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The Effect of Postoperative Early Mobilization on the Healing Process and Quality of Life Following Radical Cystectomy and Ileal Conduit: A Randomized Prospective Controlled Trial

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What's known on the subject? and What does the study add?

Early and organized mobilization after surgery is in the context of enhanced recovery after surgery interventions. However, there is no clear data about the time of early mobilization. This mobilization procedure can be performed safely. Early mobilization could be safely performed in the patients who underwent radical cystectomy and ileal diversion in accordance with following the standard procedure and it, which has positively contributed to the healing process and improved their quality of life.

Abstract

Objective: This study aimed to evaluate the effect of postoperative early mobilization in patients who underwent radical cystectomy (RC) and ileal conduit in terms of the healing process and quality of life (QoL).

Materials and Methods: This multicenter prospective randomized controlled study included 40 patients who were randomly divided into two groups. The intervention group was mobilized within the first 16 h postoperatively following the mobilization procedure, which was determined according to the literature. Data were collected using the case report form, hospital anxiety and depression scale, and 36-Item Short Form Survey (SF-36) QoL scale.

Results: Postoperative hospitalization, narcotic analgesic administration duration, first oral food intake, flatus, defecation, and nasogastric tube termination time were shorter in the intervention group. Additionally, blood glucose and pulse values were higher in the control group after mobilization. SF-36 physical function, physical role difficulty, and general perception of health subscales were higher in the intervention group at the postoperative first and third months ($p<0.05$).

Conclusion: Early mobilization positively contributed to the healing process and improved the QoL in patients who underwent RC and ileal conduit surgery.

Keywords: Early mobilization, radical cystectomy, ileal conduit, quality of life

Introduction

Radical cystectomy (RC) is considered a standard treatment option for invasive and high-risk recurrent non-invasive bladder cancer (1). RC is one of the most traumatic cancer surgeries in terms of psychological stress and lifestyle change (2).

Today, interest is growing in quality of life (QoL) studies that evaluated the symptomatic effects of oncological surgical modalities considering the patients' subjective statements (1). Negative changes are observed regarding urinary, rectal, and sexual functions and in the perception of body image in patients undergoing RC and urinary diversion (3). Minimizing the loss

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of function as a result of surgical intervention is possible with evidence-based treatments (4).

Most of the enhanced recovery after surgery (ERAS) protocols are physiologically based on preoperative, operative, and postoperative procedures that can be adapted to a specific problem (5). Early and organized mobilization after surgery is in the context of ERAS interventions (6). Nowadays, ERAS is still limited in clinical practice despite the evidence of its efficacy in patients who underwent RC and urinary diversion (7,8). In their meta-analysis, Cerantola et al. (9) revealed that the evidence of the effectiveness of many ERAS components on RC treatment is insufficient. Early mobilization has been provided for patients who received RC treatment; however, standard mobilization procedure was not defined in the ERAS protocol studies (10,11). To our knowledge, our study is the first prospective randomized controlled study that evaluated the effect of early mobilization on clinical outcomes and QoL in patients who underwent RC and urinary diversion. This study aimed to investigate the effects of early mobilization on the postoperative healing process and QoL in patients who underwent RC and ileal conduit surgery due to bladder cancer. This study highlights the need to increase the healthcare professionals' awareness of the importance of ERAS protocol and ERAS components on the healing process of patients who received RC and ileal loop.

Materials and Methods

Design

A prospective randomized controlled study.

Research Model

This study was conducted between March 2015 and April 2017 as multicenter research within the body of the Urooncology Association at an educational research hospital and two university hospitals serving in the Aegean region of Turkey. The sampling was determined following the study conducted by Porserud et al. (10), which was conducted with two groups consisting of 20 individuals by block randomization. The sample size of the study was determined by power analysis following Porserud et al. (10). According to the power analysis results, 40 patients were included in the study and were divided into two groups of 20 patients by block randomization, as intervention and control groups. Patients who were hospitalized to receive RC and ileal loop treatments were included in the study; the individuals were aged 50-75 years, literate, and open to communicate and cooperate, without sensory loss or comorbidity that could hinder mobilization and history of radiotherapy and chemotherapy and were in American Society of Anesthesiologists I-II risk groups, and did not have any mental and psychiatric disorders. Those who signed the informed consent form were included in the study. During the study, 2 patients could not be followed due to communication problems, 3 patients developed intolerance symptoms during mobilization, and 12 patients underwent additional surgical procedures; a total of 17 patients were excluded from the study. Patient recruitment went on until the number of sampling was reached. After exclusion of 17 patients, the study was ended when a total of 40 patients (intervention: 20, control group: 20) were reached.

Surgical Procedure

Surgical operations were performed by three surgeons, one in each center. A vertical midline incision that does not extend above the umbilicus was performed. The ileal conduit was preferred as the diversion technique and extended lymph node dissection was also performed. Apart from early mobilization, ERAS protocols, as applied in clinical practice, were performed in all study participants from all three centers (intervention and control groups) as follows: Preoperative counseling and training, preoperative medical optimization, oral mechanical bowel preparation, preoperative diet, epidural analgesia, antimicrobial prophylaxis, and skin preparation, standard anesthesia protocol, preoperative liquid diet 8 h before surgery, urinary drainage, and postoperative multimodal analgesia practices (patient-controlled analgesia was not performed in postoperative pain control). No postoperative complications were observed that might necessitate the patients to have an additional operation, as well as surgical mortality.

Mobilization Procedure

The patients were mobilized following the assessment of their suitability for mobilization as shown in Figure 1. Analgesic treatments were applied before the mobilization as prescribed by clinicians. The patients were mobilized under the supervision of researchers in accordance with the mobilization procedure in Figure 2. The exact definition of "early mobilization" in terms of the period after RC with ileal diversion is not reported in the literature. Therefore, the most appropriate time for mobilization was determined as the beginning of the next workday (on the first day after surgery), considering the factors, such as the time and length of operation, and the fact that the postoperative process coincided with the time of shift change, and the number of health personnel working in the clinic at night shift sufficient for safe mobilization. This period included the first 16 h after surgery assuming a normal operating procedure, and the period after 17 h was considered as late mobilization. Patients in the intervention group were mobilized within the 16 h postoperatively, whereas the mobilization of the control group was carried out after 17 h postoperatively.

Data Collection Method

The case report form (CRF) and hospital anxiety and depression scale (HADS) were completed by the researchers using the face-to-face interview method and the 36-Item Short Form Survey (SF-36) QoL scale was filled by patients 1 day before surgery. Vital signs and peripheral blood glucose levels of patients before and after mobilization were recorded. HADS and SF-36 scales were applied after mobilization at the first and third months after surgery.

Data Collection Tools

CRF: This form consists of 14 questions that are related to sociodemographic and clinical features of patients, information about the operation process and postoperative healing process, and data on the patient's vital signs before and after mobilization.

HADS: The validity and reliability of the Turkish version of the HADS scale were developed in 1983 and tested by Aydemir et al. (12). The scale is used to measure the level and severity of anxiety and depression and determine the risk of anxiety and depression. There are, in total, 14 questions on the 4-point Likert scale; the odd numbers measure anxiety and the even numbers measure depression. The cut-off point of the scale is considered as 10/11 for the anxiety subscale and 7/8 for the depression subscale; those having higher scores are considered at risk.

SF-36 Quality of Life Scale: The SF-36 scale consists of 36 items and eight dimensions as follows: physical function, social functioning, role limitations due to physical problems, role

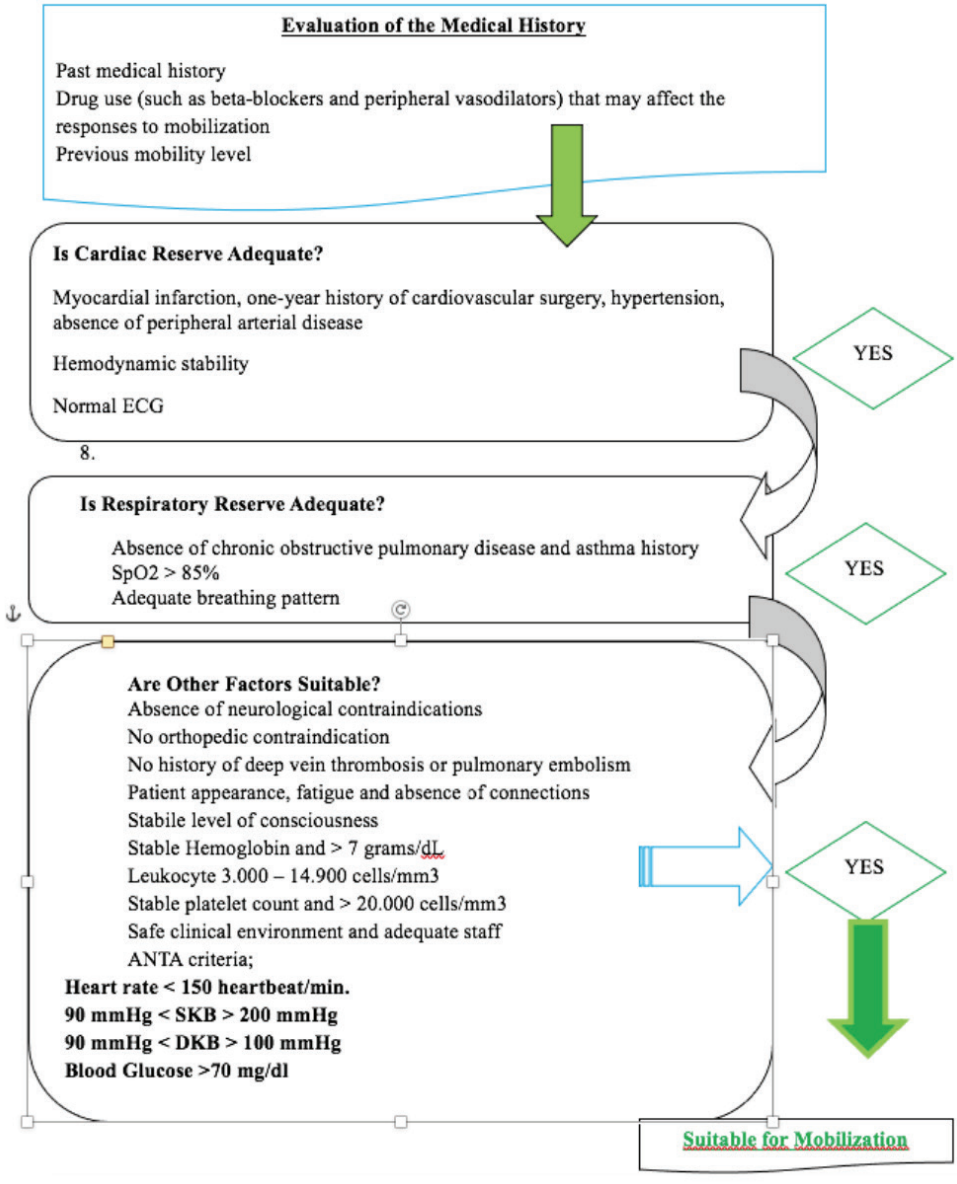

Figure 1. Mobilization suitability assessment guide

limitations due to emotional problems, mental health, energy/vitality, pain, and general perception of health. Zero-point from the subdimensions represent the worst health status, whereas 100 points show the best health status. Turkish validity and reliability test of The SF-36 scale was made by Kocyigit et al. (13).

Ethical Considerations

Written permission was obtained from the research centers before the research. The local ethics committee approval was obtained (İzmir Tepecik Training and Research Hospital, approval number: 14/2, date: 30.10.2014). Written and verbal informed consent of patients was also obtained using an informed volunteer consent form.

Statistical Analysis

The Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) package program was used to evaluate the research data. The Shapiro-Wilk test was used to determine the normally distributed data. The descriptive statistics, Student t-test, and Mann-Whitney U test were used to analyze the data. The accepted level of significance was considered as $p<0.05$.

Results

The mean age of the patients was 64.8±10.3 [minimum-maximum (min-max): 48.0-80.0) years in the intervention group and 65.8±7.2 (min-max: 52-80] years in the control group. No significant difference was found between the groups in terms of sociodemographic characteristics, such as age, gender, smoking, and chronic disease ($p>0.05$). Previous surgical history was present in 75% (n=15) of the intervention group, whereas 40% (n=8) of the control group ($p=0.027$). Postoperative complications were recorded according to the Clavien-Dindo classification system and were similar in frequency and incidence between the two groups. Complications, which were seen in both group participants, were limited to requiring medical interventions, such as antiemetics, analgesics, or antibiotics, according to the Clavien-Dindo classification system (Table 1).

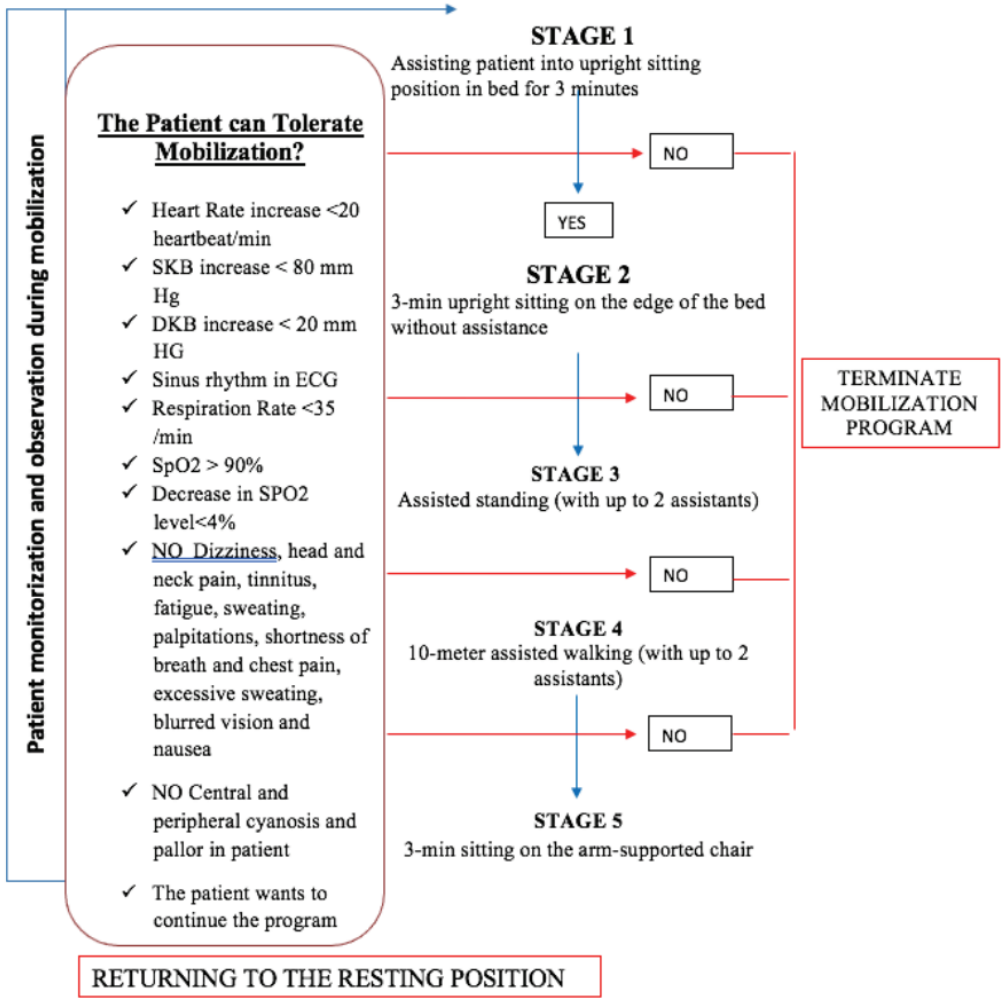

Figure 2. Mobilization application procedure

The mean length of total hospital stay was 15.6±3.9 (min-max: 10.0-25.0) days and 19.7±5.9 (min-max: 10.0-31.0) days in the intervention and control groups, respectively (p=0.013). The mean duration of postoperative narcotic analgesic administration time was 4.3±3.8 (min-max: 1.0-18.0) days in the intervention group, which was shorter than in the control group with statistically significant difference (p=0.026). The mean first oral food intake, flatus, defecation, and nasogastric (NG) tube termination times in group 2 were 3.2±1.1 (min: 1.0-max: 6.0) days, 3.4±1.4 (min: 2.0-max: 6.0) days, 4.4±1.5 (min: 3.0-max: 8.0) days, and 2.7±1.3 (min: 1.0-max: 5.0) days, respectively, which were earlier than the control group with statistically significant difference (p=0.026, p=0.013, p=0.023, and p=0.013). In the intervention group, the mean mobilization time in the first 24 h after surgery was 70.5±20.1 (min: 40.0-max: 105.0) min, with statistically significant difference (p<0.01) (Table 2).

The mean pulse rate after mobilization was 101.3±15.3 (min: 76.0-max: 137.0) min in the control group and the mean value of SPO2 without oxygen support was 96.1%±2.3% (min-max: 92.0-100.0) in the intervention group, which were statistically significantly higher (p=0.036 and p=0.001).The mean blood glucose value after mobilization was 109.8±24.3 (min: 90.0-max: 176.0) mg/dL in the intervention group and 139.3±41.7 (min: 92.0-max: 234.0) mg/dL in the control group, which was statistically significantly lower in the intervention group as shown in Table 3 (p=0.009).

No significant difference was found between the groups in terms of SF-36 quality of life and HADS scale scores preoperatively (p>0.05) (Table 4). The SF-36 subscale scores of physical function, physical role difficulty, and general perception of health were significantly higher in the intervention group in the first postoperative month (p=0.016, p=0.041, and p=0.001). The mean of SF-36 vitality, mental health, social functioning, and general perception of health subscale scores were statistically significantly higher in the third postoperative month (p<0.01, p<0.01, p=0.013, and p<0.01) (Table 5).

Discussion

ERAS protocols do not only increases patient satisfaction and QoL but also improve clinical outcomes (14). The results related to sociodemographic variables, such as age and gender participants, were consistent with the literature (7,15-18). Considering the effects of sociodemographic and clinical characteristics on QoL and postoperative healing process, homogeneity of the research sample is of importance to not affect the results biasedly.

Table 1. Sociodemographic characteristics

Variable		Intervention (n=20)		Control (n=20)		Test statistics		Variable		Intervention (n=20)		Control (n=20)		Test statistics	
		(n)	(%)	(n)	(%)	z	p			(n)	(%)	(n)	(%)	z	p
Age groups	18-65 years	9	45.0	11	55.0	-0.624	0.532[b]	Gender	Male	19	95.0	19	95.0	0.000	1.000[b]
	66-80 years	11	55.0	9	45.0				Female	1	5.0	1	5.0		
Marital status	Married	17	85.0	16	80.0	-0.411	0.681[b]	Previous any surgical experience	Yes	15	75.0	8	40.0	-2.211	0.027[b]
	Single	3	15.0	4	20.0				No	5	25.0	12	60.0		
Educational background	Literate	4	20.0	7	35.0	-0.452	0.651[b]	Preoperative training	Yes	11	55.0	10	50.0	-0.313	0.755[b]
	Primary education	9	45.0	6	30.0				No	9	45.0	10	50.0		
	High school	4	20.0	3	15.0			Postoperative complication	Yes	4	20.0	3	15.0	-0.411	0.681[b]
	Graduate and postgraduate	3	15.0	4	20.0				No	16	80.0	17	85.0		
Body mass index	Normal weight	9	45.0	6	30.0	-0.805	0.421[b]	Intensive care monitoring	Yes	4	20.0	7	35.0	-1.049	0.294[b]
	Overweight	6	30.0	6	40.0				No	16	80.0	13	65.0		
Smoking	Smokes	7	35.0	4	20.0	-1.049	0.294[b]			Intervention		Control (n=20)		Test statistics	
	Gave up	13	60.0	16	80.0										
HT	Yes	7	35.0	8	40.0	-0.322	0.747[b]			Mean ± SD (min-max)		Mean ± SD (min-max)		t	p
	No	13	65.0	12	60.0										
Diabetes	Yes	5	25.0	4	20.0	-0.374	0.708[b]	Age/Year		64.8±10.3 (48.0-80.0)		65.8±7.2 (52.0-80.0)		-0.375	0.710[a]
	No	15	75.0	16	80.0										

[a]: Student t-test, [b]: Mann-Whitney U test, SD: Standard deviation, Min: Minimum, Max: Maximum, HT: Hypertension

Preoperative anxiety, which negatively affects the QoL, is more common in patients with previous surgical experience (3). Patients' expectations for the healing process also affect the QoL (6,19). Our study revealed that the status of having previous surgical experience was higher in the intervention group; however, the expectations for recovery time, SF-36, and HADS scores were similar in both groups.

ERAS components have been reported to decrease the length of postoperative hospital stay (7,16,20). Similar to the literature, our study revealed a significantly shorter length of postoperative and total hospital stay in the intervention group. However, the total hospital stay in our study was longer than in the literature (7,17,20). In Turkey, government health payments cover the entire treatment process without being affected by the length of hospital stay. Therefore, most physicians prefer to follow the recovery process in the hospital. Additionally, as the sample of the study was 60 years or older, the anesthesia preparation process was conducted in the hospital. Therefore, preoperative hospital stay was higher in both groups compared to the literature (15,18,21). Early mobilization may play a significant role in decreasing postoperative and total hospital stays.

Djaladat et al. (5) revealed that the complication incidence decreased in parallel with the length of hospital stay in patients who underwent ERAS. Moreover, Rivas et al. (21) revealed that the length of hospital stay was shortened without the risk of postoperative complications. The current study revealed no significant difference between the groups in terms of complication incidence rate. ERAS components that are jointly applied in research groups are thought to cause similarities between the groups.

Table 2. Clinical features and data on the postoperative healing process

Variables	Intervention (n=20)	Control (n=20)	Test statistics	
	Mean ± SD (min-max)	Mean ± SD (min-max)	z	p
Length of operation/hour	5.6±1.7 (3.0-8.0)	6.4±1.8 (3.0-9.0)	-1.346	0.178[a]
Preoperative hospital stay/day	5.2±3.6 (2.0-16.0)	7.3±5.1 (1.0-18.0)	-1.906	0.057[a]
Postoperative hospital stay/day	10.4±2.8 (6.0-16.0)	12.4±3.3 (6.0-19.0)	-2.199	0.046[a]
Total hospital stay/day	15.6±3.9 (10.0-25.0)	19.7±5.9 (10.0-31.0)	-2.904	0.013[a]
History of bladder problems/month	11.4±10.6 (1.0-36.5)	9.3±8.7 (2.0-36.5)	-0.628	0.530[a]
Intensive care monitoring period/day	0.7±1.7 (0.0-7.0)	0.7±1.1 (0.0-4.0)	-0.793	0.428[a]
Narcotic analgesic administration/day	4.3±3.8 (1.0-18.0)	5.6±2.5 (1.0-11.0)	-2.221	0.026[a]
Parenteral nutrition/hour	72.8±25.6 (28.0-120.0)	90.5±41.0 (48.0-168.0)	-1.040	0.298[a]
Oral food intake/day	3.2±1.1 (1.0-6.0)	4.3±1.7 (2.0-7.0)	-2.292	0.026[a]
First flatus time/day	3.4±1.4 (2.0-6.0)	4.4±1.2 (2.0-7.0)	-2.495	0.013[a]
First defecation time/day	4.4±1.5 (3.0-8.0)	5.7±2.1 (2.0-8.0)	-2.276	0.023[a]
Nasogastric tube termination/day	2.7±1.3 (1.0-5.0)	4.2±2.0 (2.0-8.0)	-2.496	0.013[a]
Drain removal/day	9.6±2.8 (7.0-19.0)	9.8±3.7 (6.0-23.0)	-0.056	0.956[a]
First mobilization time/hour	13.1±3.2 (6.0-16.0)	26.4±6.3 (18.0-40.0)	-5.431	0.000[a]
Mobilization in the first 24 hours after surgery/times	5.9±2.3 (4.0-8.0)	1.0±1.4 (0.0-5.0)	-5.294	0.000[a]
Mobilization time in the first 24 hours after surgery/minutes	70.5±20.1 (40.0-105.0)	11.8±20.9 (0.0-90.0)	-5.039	0.000[a]

[a]: Mann-Whitney U test, SD: Standard deviation, Min: Minimum, Max: maximum

A study that examined the mobilization efficiency in the intensive care unit after organ transplantation revealed that the pulse rate was reduced to the normal limits after mobilization (22). Our study revealed that the pulse rate and blood glucose levels after mobilization were lower in the intervention group. Blood glucose levels may be higher in patients who remained inactive for a long time due to metabolic stress that may occur after the surgery. Our study revealed that the glucose levels of all patients were stable before the surgery. Blood glucose value is decreased in the intervention group due to the increased energy requirement of muscle tissue during mobilization, increased use of glucose, and increased insulin sensitivity along with mobilization. We believe that early mobilization can be effective in terms of early hyperglycemia control that is induced by metabolic stress and hepatic glucose metabolism regulation.

Mobilization is of great importance in terms of increasing muscle strength and function, decreasing the level of dependence, and providing cardiorespiratory healing and gravitational stimulation after major surgery without complication (2,3). Postoperative early mobilization was reported to increase oxygen transport and reduce the incidence of pulmonary complications (23). Our study revealed that the values of SPO_2 with and without oxygen support measured after mobilization were significantly higher in the intervention group in parallel with the literature and no early-stage pulmonary complications were observed in both groups.

Semerjian et al. (20) revealed that patients were mobilized at night after surgery and Persson et al. (11) and Arumainayagam et al. (24) revealed that patients were mobilized within the first 24 h (11,20,24). Guan et al. (16) revealed that patients were encouraged to get out of bed at least four times a day, 24 h after surgery (16). Dutton et al. (17) revealed that patients were sitting up on the bed in the first 48 h after surgery and the walking exercises were started after 48 h. Mukhtar et al. (18) revealed that patients were mobilized at least 6 h a day after the first mobilization. Retrospective (17,18,21,24) and prospective studies (7,8,15,20) on ERAS protocols in RC treatment were analyzed; early mobilization procedure was reported to be

Table 3. Vital signs and peripheral blood glucose values before and after mobilization

Parameter	Before/after mobilization	Intervention (n=20)	Control (n=20)	Test statistics	
		Mean ± SD (min-max)	Mean ± SD (min-max)	z/t	p
Systolic blood pressure/mmHg	Before	128.7±16.9 (90.0-152.0)	126.7±17.8 (95.0-160.0)	-0.298	0.766[a]
	After	117.7±15.12 (90.0-140.0)	120.6±22.6 (90.0-170.0)	-0.477	0.636[b]
Diastolic blood pressure/mmHg	Before	77.7±14.2 (40.0-94.0)	72.7±9.2 (60.0-91.0)	1.334	0.190[b]
	After	69.5±6.4 (58.0-80.0)	71.1±10.6 (50.0-97.0)	-0.577	0.568[b]
Pulse/min.	Before	85.9±12.6 (68.0-109.0)	83.5±16.0 (60.0-116.0)	0.515	0.609[b]
	After	92.0±11.5 (72.0-118.0)	101.3±15.3 (76.0-137.0)	-2.174	**0.036[b]**
Fever/°C	Before	36.6±0.3 (36.0-37.6)	36.6±0.4 (36.0-37.7)	-0.399	0.690[a]
	After	36.5±0.2 (36.2-36.8)	36.6±0.4 (36.2-37.6)	-0.302	0.763[a]
SPO_2/with O_2 support (%)	Before	97.1±1.8 (94.0-100.0)	96.8±1.6 (94.0-99.0)	-0.422	0.673[a]
	After	98.9±1.8 (92.0-100.0)	96.8±1.6 (94.0-99.0)	-4.005	**0.000[a]**
SPO_2/without O_2 support (%)	Before	92.6±2.9 (88.0-100.0)	92.6±2.7 (88.0-97.0)	-0.096	0.923[a]
	After	96.1±2.3 (92.0-100.0)	93.3±2.5 (89.0-98.0)	3.733	**0.001[b]**
Blood glucose (mg/dL)	Before	131.4±27.0 (107.0-212.0)	148.5±42.7 (98.0-248.0)	-1.382	0.167[a]
	After	109.8±24.3 (90.0-176.0)	139.3±41.7 (92.0-234.0)	-2.441	**0.015[a]**

[a]: Mann-Whitney U test [b]: Student t-test, SD: Standard deviation, Min: Minimum, Max: Maximum

applied; however, no information was given concerning the mobilization process in terms of its time, duration, and method. Our study revealed that patients in the intervention group were mobilized within the first 16 h following a standard mobilization procedure differently from the literature. Factors, such as the length of surgery and the presence of adequate medical staff for safe mobilization after surgery, were considered.

The literature reported that regaining regular intestinal functions took a shorter time in patients who underwent ERAS protocol (4,20). NG tube was reported to be removed in 2.0±0.3 days by Mukhtar et al. (18); on the first day after the surgery by Arumainayagam et al. (24); and immediately after the surgery by Saar et al. (15,18,24). The first defecation time in the literature was reported as 6.1±0.3/days by Mukhtar et al. (18) and 2.6±0.9/days by Saar et al. (15), Persson et al. (11) revealed that the time of the first bowel movement was 2 days earlier in the ERAS group (11). Moreover, Frees et al. (7) pointed out that the first defecation time was shorter in enterally fed patients. Our study revealed that the first defecation time was 4.4±1.5 days (intervention group), similar to the results of Frees et al. (7) and Mukhtar et al. (18) and it was 1.5 days shorter in the intervention group (5.7±2.1 days/control group) as in Persson et al. (11). Our findings suggest that early mobilization contributes to the early motility of bowel and NG tube removal.

Karl et al. (8) revealed that QoL was better on the third and seventh days after surgery in patients who underwent ERAS protocols. Porserud et al. (10) revealed that patients who were included in the exercise program had higher scores at functional capacity and physical area dimensions of QoL. Our study revealed that QoL was significantly better in the intervention group in terms of physical function, physical role difficulty, and general perception of health in the first month. In the third month after surgery, the scores of physical and emotional role difficulty, vitality, mental health, and general perception of health subdimensions were significantly better in the intervention group. RC treatment has a significant effect on QoL in patients who underwent RC in the early postoperative period. The disappearance of the difference that was observed in the physical function subdimension of QoL in the first month could be explained by the healing effect of the ERAS components jointly applied in both groups. Standardized ERAS protocols improve patient satisfaction and QoL in addition to improved clinical patient outcomes (6). Additionally, the inclusion of patients' relatives in the care planning will have positive effects on the healing process (25).

Rivas et al. (21) revealed that ERAS may have a positive effect on patients who underwent RC and only with multidisciplinary teamwork. Our multicenter study revealed that great importance

Table 4. Preoperative SF-36 quality of life and HADS scale score distributions

Score distributions	Intervention (n=20)	Control (n=20)	Test statistics	
	Mean ± SD (min-max)	Mean ± SD (min-max)	t/z	p
SF-36 physical function	74.3±21.8 (25.0-100.0)	61.5±32.9 (0.0-100.0)	-0.992	0.321[b]
SF-36 physical role difficulty	35.0±38.4 (0.0-100.0)	22.5±38.0 (0.0-100.0)	-1.190	0.234[b]
SF-36 emotional role difficulty	31.7±43.9 (0.0-100.0)	40.0±42.7 (0.0-100.0)	-0.710	0.478[b]
SF-36 vitality	47.8±22.7 (5.0-80.0)	44.3±22.5 (10.0-80.0)	0.489	0.627[a]
SF-36 mental health	55.0±19.6 (20.0-92.0)	52.0±18.2 (20.0-88.0)	0.502	0.618[a]
SF-36 social functioning	60.0±25.8 (12.5-100.0)	42.5±26.8 (0.0-100.0)	1.502	0.141[a]
SF-36 pain	48.5±25.4 (10.0-100.0)	56.5±38.2 (0.0-100.0)	-0.746	0.445[b]
SF-36 general perception of health	57.8±15.9 (35.0-90.0)	46.8±21.9 (10.0-80.0)	1.816	0.777[a]
HADS-anxiety	19.9±2.9 (11.0-23.0)	20.3±2.4 (15.0-24.0)	-0.270	0.978[b]
HADS-depression	18.2±2.4 (15.0-24.0)	18.4±2.1 (14.0-22.0)	-0.285	0.777[a]
HADS-total	38.0±4.2 (27.0-46.0)	38.6±3.0 (33.0-45.0)	-0.552	0.605[a]

[a]: Student t-test, [b]: Mann-Whitney U test, SD: Standard deviation, Min: Minimum, Max: Maximum, HADS: Hospital anxiety and depression scale

Table 5. Postoperative SF-36 quality of life and HADS scale score distributions

Score distribution		Intervention	Control	Test statistics	
		Mean ± SD (min-max)	Mean ± SD (min-max)	z	p
First Month	SF-36 physical functioning	41.0±19.4 (15.0-70.0)	26.8±16.2 (0.0-55.0)	-2.409	**0.016**[a]
	SF-36 physical role difficulty	11.3±12.8 (0.0-25.0)	3.8±9.2 (0.0-25.0)	-2.044	**0.041**[a]
	SF-36 emotional role difficulty	31.7±39.7 (0.0-100.0)	13.3±22.7 (0.0-66.7)	-1.406	0.160[a]
	SF-36 vitality	32.5±21.2 (10.0-85.00)	23.8±22.4 (0.0-60.0)	-1.813	0.070[a]
	SF-36 mental health	53.4±20.4 (28.0-96.0)	41.6±17.8 (20.-68.0)	-1.820	0.069[a]
	SF-36 social functioning	21.3±12.2 (0.0-50.0)	15.0±12.6 (0.0-37.5)	-1.501	0.133[a]
	SF-36 pain	53.0±13.7 (32.5-62.5)	54.6±13.1 (32.5-77.5)	-0.260	0.795[a]
	SF-36 general perception of health	38.8±11.7 (20.8-60.6)	21.9±16.1 (1.0-46.0)	-3.243	**0.001**[a]
	HADS-anxiety	21.4±2.1 (16.0-23.0)	20.4±3.1 (14.0-24.0)	-0.575	0.565[a]
	HADS-depression	20.1±2.1 (17.0-24.0)	20.3±2.3 (18.0-24.0)	-0.151	0.880[a]
	HADS-total	41.4±2.9 (35.0-45.0)	40.7±2.6 (35.0-45.0)	-0.589	0.556[a]
Third Month	SF-36 physical functioning	74.3±15.9 (40.0-90.0)	66.0±16.0 (40.0-100.0)	-1.922	0.055[a]
	SF-36 physical role difficulty	70.1±31.0 (0.0-100.0)	42.5±28.2 (0.0-100.0)	-2.838	**0.005**[a]
	SF-36 emotional role difficulty	73.9±40.8 (0.0-100.0)	45.0±39.4 (0.0-100.0)	-2.765	**0.006**[a]
	SF-36 vitality	66.3±16.1 (20.0-85.0)	41.0±21.1 (5.0-70.0)	-3.931	**0.000**[a]
	SF-36 mental health	83.4±11.8 (40.0-100.0)	60.8±20.5 (36.0-92.0)	-3.699	**0.000**[a]
	SF-36 social functioning	65.0±20.5 (12.5-87.5)	48.8±18.1 (25.0-87.5)	-2.486	**0.013**[a]
	SF-36 pain	49.3±2.4 (40.0-50.0)	53.6±9.7 (45.0-77.5)	-1.633	0.112[a]
	SF-36 general perception of health	64.3±15.5 (20.0-80.0)	38.0±15.9 (20.0-80.0)	-4.073	**0.000**[a]
	HADS-anxiety	22.3±1.7 (17.0-25.0)	20.6±2.9 (15.0-25.0)	-1.588	0.112[a]
	HADS-depression	18.0±1.8 (14.0-23.0)	18.0±1.4 (16.0-23.0)	-0.086	0.932[a]
	HADS-total	40.3±2.4 (34.0-46.0)	38.6±3.4 (33.0-45.0)	-1.282	0.200[a]

[a]: Mann-Whitney U test, SD: Standard deviation, Min: Minimum, Max: Maximum, HADS: Hospital anxiety and depression scale

was attached to the multidisciplinary teamwork for the surgeons who perform the surgery and the nurses responsible for clinical care to cooperate with the dieticians, physiotherapists, and all other health professionals.

Study Limitations

The limited number of patients for 3 years due to patients who had to be excluded from the study can be considered as the limitation of the current study. Additionally, the intervention

group was encouraged for early mobilization by the research team, which created a sense of exclusiveness and worthiness in the patients and their relatives, thus they were more actively involved in the process. More frequent communication with the researcher upon the request of the patients in the intervention group might have positively affected the responses to the surveys in the long run.

Conclusion

Early mobilization could be safely performed in patients who underwent RC and ileal diversion following the standard procedure, which has positively contributed to the healing process and improved their QoL.

Standardized ERAS protocols are needed to provide optimal supportive care in patients who underwent RC. More multicenter prospective randomized controlled studies with larger samplings are needed to evaluate different components of ERAS protocol in different countries.

Ethics

Ethics Committee Approval: The local ethics committee approval was obtained (İzmir Tepecik Training and Research Hospital, approval number: 14/2, date: 30.10.2014).

Informed Consent: Those who signed the informed consent form were included in the study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Ö.Ç., T.M., G.A., Concept: S.V., Ö.Ç., T.M., G.A., H.B., Design: S.V., Ö.Ç., T.M., G.A., H.B., Data Collection or Processing: S.V., Ö.Ç., T.M., G.A., Analysis or Interpretation: S.V., Ö.Ç., H.B., Literature Search: S.V., Ö.Ç., T.M., G.A., H.B., Writing: S.V., Ö.Ç., T.M., G.A., H.B.

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