent stoma reversal were compared with those who did not, significant difference was noted. QOL scores at the 1-year follow-up point of patients who underwent SPS without a stoma reversal later were found to be significantly worse compared to patients who underwent APR with a permanent stoma as seen in

Table 2 QOL scores at various time points

	PWB	SWB	EWB	FWB	CC-S	FACT-C
Preoperative	16.97	18.8	14.99	14.59	16.13	81.47
Post-op (1 month)	12.1	16.96	11.51	8.12	12.58	61.26
3 months	16.26	18.44	13.12	10.76	13.53	72.11
1 year	18.73	22.42	16.56	13.18	16.55	87.28

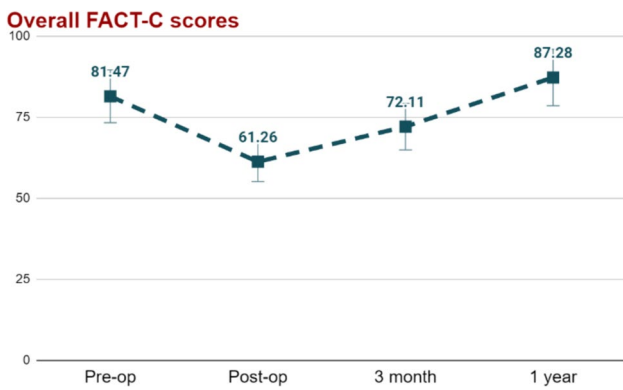


Fig. 2 Trends of QOL-Overall FACT-C scores after rectal cancer surgery

Fig. 5. This showed that presence of a diverting stoma at the end of 1 year after surgery significantly affects the QOL in patients who underwent SPS.

The study also analyzed baseline clinical and demographic variables to assess their predictive value for quality of life (QOL) at the 3-month and 1-year time points (as shown in Table 3). There was a significant difference observed in QOL trends between patients younger than 60 years and those older than 60 years. Younger patients

exhibited a quicker recovery with significant difference noted between overall QOL scores of both age groups (less than 60 years versus more than 60 years) at the 3-month and 1-year follow-up period. This difference was evident in PWB, SWB, and EWB domains also (Fig. 6). Additionally, female patients demonstrated a faster recovery in QOL scores compared to males, though not statistically significant in any individual domains.

Through independent *t*-test analysis, no discernible differences were found in QOL scores concerning the type of surgery (open versus laparoscopic), neoadjuvant radiation type, tumor location, and requirements for adjuvant therapy. Better QOL scores were seen in patients not getting adjuvant chemotherapy, and the difference was statistically significant at the 3-month time point, while most of these patients were on chemotherapy. In 1 year, this difference was not seen. The results of independent *t*-test analysis are shown in Table 3.

Discussion

In this prospective investigation, we observed a noteworthy decline in all quality of Life (QOL) parameters in patients undergoing rectal cancer surgery. QOL scores were found to

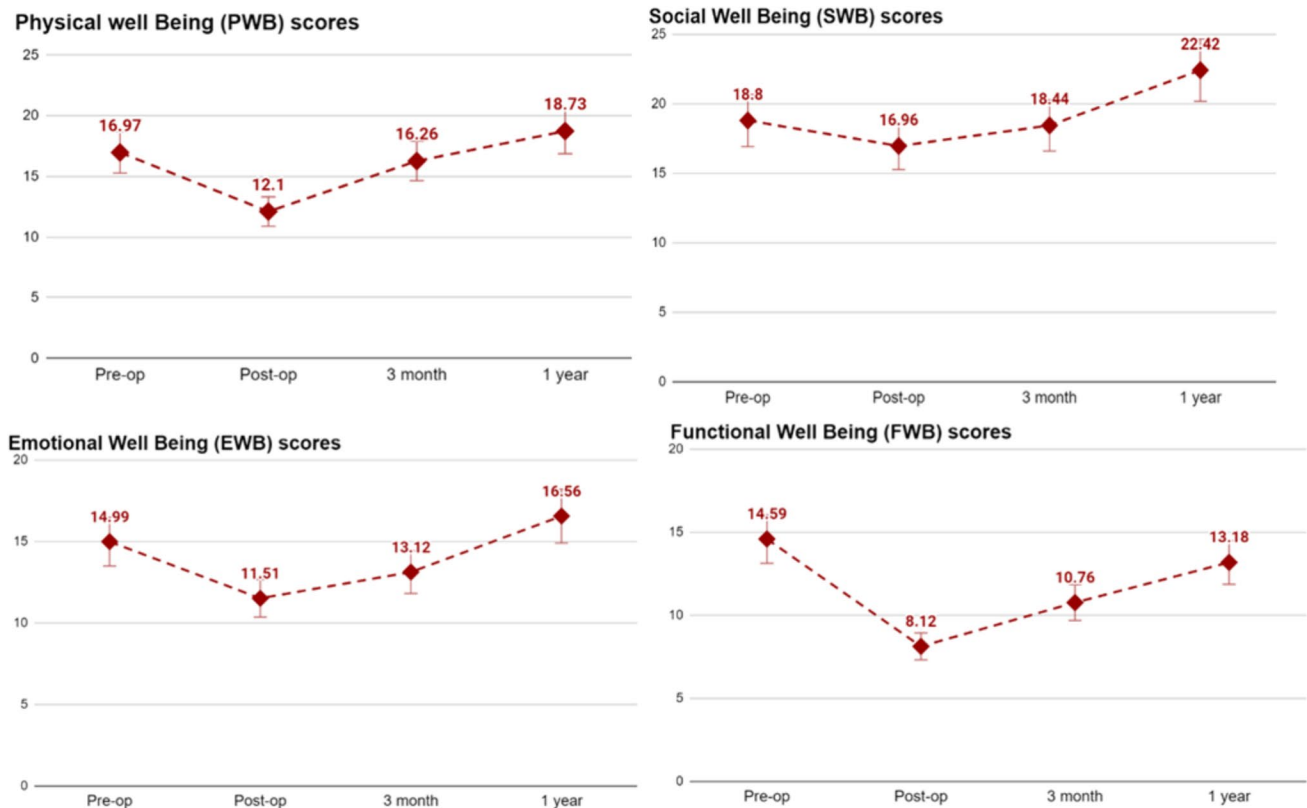


Fig. 3 Trends of QOL in each domain

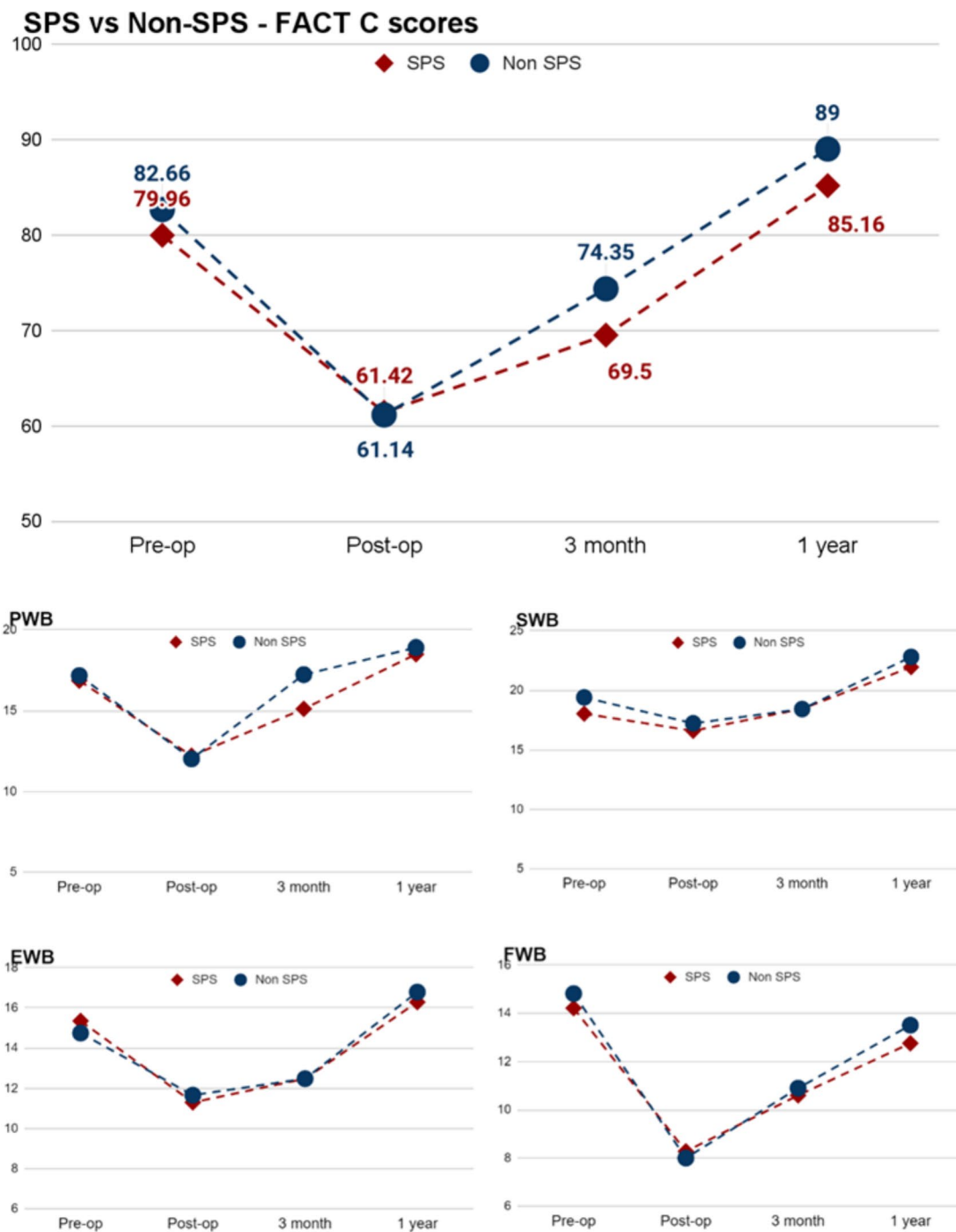


Fig. 4 QOL scores—SPS versus non-SPS

gradually recover in the postoperative period to reach values better than the preoperative values at the end of 1 year. QOL scores were found to recover faster in patients who underwent APR compared to those who had SPS. Though, at the end of 1 year, there was no significant difference between the QOL scores of patients who underwent SPS and non-SPS (APR). Presence of a diverting stoma following SPS at the end of 1 year was found to adversely affect the QOL

recovery in these patients. This finding underscores the significance of carefully selecting patients for a sphincter-preserving surgery (SPS). Patients with increased risks of sphincter function loss as in very low tumors with sphincter involvement, patients at risk of low anterior resection (LAR) syndrome and similar factors may experience an enhanced quality of life through abdominoperineal resection (APR) than compared to SPS.

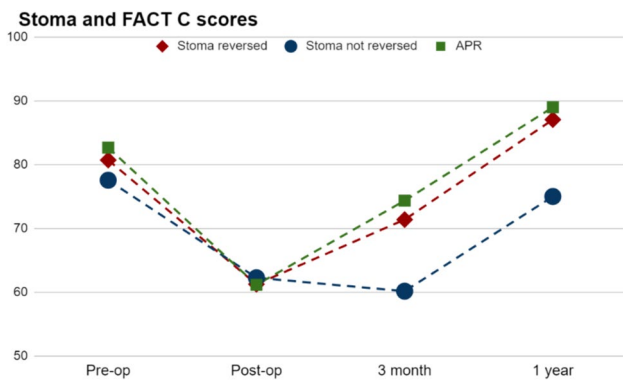


Fig. 5 QOL score comparison of patients who underwent stoma reversal after SPS, who did not undergo stoma reversal and APR patients

Only a few studies have directly compared SPS with APR and they have shown varied results [13]. In previous prospective studies exploring QOL scores in patients undergoing rectal cancer surgery, individuals who underwent APR exhibited consistently poor QOL scores due to the presence of a stoma impacting their daily activities. A prospective study by Engel et al. [14] in 2003

using EORTC QLQ-30 and CR38 questionnaires evaluating 329 patients showed anterior resection patients, despite suffering micturition and defecation problems, had better quality of life scores than APR patients. The study showed APR patients' QOL scores did not improve over time and stoma patients had significantly worse quality of life scores than non-stoma patients. QOL improved greatly for patients whose stoma was reversed. Du et al. [15] also showed QOL was better in patients with reconstruction of the anus in situ compared to those who APR patients had a lower QOL.

However, recently, few other studies done by Wani et al. [16], Trenti et al. [17], Konanz et al. [18] Arraras et al. [19], and Bong et al. [20] showed no significant differences between QOL scores of patients undergoing APR and SPS. Wani et al. [16] in 2017 prospectively assessed for quality of life following low anterior resection (LAR) and abdominoperineal resection (APR), operated for low rectal tumors at a high-volume center in northern India using the European Organization for Cancer QLQ-30 and CR29 questionnaires and observed no significant difference in the functional or symptom score between the study groups. This is consistent with our study. This study also showed that symptoms of nausea and vomiting were reported significantly more by the low anterior resection

Table 3 *t*-test analysis of determinants of QOL

Factors	<i>N</i>	Preop FACT-C	<i>p</i> value	1-month FACT-C	<i>p</i> value	3-month FACT-C	<i>p</i> value	1-year FACT-C	<i>p</i> value
Age									
< 60 years	57	80.88	0.71	60.80	0.57	74.80	0.04	90.86	0.01
> 60 years	45	82.16		61.86		68.49		82.42	
Sex									
Male	49	85.06	0.14	64.54	0.18	70.49	0.34	85.43	0.32
Female	53	78.09		58.18		73.56		88.93	
Location of tumor									
Upper 2/3rd rectum	37	80.71	0.62	61.23	0.71	73.09	0.64	88.64	0.52
Lower 1/3rd rectum	65	77.55		62.25		71.50		86.42	
Neoadjuvant therapy									
Yes	97	78.36	0.44	60.36	0.52	71.93	0.73	87.2	0.99
No	5	81.84		62.87		76.00		87.25	
Stoma									
Temporary	46	79.93	0.35	61.42	0.84	69.50	0.13	85.16	0.26
Permanent	56	82.66		61.14		74.35		89.00	
Surgical approach									
Lap	34	81.10	0.87	56.60	0.09	71.53	0.63	86.8	0.73
Open	68	82.10		64.36		73.12		88.10	
Adjuvant therapy									
Yes	81					70.50	0.05	85.79	0.08
No	21					78.21		92.47	
Stoma reversal after SPS									
Yes	35					71.37	0.06	87.06	0.04
No	11					60.14		75.00	

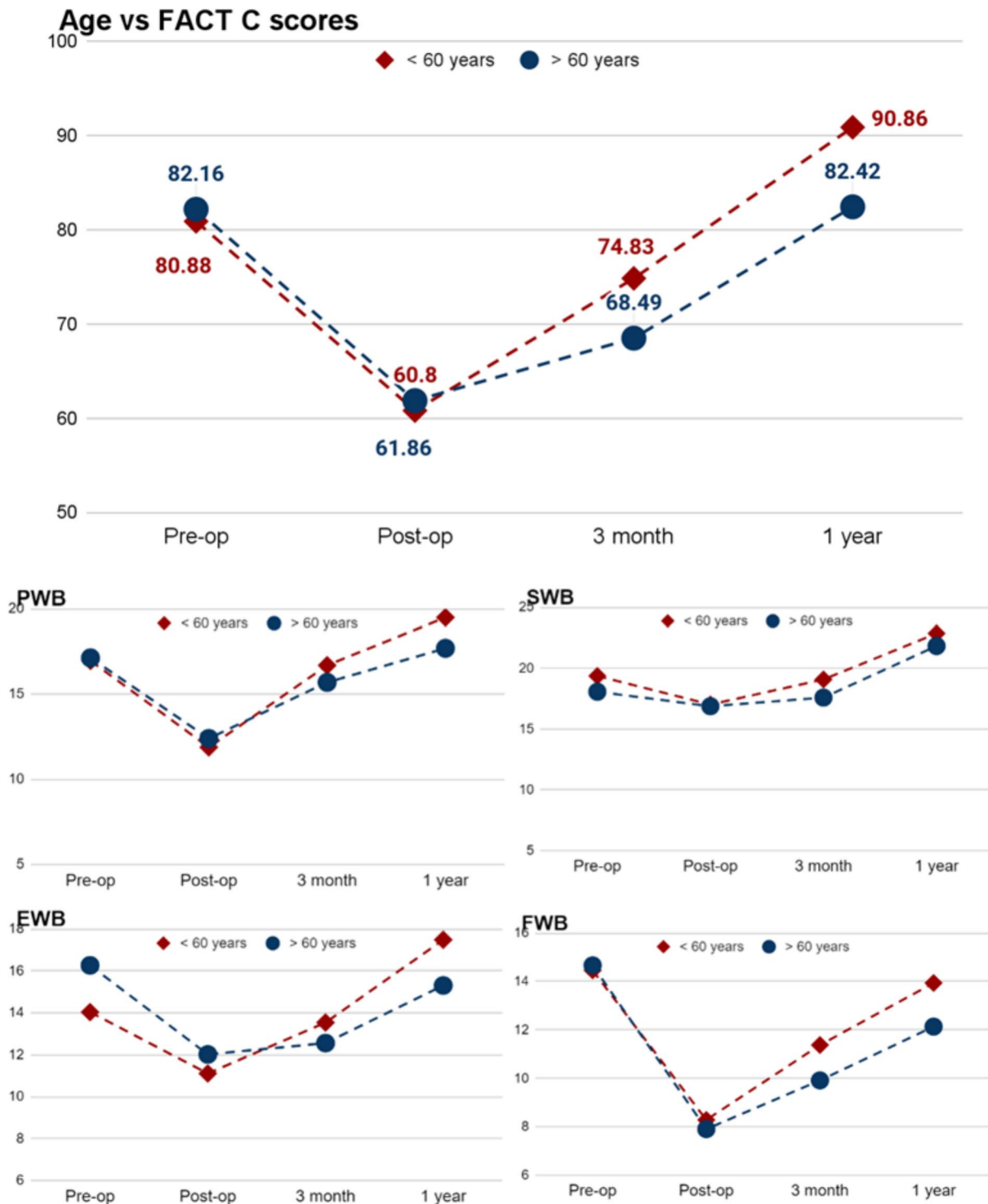


Fig. 6 Age and QOL FACT -C score association

(LAR) group patients than the APR group. APR patients had significantly higher scores with regard to urinary frequency, abdominal pain, and embarrassment than LAR patients. Trenti et al. [17] in a prospective study used QLQ-C30/CR29 questionnaires and LARS scores to study QoL

and defecatory dysfunction in APR and SPS (divided into colorectal anastomosis group and coloanal anastomosis group) patients. The global QoL score was similar among APR and SPS groups. Patients' body image perception was significantly worse after APR than after SPS. LARS score

was better in the colorectal anastomosis group compared to coloanal anastomosis group. Bong et al. [20] compared recovery of nutritional and anthropometric parameters after surgery that might indirectly reflect the QOL in patients undergoing APR and ultra low AR (uLAR) and showed that these parameters were more stable after APR than after uLAR. These parameters in the APR group recovered to the preoperative level within 3 months of discharge; however, that in the uLAR group was recovered after 1 year of discharge. This recovery pattern resembles the pattern of recovery of QOL in our study population. Arraras et al. [19] also used EORTC QLQ-C30 and the QLQ-CR29 questionnaires to evaluate QOL of patients who underwent rectal cancer surgery at a single time point at least 1 year after completion of their treatment. They found that LAR patients had a higher stool frequency than those with APR and no differences in body image were found among LAR and APR patients. Few other prospective studies have shown a worse QOL among patients undergoing SPS compared to APR. A study was conducted by Feddern et al. [21] using EORTC QLQ-C30 and a single question on the impact of bowel/stoma function in 898 patients between 2001 and 2007. It showed similar outcomes for EORTC QLQ30 while LAR patients had significantly higher negative impact of bowel function on QOL in both univariate and multivariate analysis compared with APR.

In line with these studies, our study also revealed that APR patients had QOL scores comparable to those who underwent sphincter preservation surgery and QOL recovery can be faster in patients who underwent APR compared to SPS. This discrepancy in findings may be attributed to SPS patients having a diversion stoma, which could influence their QOL scores in the postoperative period due to various complications like high stoma output, peristomal dermatitis, dehydration, nutrition deficiencies, and electrolyte imbalances. At the conclusion of 1 year, a total of 11 out of 46 patients who underwent SPS in our study still await their stoma reversal procedure. This circumstance could potentially be a factor contributing to the overall lower quality of life scores observed within the SPS patient cohort. In another study conducted in the institution, a considerable 63% of patients who underwent SPS displayed a severe LAR score, and the distance from the anal verge was identified as a significant contributing factor to the onset of LAR syndrome. It also showed patients with elevated LAR scores to exhibit lower QOL scores. This might have contributed to the slower recovery of QOL scores among patients who underwent SPS in our study. To draw a definitive conclusion about the impact of a permanent stoma on QOL, further evaluation of QOL scores over extended periods may be necessary.

As anticipated, our study demonstrated a decline in QOL scores across all domains following surgery, with the most substantial reduction observed in the physical and functional well being scores. Young subjects (less than 60 years) were found to recover QOL faster compared to old patients and female patients exhibited better QOL score recovery in all domains compared to males. Conversely, factors such as tumor location, stage of the disease, type of neoadjuvant therapy, and the requirement for adjuvant therapy did not significantly influence QOL scores. Furthermore, the laparoscopic approach did not demonstrate any notable beneficial effect on patients' QOL following surgery. Slower recovery of QOL scores in patients who underwent SPS having a persistent diverting stoma at the end of 1 year is a new finding in our study that signifies the importance of patient selection for SPS.

Conclusion

Our study highlights the profound impact of surgical interventions on the quality of life (QOL) of patients undergoing treatment for rectal cancer. Notably, while QOL scores exhibited a significant decline immediately postoperatively, they gradually improved over time, with most domains surpassing preoperative levels by the end of 1 year. Importantly, patients who underwent sphincter-preserving surgery (SPS) showed a slower QOL recovery compared to those undergoing abdominoperineal resection (APR), particularly when the reversal of a diverting stoma was delayed. This underscores the necessity of careful patient selection for SPS procedures. Our findings align with previous studies demonstrating comparable QOL outcomes between APR and SPS patients, with SPS patients experiencing challenges related to diversion stoma management and LAR syndrome. Furthermore, younger age was associated with a faster QOL recovery, while gender and surgical approach did not significantly influence outcomes. These insights contribute to a better understanding of postoperative QOL dynamics in rectal cancer patients and emphasize the importance of tailored treatment strategies to optimize patient satisfaction and well-being. Further investigation into the long-term effects of stoma presence on QOL is warranted to refine treatment decision-making and enhance patient care.

Declarations

Conflict of Interest The authors declare no competing interests.

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